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Google Slides Lessons Preview





Alberta Math Curriculum Patterns & Relations – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

LEARNING GOAL

We are learning to analyze and describe increasing patterns using addition and multiplication to understand how numbers grow, change, and relate to each other.

Increasing Patterns Rules- Multiplication

Write in the boxes to continue the increasing patterns according to the pattern rule.

| # | PATTERN | RULE |
|----|---------|---|
| 1) | | Start at 3, then multiply by 8 each time |
| 2) | | Start at 8, then multiply by 4 each time |
| 3) | | Start at 20, then multiply by 6 each time |
| 4) | | Start at 42, then multiply by 2 each time |
| 5) | | Start at 50, then multiply by 5 each time |

Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Exit Cards - Increasing Patterns

✓ Decide if the statements below are True or False. ✗

| | |
|--|--|
| Pattern: 1, 2, 4, 8, 16, _____ | Pattern Rule: Start at 147.53, add 1.08 each time. |
| Pattern Rule: Start at 1, multiply by 2 each time. | Next numbers: 148.61, 149.69, 150.77 |
| True/False Statements: | True/False Statements: |
| a) The 6th number is 32. | a) The pattern will land on 155.09 |
| b) The pattern adds 2 each time. | b) The 5th number is 152.85. |
| c) The 7th number is 64. | c) The pattern multiplies by 108 each time. |



Alberta Math Curriculum Patterns & Relations – Grade 8

Decreasing Decimal Pattern Rules - Hundredths

Fill in the blanks to complete the decreasing patterns below.

| | | | | | | | | |
|----|--------|--------|--------|-------|-------|-------|-------|-------|
| 1) | 8.61 | 8.57 | 8.53 | 8.49 | _____ | _____ | _____ | _____ |
| 2) | 89.43 | 89.30 | 89.17 | _____ | _____ | _____ | _____ | _____ |
| 3) | 164.78 | 163.53 | 162.28 | _____ | _____ | _____ | _____ | _____ |
| 4) | 503.04 | 497.70 | 492.36 | _____ | _____ | _____ | _____ | _____ |

Complete the tables below.

| | Out |
|-----|-----|
| 156 | |
| 289 | |
| 430 | |
| 621 | |
| 808 | |

| RULE = Subtract 8 | |
|-------------------|-----|
| In | Out |
| 183 | |
| 264 | |
| 385 | |
| 529 | |
| 717 | |

| RULE = Multiply 7 | |
|-------------------|-----|
| In | Out |
| 7 | |
| 9 | |
| 13 | |
| 19 | |
| 26 | |

| RULE = Divide 4 | |
|-----------------|-----|
| In | Out |
| 52 | |
| 88 | |
| 96 | |
| 124 | |
| 288 | |

Increasing

How many blocks are in each term? Sketch the next term.

| | | | | | | | |
|------------------|---|---|---|---|---|----|----|
| Figure Number | 1 | 2 | 3 | 4 | 5 | 25 | 35 |
| Number of Blocks | | | | | | | |

1) Describe the recursive pattern.

2) What is the functional relationship between the variables?
(Write the expression)

3) How many blocks will the 112th term have?



Alberta Math Curriculum Patterns & Relations – Grade 8

Two-Variable Linear Relationships

Fill in the tables and answer the questions.

1) At a skate rental kiosk, you pay a fixed fee for the helmet, then more money for every hour you skate.

| | | | | | | |
|-----------|--------|-----|------|------|------|------|
| Hours (x) | 0 | 1 | 2 | 3 | 4 | 5 |
| Cost (y) | \$4.00 | \$9 | \$14 | \$19 | \$24 | \$29 |

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much does the helmet fee cost?

c) How much would 12 hours of skating cost?

Adding and Subtracting

Use the flow chart to find the value of the variable.

| | | | |
|-----------------|---|------------------|---|
| 1) $a - 8 = 12$ | <pre> a → -8 → 12 ↑ □ ← -8 ← 12 </pre> | 5) $e - 6 = 42$ | <pre> e → -6 → 42 ↑ □ ← +6 ← 42 </pre> |
| 2) $b + 5 = 17$ | <pre> b → +5 → 17 ↑ □ ← -5 ← 17 </pre> | 6) $f + 18 = 66$ | <pre> f → +18 → 66 ↑ □ ← -18 ← 66 </pre> |
| 3) $c - 9 = 25$ | <pre> c → -9 → 25 ↑ □ ← +9 ← 25 </pre> | 7) $g - 21 = 73$ | <pre> g → -21 → 73 ↑ □ ← +21 ← 73 </pre> |
| 4) $d + 4 = 37$ | <pre> d → +4 → 37 ↑ □ ← -4 ← 37 </pre> | 8) $h + 36 = 95$ | <pre> h → +36 → 95 ↑ □ ← -36 ← 95 </pre> |

1) Linear / Non-Linear

2) Linear / Non-Linear



Workbook Preview



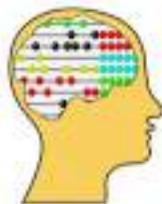
Grade 8
PATTERNS AND RELATIONS

Patterns

| | Curriculum Expectations | Pages That Cover the Expectations |
|-------------|--|-----------------------------------|
| PR.1 | Graph and analyze two-variable linear relations. | 5-71 |
| TQ | | |

**Preview of 125 pages from
this product that contains
330 pages total.**

Increasing Addition Patterns



Growing/Increasing Patterns

$$\begin{array}{cccccc}
 +10 & +10 & +10 & +10 & +10 & \\
 \wedge & \wedge & \wedge & \wedge & \wedge & \\
 10, & 20, & 30, & 40, & 50, & 60
 \end{array}$$

$$\begin{array}{cccccc}
 +5 & +5 & +5 & +5 & +5 & \\
 \wedge & \wedge & \wedge & \wedge & \wedge & \\
 3, & 8, & 13, & 18, & 23, & 28
 \end{array}$$



Part 1

Increasing Patterns - Addition

| | |
|--|---|
| 1) 15, 27, _____, _____ | 2) 71, 75, 79, _____, _____, _____ |
| 3) 121, 129, 137, _____ | 4) 251, 263, 275, _____, _____, _____ |
| 5) 317, 326, 335, _____, _____ | 6) 468, 479, _____, _____, _____ |
| 7) 602, 622, 642, _____, _____, _____ | 8) 77, 88, 99, _____, _____, _____ |
| 9) 853, 865, 877, _____, _____, _____ | 10) 907, 918, 929, _____, _____, _____ |

Part 2

Challenging addition patterns - fill in the blanks below

| | | | | | | | | | | |
|----|-----|-----|-----|-----|-----|--|--|--|--|--|
| 1) | 1 | 2 | 4 | 7 | 11 | | | | | |
| 2) | 4 | 7 | 11 | 16 | 22 | | | | | |
| 3) | 12 | 18 | 26 | 36 | 48 | | | | | |
| 4) | 100 | 150 | 250 | 400 | 600 | | | | | |
| 5) | 70 | 170 | 280 | 400 | 530 | | | | | |

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Continuing the increasing patterns.

1) 147.53, 148.61, 149.69, _____
_____2) 310.20, 315.30, 320.40, _____
_____3) 450.50, 453.53, 456.56, _____

Name: _____

Continuing the increasing patterns.

1) 147.53, 148.61, 149.69, _____
_____2) 310.20, 315.30, 320.40, _____
_____3) 450.50, 453.53, 456.56, _____

Name: _____

Continuing the increasing patterns.

1) 147.53, 148.61, 149.69, _____
_____2) 310.20, 315.30, 320.40, _____
_____3) 450.50, 453.53, 456.56, _____

Name: _____

Continuing the increasing patterns.

1) 147.53, 148.61, 149.69, _____
_____2) 310.20, 315.30, 320.40, _____
_____3) 450.50, 453.53, 456.56, _____

Decreasing Subtraction Patterns

Part 1

Decreasing Patterns - Fill in the blanks

1) 39, 35, 31, _____, _____, _____, _____, _____

Pattern Rule: _____

2) 74, 69, _____, _____, _____, _____, _____

Pattern Rule: _____

3) 140, 134, 127, _____, _____, _____, _____, _____

Pattern Rule: _____

4) 17.3, 16.8, 16.3, _____, _____, _____, _____

Pattern Rule: _____

5) 35.7, 35.1, 34.5, _____, _____, _____, _____

Pattern Rule: _____

Part 2

Fill in the boxes by continuing the decreasing pattern.

| | | | | | | | |
|----|-------|-------|-------|--|--|--|--|
| 1) | 9.21 | 9.18 | 9.15 | | | | |
| 2) | 13.84 | 13.71 | 13.58 | | | | |
| 3) | 15.55 | 15.35 | 15.15 | | | | |
| 4) | 22.97 | 22.82 | 22.67 | | | | |
| 5) | 27.70 | 27.62 | 27.54 | | | | |

Pattern Rule – Division

Part 1

Continue the decreasing patterns below

| # | Pattern | Rule ÷ ____ |
|----|-------------------------------------|-------------|
| 1) | 4096, 2048, 1024, 512, 256, 128, 64 | |
| 2) | 15625, 3125, 625, 125, 25, 5, 1 | |
| 3) | 872, 4374, 1458, 486, 162, 54 | |
| 4) | 39968, 9992, 2498, 648, 108, 18 | |
| 5) | 2726384, 681596, 170399, 56, 32 | |
| 6) | 26244, 8748, 2916, 972, 324 | |

Part 2

Write your own patterns in the box

1) _____, _____, _____, _____, _____

Pattern Rule: Start at 1024, divide by 2 each time

2) _____, _____, _____, _____, _____

Pattern Rule: Start at 1215, divide by 3 each time

3) _____, _____, _____, _____, _____

Pattern Rule: Start at 125 000, divide by 5 each time

4) _____, _____, _____, _____, _____

Pattern Rule: Start at 100 000 000, divide by 10 each time

Pattern Rule – Input/Output Tables

Instructions

Fill in the input/output tables below

| Rule: add 4 | |
|-------------|-----|
| In | Out |
| 112 | |
| 121 | |
| 143 | |

| Rule: add 7 | |
|-------------|-----|
| In | Out |
| 235 | |
| 251 | |
| 274 | |
| 295 | |

| Rule: add 12 | |
|--------------|-----|
| In | Out |
| 344 | |
| 361 | |
| 387 | |
| 408 | |

| Rule: subtract 5 | |
|------------------|-----|
| In | Out |
| 473 | |
| 486 | |
| 504 | |
| 527 | |

| Rule: subtract 11 | |
|-------------------|-----|
| In | Out |
| 574 | |
| 592 | |
| 608 | |
| 646 | |

| Rule: Subtract 9 | |
|------------------|-----|
| In | Out |
| 778 | |
| 791 | |
| 807 | |
| 832 | |

| Rule: multiply by 2 | |
|---------------------|-----|
| In | Out |
| 3 | |
| 12 | |
| 25 | |
| 41 | |

| Rule: multiply by 5 | |
|---------------------|-----|
| In | Out |
| 5 | |
| 9 | |
| 13 | |
| 17 | |

| Rule: multiply by 7 | |
|---------------------|-----|
| In | Out |
| 8 | |
| 10 | |
| 12 | |

| Rule: divide by 3 | |
|-------------------|-----|
| In | Out |
| 150 | |
| 240 | |
| 300 | |
| 390 | |

| Rule: divide by 4 | |
|-------------------|-----|
| In | Out |
| 40 | |
| 80 | |
| 100 | |
| 240 | |

| Rule: divide by 6 | |
|-------------------|-----|
| In | Out |
| 48 | |
| 72 | |
| 120 | |
| 180 | |

Two-Operation Patterns

Some patterns can be formed with two operations. We can determine the pattern rule by analyzing the gap between the two numbers.

You may need to multiply or divide first and add or subtract after. If you can't determine the pattern that way, try adding or subtracting first, and then multiplying or dividing after.



Practice Two-Operation Patterns – Write the pattern rule and fill in the blanks

| | | | | | | | |
|--|----|----|----|-----|-----|--|--|
| 1) | 1 | 4 | 13 | 40 | 121 | | |
| Rule: Start at 1, multiply by 3, and add 1 | | | | | | | |
| 2) | 2 | 4 | 14 | 30 | 62 | | |
| Rule: | | | | | | | |
| 3) | 3 | 8 | 18 | 38 | 78 | | |
| Rule: | | | | | | | |
| 4) | 5 | 15 | 35 | 75 | | | |
| Rule: | | | | | | | |
| 5) | 4 | 10 | 22 | 46 | 94 | | |
| Rule: | | | | | | | |
| 6) | 8 | 22 | 50 | 106 | 218 | | |
| Rule: | | | | | | | |
| 7) | 3 | 8 | 23 | 68 | 203 | | |
| Rule: | | | | | | | |
| 8) | 16 | 20 | 28 | 44 | 76 | | |
| Rule: | | | | | | | |

Name: _____

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Algebra Jeopardy

Objective

What are we learning about?

To reinforce students' understanding of basic algebraic concepts and their application to solve simple equations and word problems in a fun and competitive game format.

Materials

What materials will need for the activity.

- Jeopardy board and questions
- Buzzer or bell



Instructions

How you will complete the activity.

1. Print the Jeopardy board on the next page.
2. Divide the class into two teams.
3. Ask one team to go first by selecting a point value.
4. Read the question aloud from the point value.
5. The first team to ring the bell or buzzer gets to answer.
6. If they answer correctly, award them the points. If not, another team can answer.
7. Continue the game until all questions have been answered.
8. Tally the points to determine the winning team.
9. Conclude by discussing what they learned about the topic in the questions.

Name: _____

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Jeopardy Questions

Ask students the questions below

| \$100 | \$200 | \$300 | \$400 | \$500 |
|------------------------------|-------------------------------|--|---|---|
| 87, 93, 99, _____ | 5.2, 5.5, 5.8, _____ | Start at 1, multiply by 3 and add 1, what is the fourth term? | A plant grows 3.5 cm every week. If it was 12.3 cm tall at the start, how tall will it be after 3 weeks? | A builder lays 14.5 bricks per hour. If they have already laid 58 bricks, how many bricks will they have laid after 4 more hours of work? |
| 148, 158, 159, 170, _____ | 15.8, 15.9, _____ | Start at 6, divide by 2 and add 1, what is the third term? | A rabbit population doubles every year. If there are 4 rabbits this year, how many will there be in 5 years? | A runner increases their distance by 1.75 km every week. If they started at 5.25 km, how far will they be running after 10 weeks? |
| 82, 75, 68, _____ | 18.52, 18.59, 18.66, _____ | Start at 1, multiply by 2 and add 3, what is the fifth term? | A car's fuel consumption increases by 0.5 km/h every hour. If it starts at 40 km/h, how far will it travel in 4 hours? | A teacher's class size increases by 3.5 students every term. If the initial class size was 20 students, what will the class size be after 4 terms? |
| 177, 168, 159, _____ | 35.7, 35.1, 34.5, _____ | Start at 3, multiply by 4 and subtract 2, what is the fourth term? | A car travels 50 meters in the first day, 55 meters in the second day, and 7.5 meters more in the third day. How far will it travel in total by the sixth day? | An investment gives a raise of 5% every year. If his starting amount is \$45,000, how much will it be after 6 years? |
| 2, 10, 50, _____ | 17.3, 16.8, 16.3, _____ | Start at 7, multiply by 3 and subtract 1, what is the third term? | A train travels 75 km in the first hour, 112.5 km in the second hour, and 150 km in the third hour. How far will it travel in total by the fifth hour? | A swimmer increases their training distance by 2.25 km every week. If they started at 4.75 km, how far will they be swimming after 8 weeks? |
| 9, 18, 36, _____ | 11.32, 11.53, 11.74, _____ | Start at 6, multiply by 5 and add 2, what is the fourth term? | A tree grows 5.5 inches in the first year, 7.5 inches in the second year, and 9.5 inches in the third year. How much will it have grown in total by the sixth year? | A bank account balance increases by \$75.50 every month due to interest. If the initial balance was \$2500, what will the balance be after 10 months? |

Recursive vs Functional Relationships

A **recursive relationship** describes the pattern between successive numbers in one of the rows/columns of a table of values. A **functional relationship** is a general rule to describe the relationship between two variables in a table of values. For a functional relationship, we look across the table instead of beside.

Part 1

Is Hanna describing the recursive or functional relationship?

| | Pattern | | | | | Hanna's Description | Recursive or Functional |
|----|---------|----|-----|-----|-----|---|-------------------------|
| 1) | x | 1 | 2 | 3 | 4 | The pattern goes up by 5 each time. | |
| | y | 7 | 12 | 17 | 22 | | |
| 2) | x | 5 | 15 | 25 | 35 | The y variable goes up by 50 each time | |
| | y | 50 | 100 | 150 | 200 | | |
| 3) | x | 1 | 2 | 3 | 4 | The x variable is multiplied by 7 and the y variable is added | |
| | y | 8 | 15 | 22 | 29 | | |
| 4) | x | 1 | 2 | 3 | 4 | | |
| | y | 5 | 14 | 23 | 32 | | |
| 5) | x | 1 | 2 | 3 | 4 | Start at 17, add 6 each | |
| | y | 17 | 23 | 29 | 35 | | |

Part 2

Provide a recursive and functional description of the patterns

| | | | | | | | |
|----|---------|----|----|----|----|------------|--|
| 1) | Pattern | | | | | Recursive | |
| | x | 1 | 2 | 3 | 4 | Functional | |
| | y | 4 | 11 | 18 | 25 | | |
| 2) | Pattern | | | | | Recursive | |
| | x | 1 | 2 | 3 | 4 | Functional | |
| | y | 20 | 45 | 70 | 95 | | |

Table of Values – Finding Term N

When finding a random term in a pattern, we can use a variable. Often n is used to take the place of the term number. When we use n , we can change the value to find the term value for any term number.

We can find the value for n by looking at the pattern between the term number and term value. To do this, we look across the table from the term number to the term value.

Practice finding the pattern rule when you look across the table of values

| Term Number | Term Value |
|-------------|------------|
| 1 | 6 |
| 2 | 12 |
| 3 | 18 |
| 4 | |
| 5 | |
| 8 | |

1) $6n$

| Term Number | Term Value |
|-------------|------------|
| 1 | 3 |
| 2 | 8 |
| 3 | 12 |
| 4 | 17 |
| 5 | 21 |
| 9 | |

2) $5n - 2$

| Term Number | Term Value |
|-------------|------------|
| 1 | 4 |
| 2 | 8 |
| 3 | 12 |
| 4 | 16 |
| 5 | |
| 9 | |

3) _____

| Term Number | Term Value |
|-------------|------------|
| 1 | 9 |
| 2 | 16 |
| 3 | 23 |
| 4 | 30 |
| 5 | |
| 9 | |

4) _____

| Term Number | Term Value |
|-------------|------------|
| 1 | 6 |
| 2 | 9 |
| 3 | 12 |
| 4 | 15 |
| 5 | |
| 10 | |

5) _____

| Term Number | Term Value |
|-------------|------------|
| 1 | 4 |
| 2 | 10 |
| 3 | 16 |
| 4 | 22 |
| 5 | |
| 11 | |

6) _____

Using Algebraic Expressions

In the expression $6y + 5$, the 6 is the **numerical coefficient** of the variable and the 5 is the **constant term**. The **variable** is the y , which can represent any number.

Part 1

Use the algebraic expression to fill in the tables

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 8 | |

1) $5x + 2$

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 9 | |

4

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 11 | |

3) $t + 9$

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 11 | |

4) $4n - 3$

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 4 | |
| 5 | |
| 10 | |
| 20 | |

5) $20 \div x + 8$

| Term Number | Term Value |
|-------------|------------|
| 1 | |
| 2 | |
| 4 | |
| 5 | |
| 11 | |

6) $7x - 6$

Part 2

Write 4 algebraic expressions using:

Variable = n Constant term = 12 Numerical coefficient = 4

| | |
|---|--|
| 1 | |
| 2 | |

| | |
|---|--|
| 3 | |
| 4 | |

Pattern Rule – Input/Output Tables

Instructions

Fill in the input/output tables below

1)

| In | Out |
|-----|------|
| n | $3n$ |
| 1 | |
| 2 | |
| 4 | |
| 5 | |

2)

| In | Out |
|-----|----------|
| n | $3n + 2$ |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

3)

| In | Out |
|-----|----------|
| n | $4n - 4$ |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |

4)

| In | Out |
|-----|----------|
| x | $5x - 4$ |
| 10 | |
| 20 | |
| 30 | |
| 40 | |
| 50 | |

5)

| In | Out |
|-------|-----|
| $10x$ | |
| 2 | |
| 4 | |
| 6 | |
| 8 | |
| 10 | |

6)

| In | Out |
|-----|----------|
| x | $50 + x$ |
| 1 | |
| 2 | |
| 3 | |
| 9 | |

7)

| In | Out |
|-----|-----------|
| p | $7p + 20$ |
| 20 | |
| 40 | |
| 60 | |
| 80 | |
| 100 | |

8)

| In | Out |
|-----|------------|
| p | $10p - 15$ |
| 3 | |
| 6 | |
| 9 | |
| 12 | |
| 15 | |

9)

| In | Out |
|-----|------------|
| p | $8p + 100$ |
| 5 | |
| 10 | |
| 15 | |
| 20 | |
| 25 | |

Name: _____

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Activity Title: Algebraic Adventure Hunt

Objective

What are we learning about?

To help students understand and practice filling in input/output tables using given expressions involving all four operations through a fun and engaging treasure hunt.

Materials

What you will need for the activity.

- Stopwatch or timer (you can use a smartphone)
- Index cards
- Markers
- Small prizes or stickers (optional)
- Tape



Instructions

How you will complete the activity.

- 1) Cut out the index cards with the input/output tables provided. These will be the treasure hunt challenge questions.
- 2) Hide these cards around the classroom or in a designated area of the school. You are taping them under chairs, desks, or tucked into non-obvious spots.
- 3) Divide the class into small teams and give each team a stopwatch or timer.
- 4) Explain the game: each team will hunt for a card, fill in the table as quickly as they can, and return to you for verification.
- 5) Start the timer when you say "Go!" Each team rushes to find their first card.
- 6) When a team thinks they have the correct answer, they come back to you for verification. If they get it right, the teacher keeps the card. If the answer is wrong, they can try again or hide the card back in its original spot and find a new card.
- 7) The game continues until all cards are found or you call time. The team with the most correct answers wins.
- 8) Discuss the game, focusing on the concepts taught on the cards.

Instructions

Cut out the cards below

| | | | | | | | |
|---------|---------------------|---------|------------------------|---------|---------------------|---------|------------------|
| In j | Out $44j \div 4$ | In u | Out $u \div 4 + 12$ | In c | Out $16c \div 2$ | In a | Out $3a + 37$ |
| 3 | | 4 | | 3 | | 2 | |
| 6 | | 8 | | 5 | | | |
| 9 | | 12 | | 7 | | 3 | |
| 12 | | 16 | | | | 4 | |
| 15 | | 20 | | | | 5 | |
| In k | Out $k + 120$ | In l | Out $l + 5$ | In | Out $40e - 3$ | In x | Out $15x$ |
| 100 | | 1 | | 10 | | 2 | |
| 150 | | 2 | | 15 | | 4 | |
| 200 | | 3 | | 20 | | 6 | |
| 250 | | 4 | | 25 | | 8 | |
| 300 | | 5 | | 35 | | 10 | |

Instructions

Cut out the cards below

| | | | | | | | |
|---------|-----------------------|---------|------------------------|---------|------------------------|---------|------------------|
| In r | Out $r \div 5$ | In p | Out $p \div 4 + 40$ | In u | Out $u \div 7 - 21$ | In z | Out $3z + 1$ |
| 25 | | 12 | | 14 | | 15 | |
| 50 | | 24 | | 28 | | 115 | |
| 75 | | 36 | | 42 | | 125 | |
| 100 | | 48 | | | | 135 | |
| 125 | | 60 | | | | 145 | |
| In u | Out $u \div 5 + 7$ | In z | Out $4z + 1$ | In a | Out $32a - 11$ | In a | Out $4a + 17$ |
| 10 | | 2 | | 8 | | 8 | |
| 20 | | 4 | | 10 | | 16 | |
| 30 | | 6 | | 15 | | 24 | |
| 40 | | 8 | | 20 | | 32 | |
| 50 | | 10 | | 25 | | 40 | |

Instructions

Cut out the cards below

| | | | | | | | |
|---------|------------------------|---------|------------------|---------|-----------------------|---------|-----------------------|
| In h | Out $h \div 6 + 5$ | In f | Out $5f - 51$ | In e | Out $15e + 20$ | In b | Out $b \div 7 - 7$ |
| 12 | 15 | 15 | 5 | 5 | 70 | | |
| 24 | 20 | 20 | 9 | 9 | 84 | | |
| 36 | 25 | 25 | 13 | 13 | 98 | | |
| 48 | 30 | 30 | | | 112 | | |
| 60 | 35 | 35 | | | | | |
| In k | Out $k \div 4 - 18$ | In g | Out $13g$ | In c | Out $d \div 9 - 5$ | In c | Out $5c + 55$ |
| 112 | 7 | 7 | 15 | 3 | | 3 | |
| 240 | 14 | 14 | 72 | 5 | | 5 | |
| 304 | 21 | 21 | 99 | 7 | | 7 | |
| 368 | 28 | 28 | 126 | 9 | | 9 | |
| 432 | 35 | 35 | 153 | 11 | | 11 | |

Growing Patterns

Instructions

How many blocks are in each term? Sketch the next 3 terms

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

| Figure Number | 3 | 4 | 5 | 20 | 50 |
|------------------|---|---|---|----|----|
| Number of Blocks | | | | | |

1) Describe the recursive pattern?

2) What is the functional relationship between the variables?
(Write the expression)

3) How many blocks would the 100th figure have?

Number of Blocks







1 2 3 4 5

Figure Number

Matchstick Growing Patterns

Instructions How many matchsticks are in each term? Sketch the next 2/3 terms

| F-1 | F-2 | F-3 | F-4 | F-5 | F-6 |
|---|---|---|---|-----|-----|
|  |  |  |  | | |
| | | | | | |





Write the functional relationship:

| Figure # | 1 | 2 | 3 | 4 | 5 | 6 | 20 |
|------------------|---|---|---|---|---|---|----|
| # of matchsticks | | | | | | | |

| F-1 | F-2 | F-3 | F-4 | F-5 | F-6 |
|---|---|---|-----|-----|-----|
|  |  |  | | | |
| | | | | | |

Write the functional relationship:

| Figure # | 1 | 2 | 3 | 4 | 5 | 6 | 20 |
|------------------|---|---|---|---|---|---|----|
| # of matchsticks | | | | | | | |

| F-1 | F-2 | F-3 | F-4 | F-5 | F-6 |
|---|---|---|---|-----|-----|
|  |  |  |  | | |
| | | | | | |



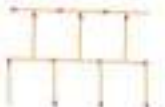
Write the functional relationship:

| Figure # | 1 | 2 | 3 | 4 | 5 | 6 | 20 |
|------------------|---|---|---|---|---|---|----|
| # of matchsticks | | | | | | | |

Matchstick Growing Patterns

Instructions

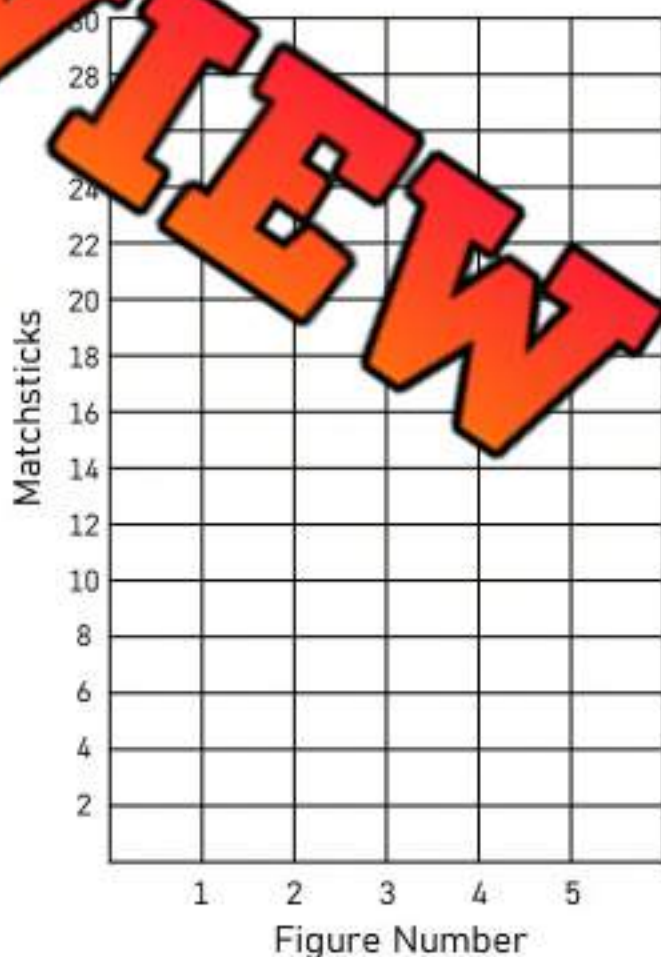
How many matchsticks are in each figure? Draw the next 2 figures

| <u>F-1</u> | <u>F-2</u> | <u>F-3</u> | <u>F-4</u> | <u>F-5</u> |
|---|---|---|------------|------------|
|  |  |  | | |
| | | | | |

| Figure Number | 3 | 4 | 5 | 10 | 20 |
|-----------------------|---|---|---|----|----|
| Number of Matchsticks | | | | | |

Questions

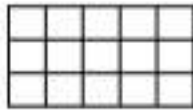
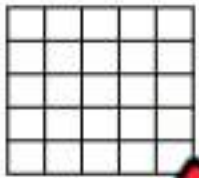
- Write an expression that represents the functional relationship.
- How many matchsticks will the 7th term have?
- How many matchsticks will the 10th term have?
- What figure would use 201 matchsticks?



Shrinking Patterns

Instructions

How many blocks are in each term. Sketch the next 3 terms



Functional Relationship

Expression:

Figure Number

1

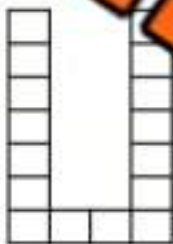
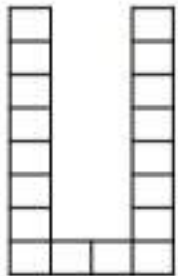
2

3

4

5

Number of Blocks



Functional Relationship

Expression:

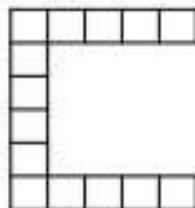
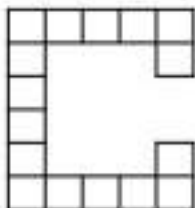
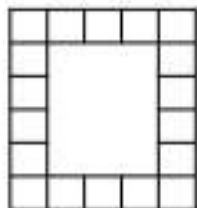
Figure Number

1

2

3

Number of Blocks



Functional Relationship

Expression:

Figure Number

1

2

3

4

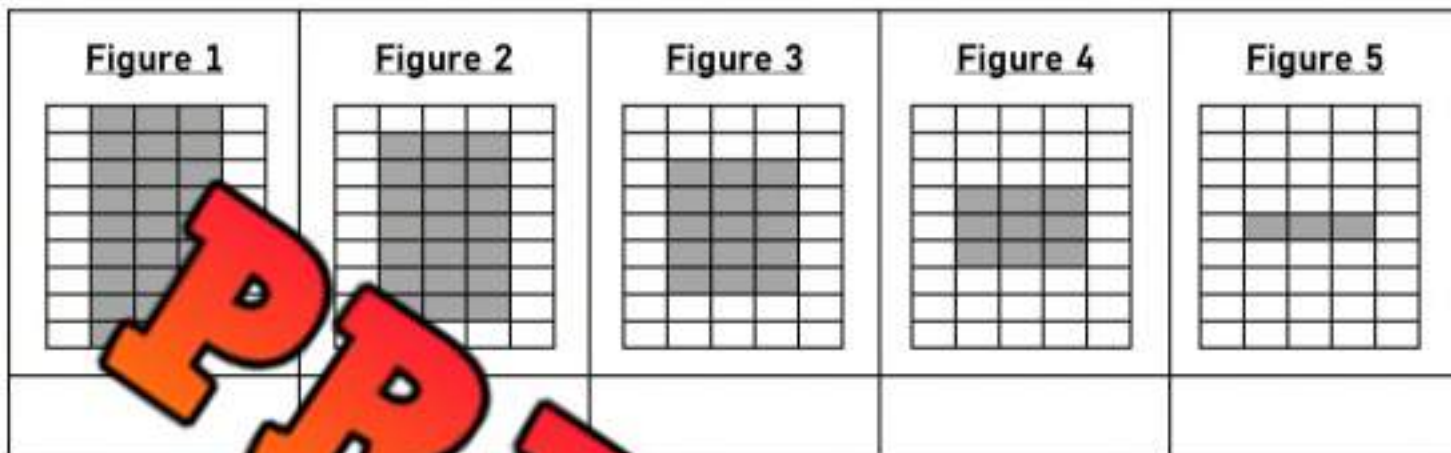
5

Number of Blocks

Shrinking Patterns

Instructions

How many grey blocks are in each term?



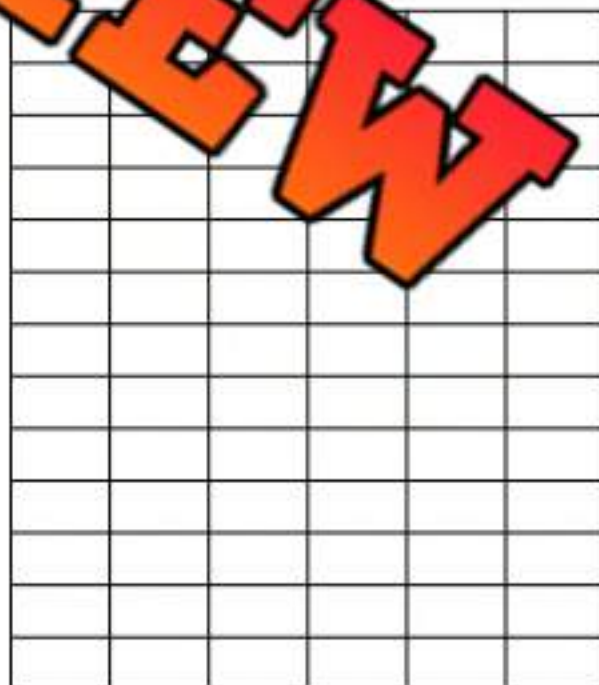
| Figure Number | 2 | 3 | 4 | 5 |
|------------------------|---|---|---|---|
| Number Of Grey Blocks | | | | |
| Number Of White Blocks | | | | |
| Number Of Total Blocks | | | | |

Write the functional relationship between the two-variables below
(Write the expression)

1) Figure number and grey blocks

2) Figure number and white blocks

Grey Blocks






1 2 3 4 5

Figure Number

Matchstick Shrinking Patterns

Instructions

How many matchsticks are in each figure? Draw the next 2 figures

| F-1 | F-2 | F-3 | F-4 | F-5 |
|---|---|--|-----|-----|
|  |  |  | | |
| | | | | |

| Figure Number | 1 | 2 | 3 | 4 | 5 |
|-----------------------|---|---|---|---|---|
| Number of Matchsticks | | | | | |

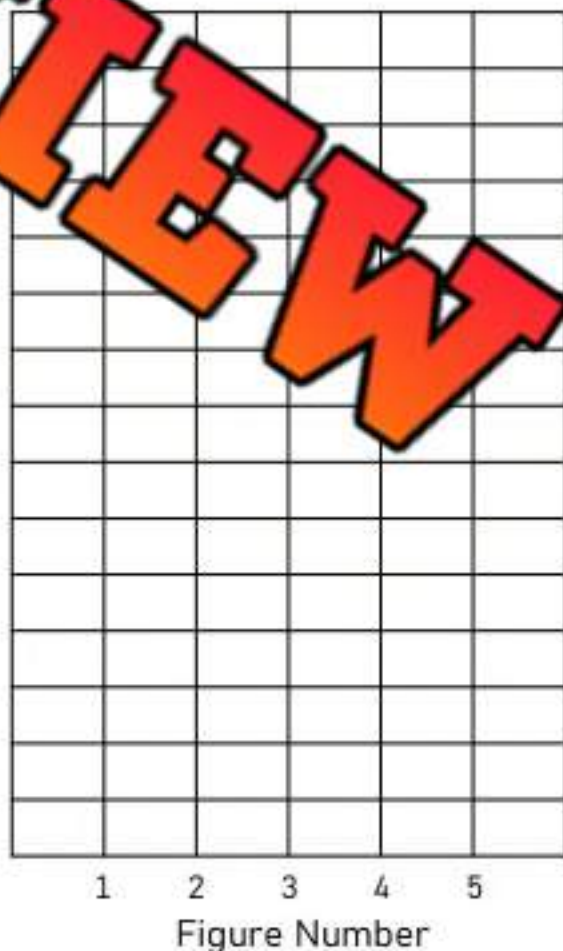
Questions

1) How many matchsticks will the 7th term have?

2) Is the line straight? If so, the relationship between the two variables is linear. Is there a linear relationship between the variables?

3) How many matchsticks in total would you need to make 8 figures?

Matchsticks



Two-Variable Linear Relationships

A **two-variable linear relationship** is when the increasing or decreasing of one variable causes a corresponding increase or decrease in the other variable. For example, driving 100km/hr would be a linear relationship between time driving and distance driven (for every hour driven, you travel 100km). As you drive longer, you travel further at a predictable distance.

Instructions: Fill in the tables and answer the questions.



- 1) Chantal's earnings for today has been represented in the table below

| | | | | | | | | |
|------------------|---|----|----|---|---|---|---|---|
| Hours Worked (x) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Money Earned (y) | | 44 | 66 | | | | | |

- a) Is the relationship between variables linear? Yes No
 b) What is the functional relationship between variables? _____

- 2) John sells cars. He earns a commission when he sells a car. His earnings for last week are represented in the table below. There were some days he did not earn commission.



| | | | | | | | | |
|------------------|---|-----|-----|-----|-----|-----|------|------|
| Days Worked (x) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Money Earned (y) | 0 | 140 | 280 | 620 | 700 | 900 | 1140 | 1280 |

- a) Is the relationship between variables linear? Yes No
 b) If you graphed this relationship, would the line be straight or curved? Explain.

- 3) Greg has a membership to a shopping website. He pays a yearly membership fee and orders the same thing each week for 10 weeks. His spending is displayed below.

| | | | | | | | | |
|-----------------|----|----|-----|-----|-----|-----|-----|-----|
| Weeks (x) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Money Spent (y) | 50 | 80 | 110 | 140 | 170 | 200 | 230 | 260 |

- a) Is the relationship between variables linear? Yes No
 b) What is the functional relationship between variables? _____
 c) If you graphed this relationship, would the line be straight or curved? Explain.

Two-Variable Linear Relationships



Instructions

Answer the question below

1) At an ice cream shop, you pay for the cone and then more money for every scoop you add.

| Scoops (x) | 0 | 1 | 2 | 3 | 4 | 5 |
|----------------|--------|--------|--------|--------|--------|--------|
| Cost (y) | \$2.00 | \$2.50 | \$3.00 | \$3.50 | \$4.00 | \$4.50 |

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much would it cost to buy 5 scoops?

c) How much would it cost to buy 10 scoops?

2) It costs \$15 for admission to a museum. Once inside, you pay for each additional ride you go on.

| Rides (x) | 0 | 1 | 2 | 3 | 4 | 5 |
|--------------------|---------|---------|---------|---------|---------|---------|
| Total Cost (y) | \$15.00 | \$17.50 | \$20.00 | \$22.50 | \$25.00 | \$27.50 |

a) What is the functional relationship between the two variables (algebraic expression)?

b) How much would it cost to go on 50 rides?

3) Roger rents a truck and pays a set rate for every 10km he drives.

| KM Driven (x) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
|-------------------|------|------|------|------|------|------|------|------|------|
| Cost (y) | \$50 | \$55 | \$60 | \$65 | \$70 | \$75 | \$80 | \$85 | \$90 |

a) What is the functional relationship between the two variables (algebraic expression)?

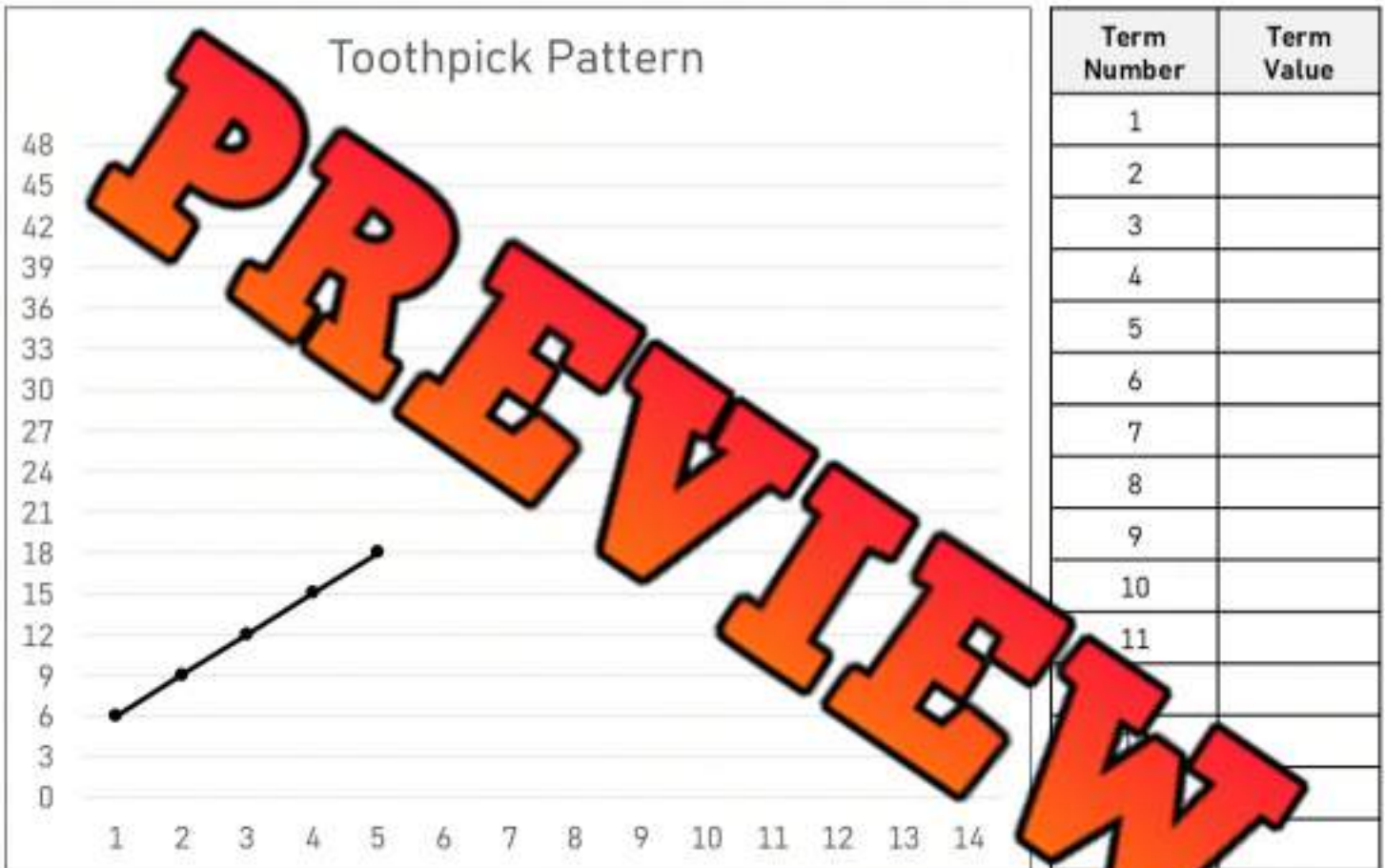
b) How much would it cost to drive 250km?

Reading a Linear Pattern - Graph

A **linear** pattern displays a constant rate of change. The pattern **increases** or **decreases** by the same amount each time.

Instructions

Continue the line on the graph and fill in the table of values



1) Draw the toothpick pattern below for the graph/table of values. Use any design you'd like.

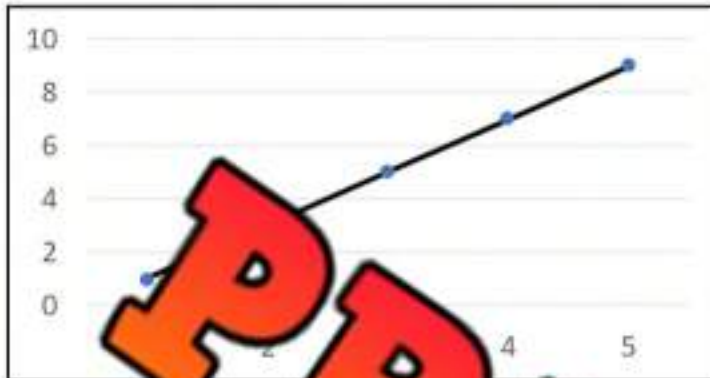
| | | | | |
|--------|--------|--------|--------|--------|
| | | | | |
| Term 1 | Term 2 | Term 3 | Term 4 | Term 5 |

2) What is the constant rate of change?

Increasing Linear Patterns – Yes or No?

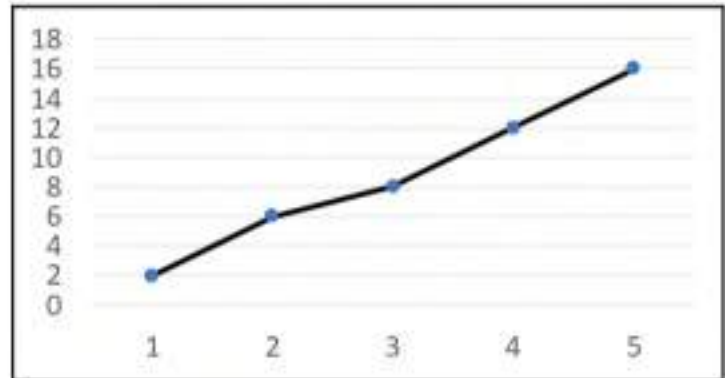
Instructions

Circle if the pattern displayed on the graph is linear or not



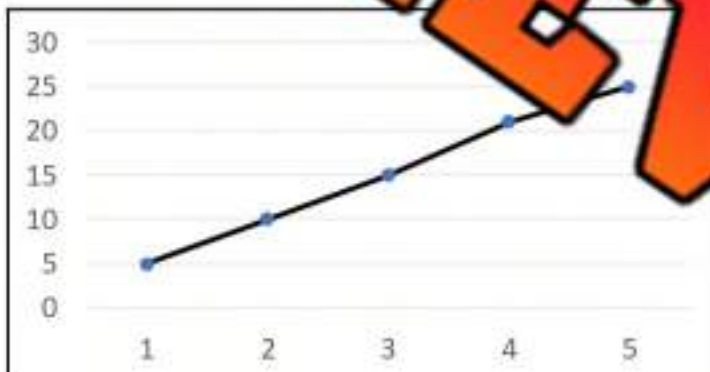
1) Linear Non-Linear

Rate of change =



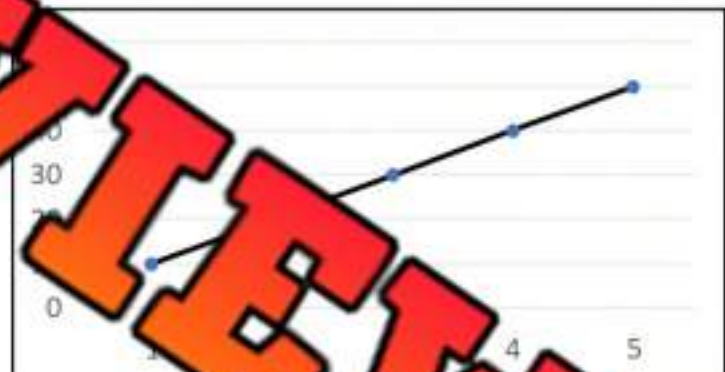
2) Linear Non-Linear

Rate of change =



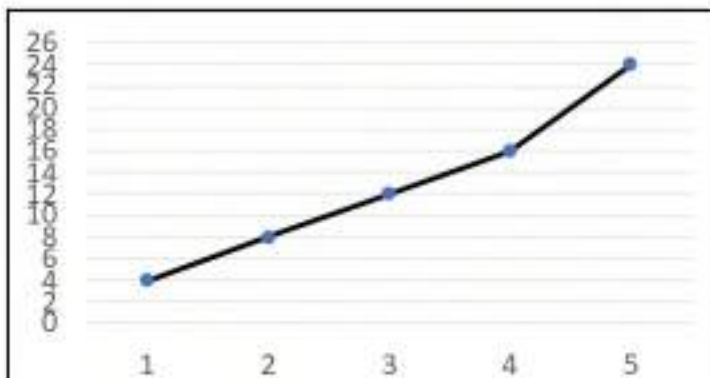
3) Linear Non-Linear

Rate of change =



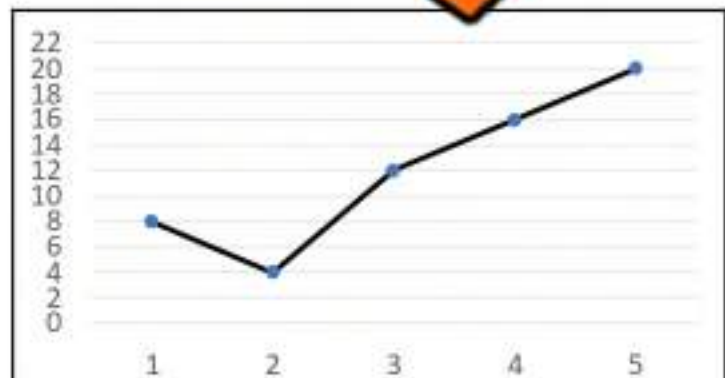
4) Linear Non-Linear

Rate of change =



5) Linear Non-Linear

Rate of change =



6) Linear Non-Linear

Rate of change =

Decreasing Linear Patterns – Yes or No?

Instructions

Circle if the pattern is linear or not, based on the table of values

| Term Number | Term Value |
|-------------|------------|
| 1 | 22 |
| 2 | 18 |
| 3 | 14 |
| 4 | 10 |
| 5 | 6 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 75 |
| 2 | 60 |
| 3 | 45 |
| 4 | 30 |
| 5 | 15 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 9.9 |
| 2 | 8.7 |
| 3 | 7.5 |
| 4 | 6.4 |
| 5 | 5.3 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 25.0 |
| 2 | 22.5 |
| 3 | 20.0 |
| 4 | 17.5 |
| 5 | 15.0 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 110 |
| 2 | 105 |
| 3 | 100 |
| 4 | 110 |
| 5 | 98 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 218 |
| 2 | 201 |
| 3 | 186 |
| 4 | 170 |
| 5 | 154 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 36.8 |
| 2 | 36.5 |
| 3 | 36.2 |
| 4 | 35.8 |
| 5 | 35.5 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 375 |
| 2 | 305 |
| 3 | 235 |
| 4 | 165 |
| 5 | 95 |
| Linear | Non-Linear |

| Term Number | Term Value |
|-------------|------------|
| 1 | 85.5 |
| 2 | 84.9 |
| 3 | 84.3 |
| 4 | 83.7 |
| 5 | 83.1 |
| Linear | Non-Linear |

Name: _____

Integer Patterns - Adding

| | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| -20 | -19 | -18 | -17 | -16 | -15 | -14 | -13 | -12 | -11 | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

Instructions

Fill in the blanks below using the pattern rule

1) Start at 0, add 3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

2) Start at 4, add 4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

3) Start at -17, add 4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

4) Start at 19, add -5 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

5) Start at 15, add -4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

6) Start at -3, add -2 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

7) Start at 12, add -5 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

8) Start at -20, add 4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

9) Start at 20, add -4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

10) Start at -16, add 3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

PREVIEW

Pattern Rule – Input/Output Tables - Integers**Instructions**

Fill in the input/output tables below

1)

| In | Out |
|-----|------------|
| n | $n + (-5)$ |
| 1 | |
| 2 | |
| 4 | |
| 5 | |

2)

| In | Out |
|-----|-------------|
| n | $2n + (-3)$ |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

3)

| In | Out |
|-----|---------|
| n | $n + 9$ |
| -1 | |
| -2 | |
| -3 | |
| -4 | |
| -5 | |

4)

| In | Out |
|-----|------------|
| x | $x + (-3)$ |
| -2 | |
| -4 | |
| -6 | |
| -8 | |
| -10 | |

| In | Out |
|-----|---------|
| n | $n + 1$ |
| 2 | |
| 4 | |
| 6 | |
| 8 | |
| 10 | |

6)

| In | Out |
|-----|----------|
| x | $x + 13$ |
| -1 | |
| 3 | |
| -6 | |

7)

| In | Out |
|-----|--------------|
| p | $2p + (-12)$ |
| 20 | |
| 40 | |
| 60 | |
| 80 | |
| 100 | |

8)

| In | Out |
|-----|-------------|
| p | $p + (-15)$ |
| -3 | |
| -6 | |
| -9 | |
| -12 | |
| -15 | |

9)

| In | Out |
|-----|-------------|
| p | $p + (-12)$ |
| -3 | |
| -1 | |
| 2 | |
| 4 | |
| 6 | |

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Fill in the input/output tables below

| | Out $+ (-7)$ |
|----|-----------------|
| -2 | |
| 2 | |
| 5 | |
| 10 | |
| 20 | |

Name: _____

Fill in the input/output tables below

| In n | Out $5n + (-7)$ |
|-----------|--------------------|
| -2 | |
| 2 | |
| 5 | |
| 10 | |
| 20 | |

Name: _____

Fill in the input/output tables below

| In n | Out $5n + (-7)$ |
|-----------|--------------------|
| -2 | |
| 2 | |
| 5 | |
| 10 | |
| 20 | |

Name: _____

Fill in the input/output tables below

| In n | Out $5n + (-7)$ |
|-----------|--------------------|
| -2 | |
| 2 | |
| 5 | |
| 10 | |
| 20 | |

Integer Patterns - Subtraction

| | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| -20 | -19 | -18 | -17 | -16 | -15 | -14 | -13 | -12 | -11 | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

Instructions

Fill in the blanks below using the pattern rule

1) Start at 7, subtract 2 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

2) Start at 15, subtract 4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

3) Start at -2, subtract 1 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

4) Start at 20, subtract 6 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

5) Start at -8, subtract -3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

6) Start at -15, subtract -4 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

7) Start at -1 subtract 3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

8) Start at 12, subtract -3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

9) Start at -19 subtract -2 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

10) Start at -14, subtract -3 each time

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

Integer Patterns – Writing Subtraction Rules

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|
| -20 | -19 | -18 | -17 | -16 | -15 | -14 | -13 | -12 | -11 | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|

Part 1

Write the subtraction pattern rule and complete the pattern

1)

| | | | | | | |
|---|---|---|----|--|--|--|
| 7 | 4 | 1 | -2 | | | |
|---|---|---|----|--|--|--|

2)

| | | | | | | |
|--|----|----|---|--|--|--|
| | -4 | -2 | 2 | | | |
|--|----|----|---|--|--|--|

3)

| | | | | | | |
|-----|--|--|----|--|--|--|
| -19 | | | -1 | | | |
|-----|--|--|----|--|--|--|

4)

| | | | | | | |
|----|--|----|--|--|--|--|
| 17 | | 12 | | | | |
|----|--|----|--|--|--|--|

5)

| | | | | | | |
|-----|--|-----|--|-----|--|----|
| -20 | | -16 | | -12 | | -8 |
|-----|--|-----|--|-----|--|----|

6)

| | | | | | | |
|-----|--|-----|--|-----|--|-----|
| -18 | | -16 | | -14 | | -12 |
|-----|--|-----|--|-----|--|-----|

7)

| | | | | | | |
|----|--|---|--|---|--|---|
| -3 | | 0 | | 3 | | 6 |
|----|--|---|--|---|--|---|

Part 2

Write your own pattern and pattern rule by filling in the table

1)

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

2)

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

3)

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

Pattern Rule – Input/Output Tables

Instructions

Fill in the input/output tables below

1)

| In | Out |
|-----|------------|
| n | $n - (-4)$ |
| 1 | |
| 2 | |
| 4 | |
| 5 | |

2)

| In | Out |
|-----|----------|
| n | $4n - 6$ |
| 1 | |
| 2 | |
| 3 | |
| 4 | |

3)

| In | Out |
|-----|---------|
| n | $n - 7$ |
| -1 | |
| -2 | |
| -3 | |
| -4 | |
| -5 | |

4)

| In | Out |
|-----|------------|
| x | $x - (-9)$ |
| -2 | |
| -4 | |
| -6 | |
| -8 | |
| -10 | |

5)

| In | Out |
|-----|---------|
| x | $x - 3$ |
| 2 | |
| 4 | |
| 6 | |
| 8 | |
| 10 | |

6)

| In | Out |
|-----|---------|
| x | $x - 7$ |
| -1 | |
| 3 | |
| -6 | |

7)

| In | Out |
|-----|-----------|
| p | $7p - 15$ |
| 20 | |
| 40 | |
| 60 | |
| 80 | |
| 100 | |

8)

| In | Out |
|-----|-------------|
| p | $p - (-14)$ |
| -3 | |
| -6 | |
| -9 | |
| -12 | |
| -15 | |

9)

| In | Out |
|-----|-------------|
| p | $p - (-22)$ |
| -3 | |
| -1 | |
| 1 | |
| 3 | |
| 5 | |

Name: _____

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Task Cards: Patterning – All Operations

Objective

What are we learning about?

To recognize and create patterns using the four basic mathematical operations.

Materials

What you will need for the activity.

- 24 task cards
- Sets of answer recording sheets
- Pencils



Instructions

What you will do for the activity

1. Introduce the concept of patterns in mathematics and their relevance to problem-solving in everyday life.
2. Organize the students into pairs and provide each pair with their sets of task cards.
3. Give each pair an answer recording sheet to document their responses.
4. Encourage teamwork by having students collaborate on finding solutions.
5. Allow students to select any task card to begin with, emphasizing that they can complete the cards in any order they prefer.
6. Instruct students to record the letter of their chosen answer (A, B, or C) on their answer sheet beside the task card's number.
7. Consider using a timer to create a dynamic challenge, adjusting the duration to fit the lesson's objectives and complexity.
8. After the activity, review the answers collectively, discussing any challenging patterns and strategies used to solve them.
9. Have students reflect on the activity, sharing the methods they applied and obstacles they overcame.

Task Cards

Cut out the task cards below

Card 1:

Start with 70. Subtract 30 and then add 10 for the next number. What is the second number?

- a) 40
- b) 50
- c) 60

Card 5:

Start at -20, add 15 each time. What is the third number?

- a) 10
- b) -5
- c) 20

Card 6:

Start with -35. Multiply by 3 and then add 20 for the next number. What is the second number?

- a) -85
- b) -105
- c) -55

Card 3:

Begin with 100. Subtract 40 and then multiply by 2 for the next number. What is the fourth number?

- a) 20
- b) 240
- c) 120

Card 7:

Start with 10. Divide by 2 and then add 12 for the next number. What is the second number?

- a) 10
- b) 24
- c) 16

Card 4:

Start with 30. Multiply by 3 and then subtract 15 for the next number. What is the fifth number?

- a) 1260
- b) 75
- c) 1830

Card 8:

Begin with 180. Divide by 6 and then subtract 10 for the next number. What is the second number?

- a) 10
- b) 20
- c) 25

Task Cards

Cut out the task cards below

Card 9:

Start with 55. Add 30 and then subtract 20 for the next number. What is the fourth number?

- a) 65
- b) 75
- c) 85

Card 13:

Start at -15, add 10 each time. What is the fifth number?

- a) 25
- b) -5
- c) 15

Card 14:

Begin with 70. Divide by 2 and then multiply by 3 for the next number. What is the third number?

- a) 10
- b) 35
- c) -7.5

Start with -50. Multiply by 2 and then add 30 for the next number. What is the fourth number?

- a) -40
- b) -70
- c) -250

Card 11:

Begin with 85. Subtract 45 and then multiply by 2 for the next number. What is the fifth number?

- a) 0
- b) 80
- c) 10

Start with 100. Divide by 5 and then add 25 for the next number. What is the third number?

- a) 15
- b) 34
- c) 35

Card 12:

Start with 25. Multiply by 4 and then subtract 20 for the next number. What is the third number?

- a) 80
- b) 320
- c) 300

Card 16:

Begin with 160. Divide by 8 and then subtract 5 for the next number. What is the second number?

- a) 15
- b) 20
- c) 10

Task Cards

Cut out the task cards below

Card 17:

Start with 45. Add 25 and then subtract 30 for the next number. What is the sixth number?

- a) 40
- b) 25
- c) 20

Card 21:

Start at -25 , add 20 each time. What is the seventh number?

- a) 100
- b) -35
- c) 95

Begin with 20. Multiply by 4 and then divide by 4 for the next number. What is the second number?

- a) 30
- b) 25
- c) 20

Card 22:

Start with -45 . Multiply by 3 and then add 25 for the next number. What is the third number?

- a) -110
- b) -220
- c) -305

Card 19:

Begin with 75. Subtract 35 and then multiply by 3 for the next number. What is the fourth number?

- a) 1875
- b) 660
- c) 255

Start with 10. Divide by 2 and then add 9 for the next number. What is the fourth number?

- a) 10
- b) 11
- c) 19

Card 20:

Start with 50. Multiply by 2 and then subtract 25 for the next number. What is the third number?

- a) 75
- b) 125
- c) 100

Card 24:

Begin with 170. Divide by 5 and then subtract 10 for the next number. What is the second number?

- a) 20
- b) 24
- c) 34

Linear Equations – Table of Values

A **linear equation** is an equation that is written for two different variables. The variables have a relationship where they increase or decrease at the same rate. This means when the variables are plotted on a graph, the line will be straight.

It is helpful to use a table of values to represent the values of both variables. This allows us to see the relationship between the variables. We can find any missing value by using an equation that represents the relationship between the variables. A related pair of x and y values is called an ordered pair.

Practice completing the tables using the equations below

| x | y |
|-----|-----|
| 1 | |
| 2 | 14 |
| 3 | 20 |
| 4 | |
| 5 | |
| 6 | |

1) $y = 6x + 2$

| x | y |
|-----|-----|
| | -2 |
| 2 | 1 |
| 3 | 4 |
| 4 | 7 |
| 5 | 10 |
| 9 | 26 |

2) $y = 3x - 5$

| x | y |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

| x | y |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 9 | |

4) $y = 4x - 7$

| x | y |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 10 | |

5) $y = -3x - 4$

| x | y |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 11 | |

6) $y = 5x - (-8)$

Linear Equations – Table of Values

Practice

 Write the equation that represents the relation between x and y

| x | y |
|-----|-----|
| 1 | 2 |
| 2 | 9 |
| 3 | 16 |
| 4 | 25 |
| 5 | 36 |
| 6 | 49 |

1) _____

| x | y |
|-----|-----|
| 1 | -7 |
| 2 | -11 |
| 3 | -15 |
| 4 | -19 |
| 5 | |
| 9 | |

| x | y |
|-----|-----|
| 1 | -3 |
| 2 | 0 |
| 3 | 3 |
| 4 | 6 |
| 5 | |
| 11 | |

3) _____

| x | y |
|-----|-----|
| 1 | 5 |
| 2 | 0 |
| 3 | -5 |
| 4 | -10 |
| 5 | |
| 9 | |

4) _____

| x | y |
|-----|-----|
| 1 | -2 |
| 2 | |
| 3 | |
| 4 | 18 |
| 5 | |
| 10 | |

5) _____

| x | y |
|-----|-----|
| 1 | -7 |
| 2 | -18 |
| | -29 |
| | -40 |
| | |
| | |

6) _____

Practice

Read the problem and represent it in the table of values

An ice cream shop sells cones for \$3 and toppings for \$2 each. An equation for this relation is $y = 2x + 3$ where the 3 dollars is constant, and the x represents how many toppings are chosen.

a) Fill in the table of values

b) Fill in the ordered pairs below – Remember (x, y)

(1, ___) (2, ___) (3, ___) (8, ___) (12, ___) (20, ___)

| x | y |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Write the equation that represents the relation between x and y .

| | y |
|----|-----|
| 1 | |
| 2 | -5 |
| 3 | -11 |
| 4 | |
| 5 | |
| 12 | |

Name: _____

Write the equation that represents the relation between x and y .

| x | y |
|-----|-----|
| 1 | 1 |
| 2 | -5 |
| 3 | -11 |
| 4 | -17 |
| 5 | |
| 12 | |

Name: _____

Write the equation that represents the relation between x and y .

| x | y |
|-----|-----|
| 1 | 1 |
| 2 | -5 |
| 3 | -11 |
| 4 | -17 |
| 5 | |
| 12 | |

Name: _____

Write the equation that represents the relation between x and y .

| x | y |
|-----|-----|
| 1 | 1 |
| 2 | -5 |
| 3 | -11 |
| 4 | -17 |
| 5 | |
| 12 | |

Linear Equations – Table of Values

Practice

Make a table of values for each relation

1) $y = 3x + 2$

2) $y = 5x - 6$

3) $y = -2x + 3$

4) $y = 4x - 2$

5) $y = 6x - 6$

6) $y = -7x - 8$

Challenge

Can you determine the equation using the

These ordered pairs are in the same linear relation: $(-2, -4), (0, 4), (2, 12), (4, 20)$

a) What is the equation that represents the values in the ordered pairs?

b) Fill in the missing value in the ordered pairs.

 $(1, \underline{\quad}), (3, \underline{\quad}), (8, \underline{\quad}), (-4, \underline{\quad}), (-8, \underline{\quad}), (\underline{\quad}, 56), (\underline{\quad}, -56)$

c) Fill in the table of values for the linear relation.

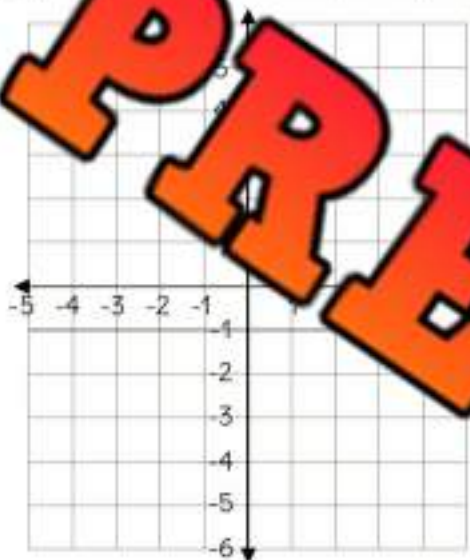
| | | | | | | | | |
|---|----|----|---|---|---|----|----|----|
| x | -6 | -3 | 0 | 5 | 7 | 12 | 15 | 20 |
| y | | | | | | | | |

Linear Equations – Graphing 2 Variables

Instructions Fill in the table of values and then graph the results using ordered pairs

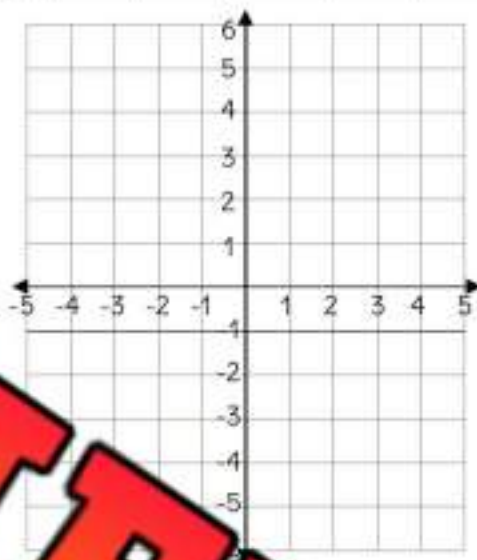
1) $y = 2x - 2$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



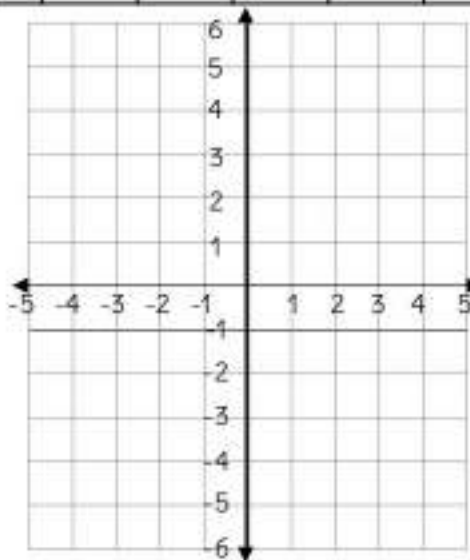
2) $y = 3x - 6$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |

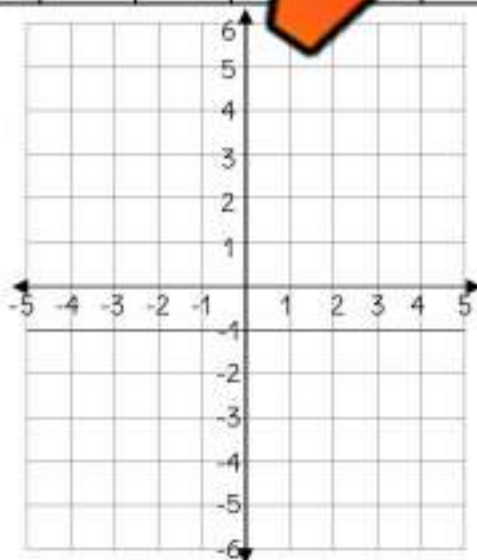


3) $y = -x + 2$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



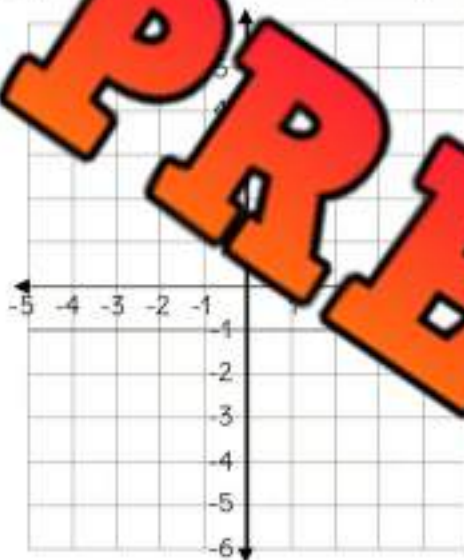
Linear Equations – Graphing 2 Variables

Instructions

Fill in the table of values and then graph the results using ordered pairs

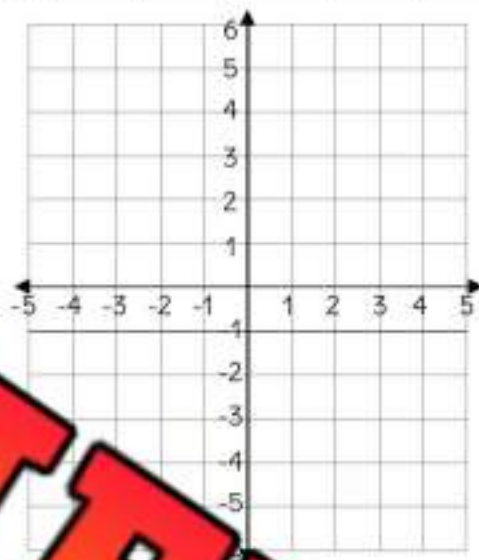
1) $y = -2x - 2$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



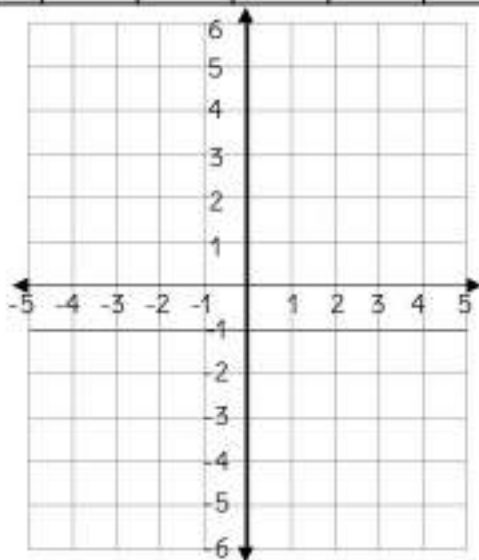
2) $y = -x + 4$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |

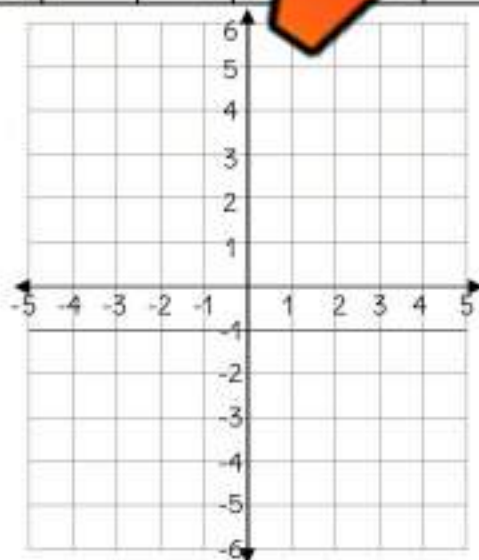


3) $y = -3x + 4$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |

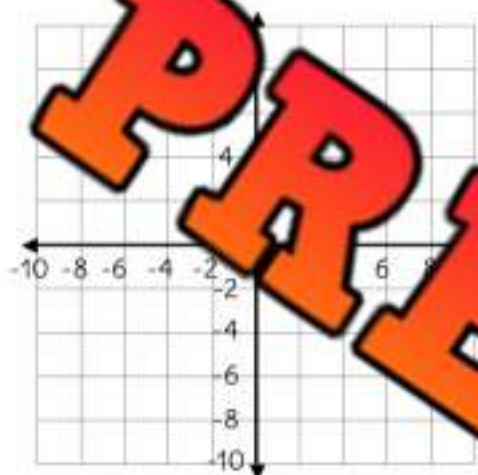


Linear Equations – Graphing 2 Variables

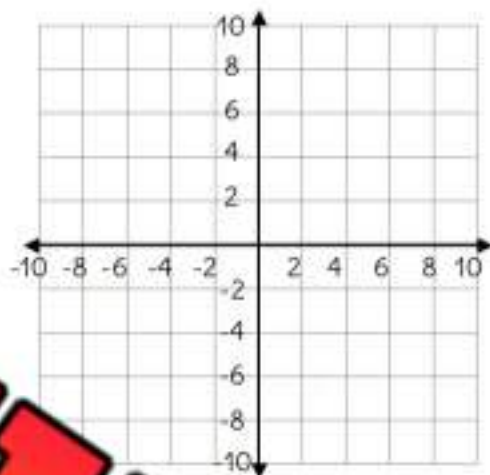
Instructions

Graph the equations below. Create a table of values if necessary

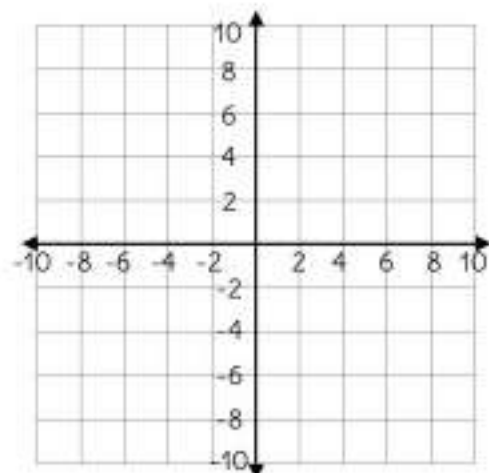
1) $y = 3x - 4$



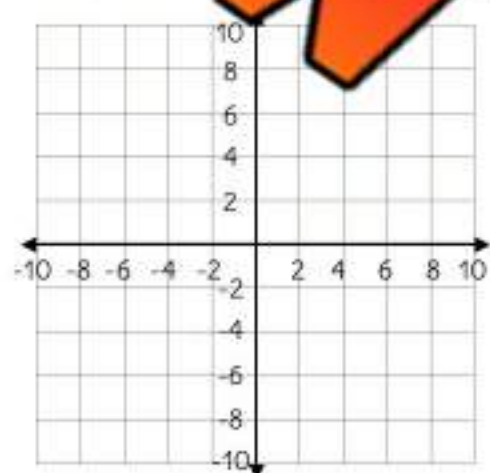
2) $y = -4x + 10$



3) $y = -3x + 8$



4) $y = 4$



Exit Cards

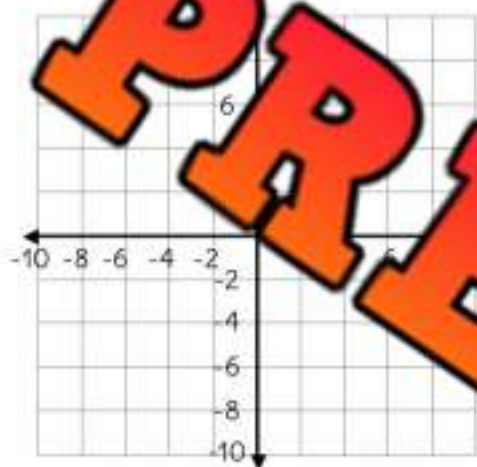
Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Graph the equations below.

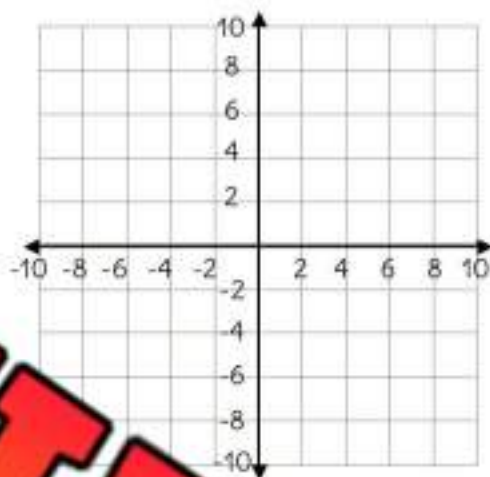
$$y = -6x + 4$$



Name: _____

Graph the equations below.

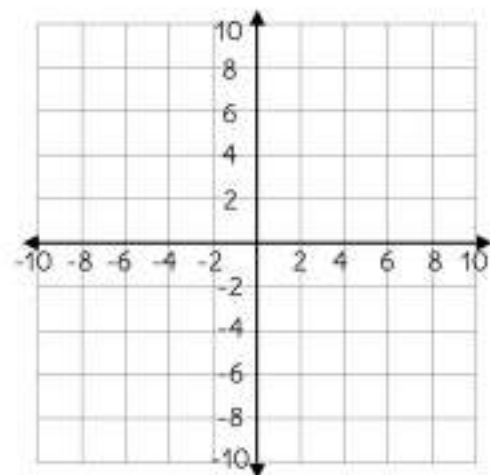
$$y = -6x + 4$$



Name: _____

Graph the equations below.

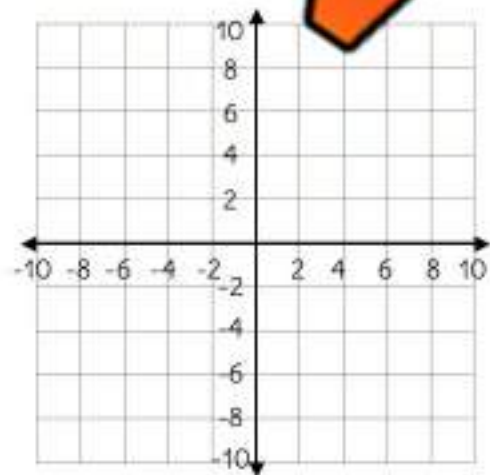
$$y = -6x + 4$$



Name: _____

Graph the equations below.

$$y = -6x + 4$$



Two-Variable Linear Relationship - Scientist

Challenge

Answer the word problem below



Mrs. Ferreyte teaches a grade 8 class. She invited a scientist to join her class to do some experiments with them. The scientist charges \$40 for the materials they use for the experiments, plus an additional \$3 per student who is in the class.

- a) Fill in the table of values below using the linear equation: $y = 3x + 40$

| # of Students | Cost | | | | | |
|---------------|------|--|--|--|--|--|
| | | | | | | |

- b) Graph the table of values

Questions

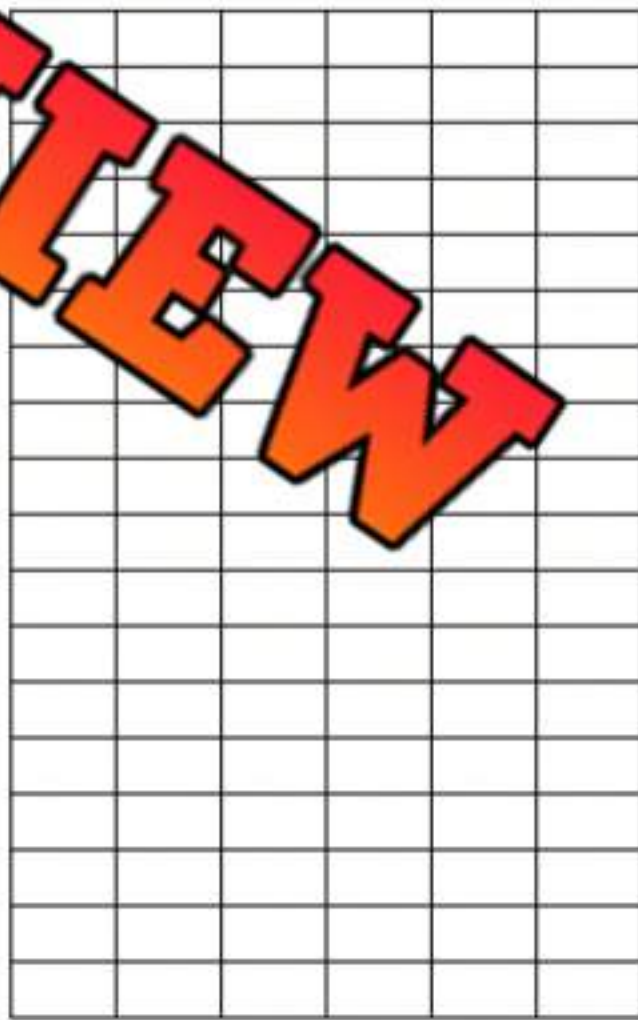
- a) Fill in the missing values in the ordered pairs below:

(25, _____), (50, _____), (100, _____)

(_____, 67), (_____, 85), (_____, 106)

- b) If 28 students are in the class, how much money will the scientist earn for their presentation?

- c) If the scientist earned \$136, how many students were in the class?



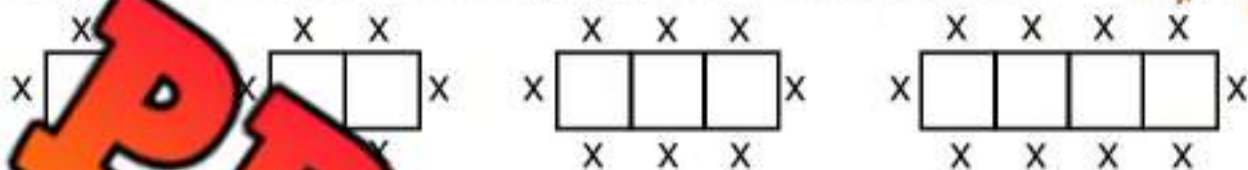
Graphing Linear Equations - Tables

Challenge

Answer the word problem below

You have been put in charge of organizing the end of year banquet for your baseball team. You want to have as many seats as you can.

The diagram below shows how many people can sit at the tables.



Fill in the table below to represent the relationship between the number of tables and seats.

| Tables (x) | | | 4 | 5 | 10 | 20 | 50 |
|----------------|--|--|---|---|----|----|----|
| # of Seats (y) | | | | | | | |

Questions

- a) Write the linear equation that represents this problem.
- b) If you had 61 tables, how many seats would you have?
- c) Fill in the missing values in the ordered pairs below

 (15, _____), (75, _____), (135, _____)

 (_____, 132), (_____, 174), (_____, 500)
- d) If you had 100 people attending the banquet, how many tables would you need?

| | | | | | | | |
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Two-Variable Linear Relationship – Moving Day

Challenge

Answer the word problem below



Aiden's family is moving. They rented a moving truck for \$50 a day. They are charged an additional \$0.50 for every 1km they drive.

1) Fill in the table of values below

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
| | | | | | |

2) Graph the graph below

3) Questions

a) Write the linear equation that represents this problem.

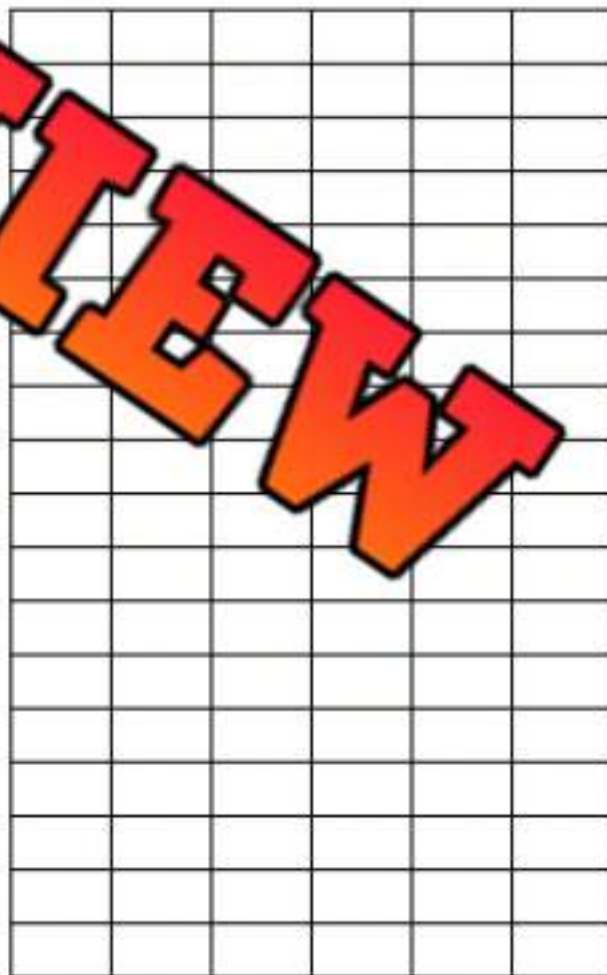
b) If Aiden's family drove 330km in one day, how much would they need to pay?

c) Fill in the missing values in the ordered pairs below.

(15, _____), (75, _____), (135, _____)

(_____, 130), (_____, 240), (_____, 500)

d) Aiden's family owes \$660 to the moving company. How far did they drive?



PREVIEW

Linear Equations – Graphing 2 Variables

Instructions

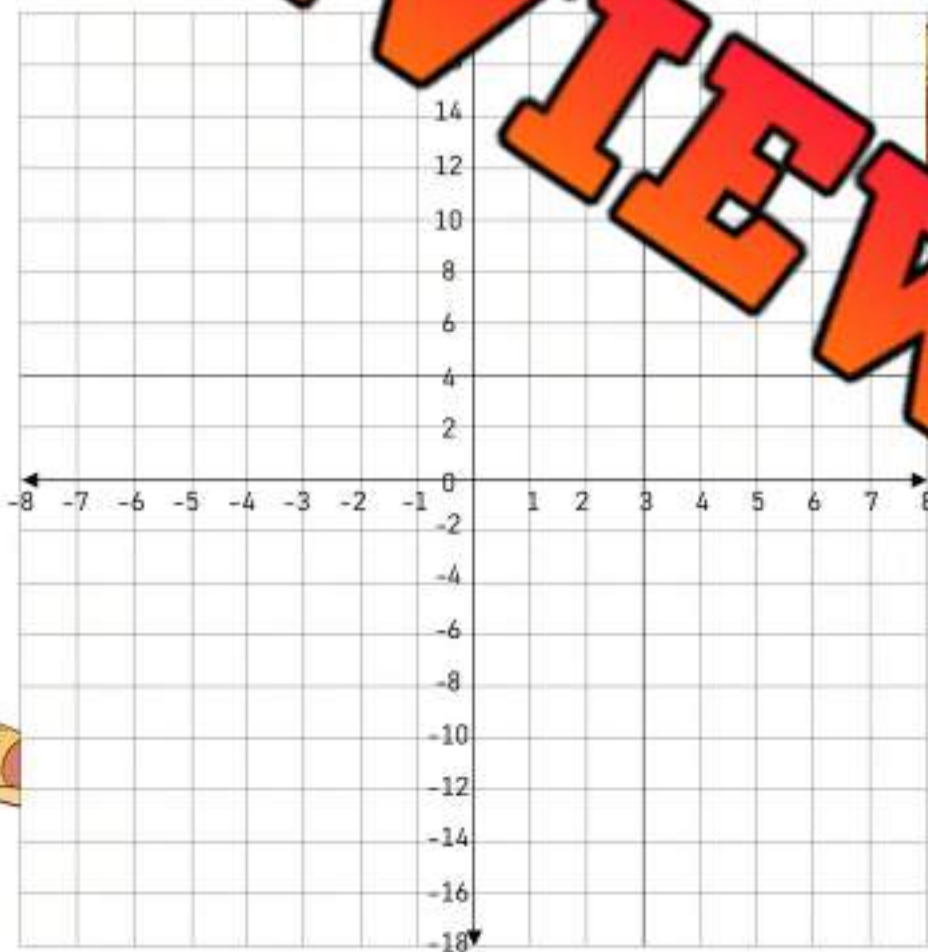
Fill in the table of values and then graph the results using ordered pairs

Matt is hosting a pizza party. He will buy 2 slices for each person coming and 4 extra slices in case someone shows up unexpectedly. He determined an equation that will help him decide how many slices to buy: $y = 2x + 4$

- a) Fill in the table of values using the equation above.

| x | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| y | | | | | | |

- b) Represent the equation on the graph. Connect the dots using a line. Is the relation linear? Explain.



Linear Equations – Graphing 2 Variables

Instructions

Fill in the table of values and then graph the results using ordered pairs

Hadley sells her homemade scarfs at a flea market. It costs her \$10 to rent a table but she makes \$5 each hour she is there. She uses the following equation to represent her earnings: $y = 5x - 10$

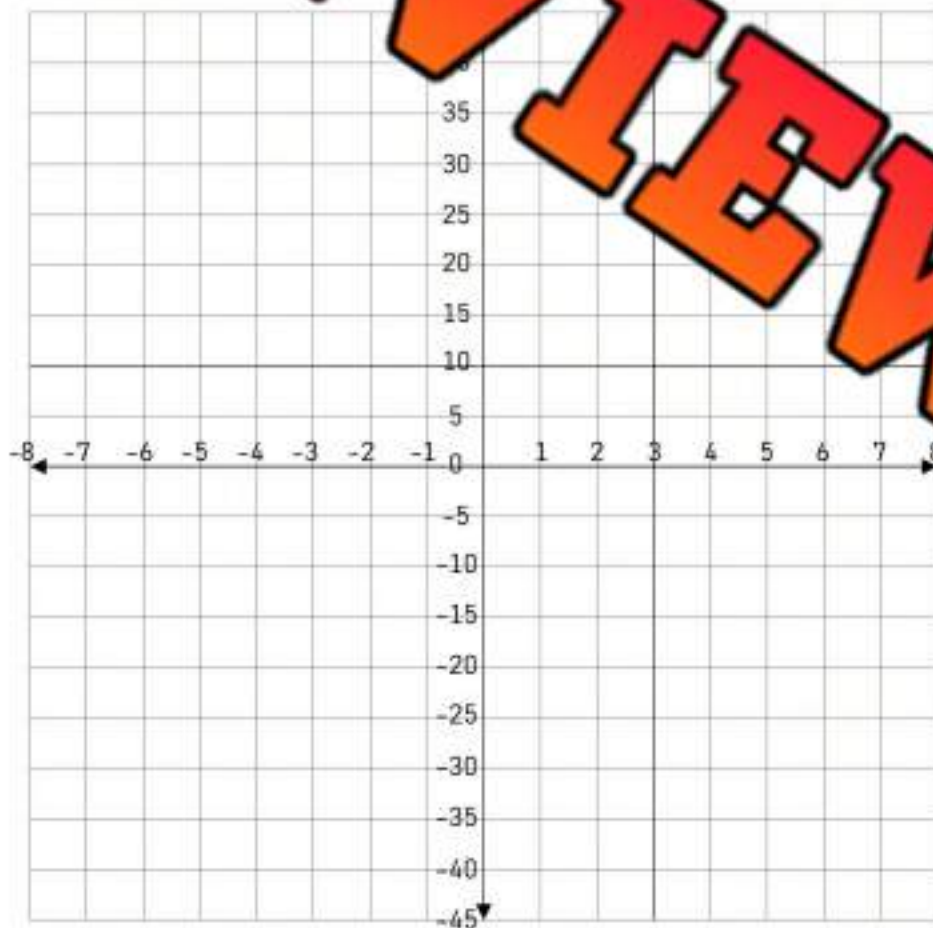
- a) Fill in the table of values using the equation above.

| | | | | | | | | |
|---|--|---|---|---|---|---|---|---|
| x | | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| y | | | | | | | | |

- b) Represent the table on the graph. Connect the dots using a line.

- c) Fill in the missing values in the ordered pairs below

(10, ___), (20, ___), (___, 80), (___, 100), (___, 150)



Graphing Linear Equations - Exercise

Instructions

Answer the questions below



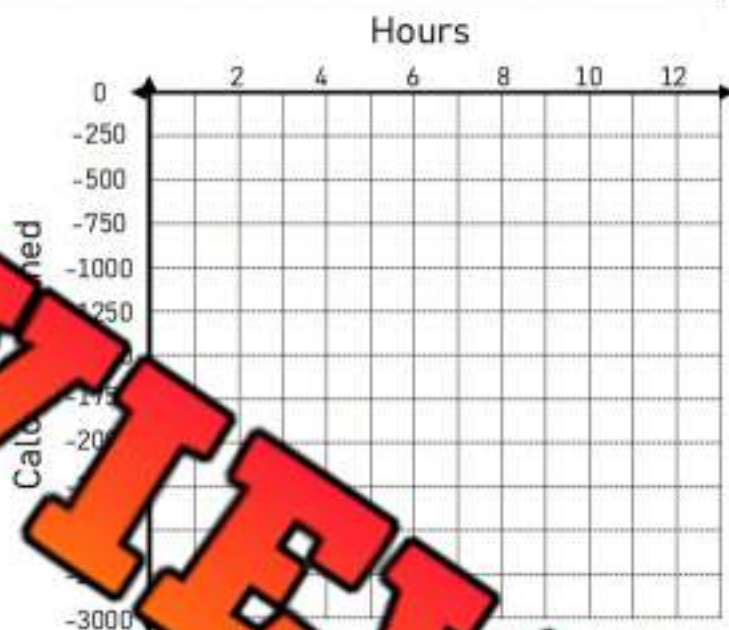
For every 1-hour Logan exercises, he burns 250 calories. Use negative integers to fill in the table of values that tracks Logan's calorie burn.

| 1-Hour | 2-Hours | 3-Hours | 4-Hours | 5-Hours | 6-Hours | 7-Hours |
|--------|---------|---------|---------|---------|---------|---------|
| | | | | | | |

a) If Logan exercises 2 hours a week, how many calories will he burn?

b) Write the linear equation that represents the situation. Use multiplication and a negative integer.

c) If Logan has already burned 750 calories this week, how many more hours will he need to exercise to burn 2250 calories? Write an equation that represents the situation.



d) Describe the relationship between the two variables in your own words.

e) Fill in the missing values in the ordered pairs below

(14, _____), (20, _____), (32, _____)

(_____, -4250), (_____, -6500), (_____, -9750)

Graphing Linear Equations - Advertising

Instructions

Answer the questions below



Chloe has an advertising budget of \$150. She decides to spend \$15 a day. Use negative integers to fill in the table of values that tracks her advertising spending. Display the table of values as a graph as well.

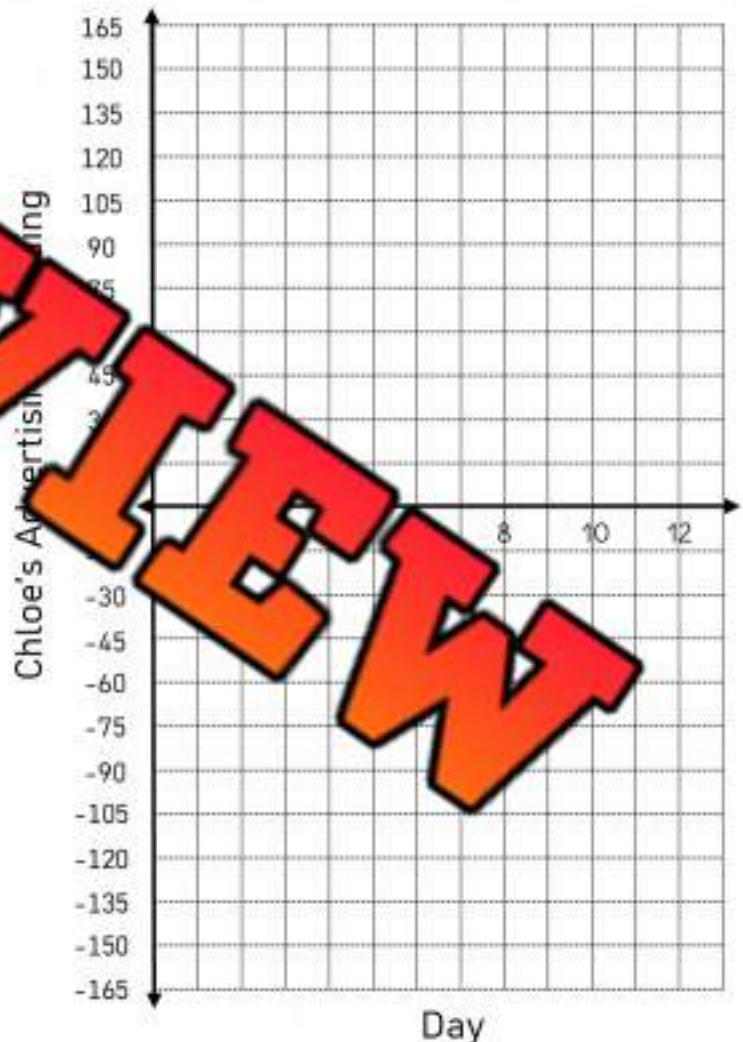
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
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1) After 20 days of advertising, how much of her budget will Chloe have left? Use a negative integer to represent the amount spent.

2) Write the linear equation that represents the situation. Use multiplication and a negative integer.

3) Chloe has discovered that she earns \$20 a day from people buying her products after seeing her advertisements. Use the numbers/operations below to write a new linear equation that represents the situation.




$$y = x \cdot (-15) + 20 + \quad =$$



4) Matthew answered the question above using this equation: $y = x(-15) + 20$ but he isn't getting the correct answer. How could he move one bracket to get the correct answer? Why was he wrong before?

Algebra Quiz - Patterning

Part 1 How many matchsticks are in each term? Sketch the next 3 terms

| F-1 | F-2 | F-3 | F-4 | F-5 | F-6 |
|---|---|---|-------------|-----|-----|
|  |  |  | | | |
| What is the functional relationship between the term # and the # of Matchsticks? | | | Expression: | | |
| Term # | 2 | 3 | 4 | 5 | 6 |
| # of Matchsticks | | | | | 20 |

Part 2 Read the problems and answer the questions

1) Cole's pay for today has been recorded in the table below

| | | | | | | | | | |
|--------------------------|---|----|----|----|-----|-----|-----|-----|-----|
| Hours Worked | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Money Earned (\$) | 0 | 27 | 54 | 81 | 108 | 135 | 162 | 189 | 216 |

- Is the relationship between the variables linear? Yes/No
- What is the functional relationship between variables?

2) It costs \$30 for admission to an amusement park. Once inside, you pay \$1.50 for each additional ride you go on.

| | | | | | | |
|-------------------|---------|---------|---------|---------|---------|---------|
| Rides | 0 | 1 | 2 | 3 | 4 | 5 |
| Total Cost | \$30.00 | \$31.50 | \$33.00 | \$34.50 | \$36.00 | \$37.50 |

- What is the functional relationship between the two variables (algebraic expression)?
- If you graphed the table of values, would the line be straight or curved? Explain.

c) How much would it cost if you went on 25 rides?

Part 3 Fill in the tables using the equations below

| x | y |
|---|----|
| 1 | 10 |
| 2 | 16 |
| 3 | 22 |
| 4 | |
| 5 | |
| 6 | |

| x | y |
|---|----|
| 1 | -1 |
| 2 | 2 |
| 3 | 5 |
| 4 | |
| 5 | |
| 9 | |

| x | y |
|----|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 11 | |

2) $y = 3x - 4$

3) $y = -2x + 4$

Part 4 Write an equation that represents the relation between x and y

| x | y |
|---|----|
| 1 | 3 |
| 2 | 10 |
| 3 | 17 |
| 4 | 24 |
| 5 | |
| 6 | |

| x | y |
|---|----|
| 1 | 8 |
| 2 | |
| 3 | -1 |
| 4 | |
| 5 | |
| 9 | |

| x | y |
|---|----|
| 1 | -4 |
| 2 | -1 |
| 3 | 2 |
| 4 | 5 |
| 5 | |
| 9 | |

1) _____

2) _____

3) _____

Part 5 Make a table of values for each relation

1) $y = 2x + 3$

2) $y = 4x - 5$

3) $y = -3x + 3$

Part 6

Answer the word problem below

1) Cameron went to an amusement park. He paid \$22 to get in and then \$3 per ride he went on.

a) Write a linear equation that represents the situation.



b) Fill in the table of values below

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
| | | | | | | | |

c) Graph the table of values

2) If Cameron went on 15 rides, how much would it cost him?

| | | | | | | | |
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3) Cameron ended up paying \$118 at the amusement park. How many rides did he go on?

4) Fill in the missing values in the ordered pairs below

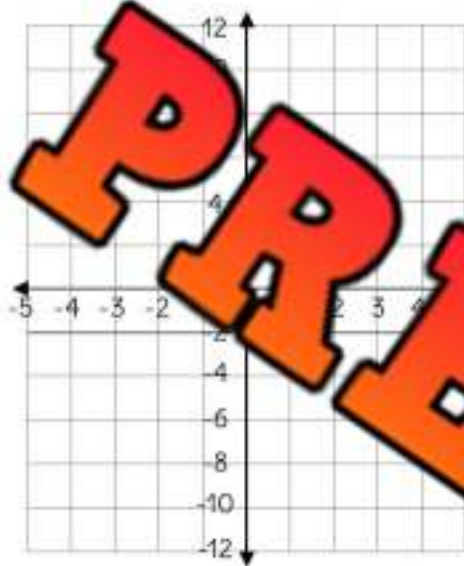
(18, _____), (35, _____), (110, _____)

(_____, 100), (_____, 136), (_____, 937)

Part 7 Fill in the table of values and then graph the results using ordered pairs

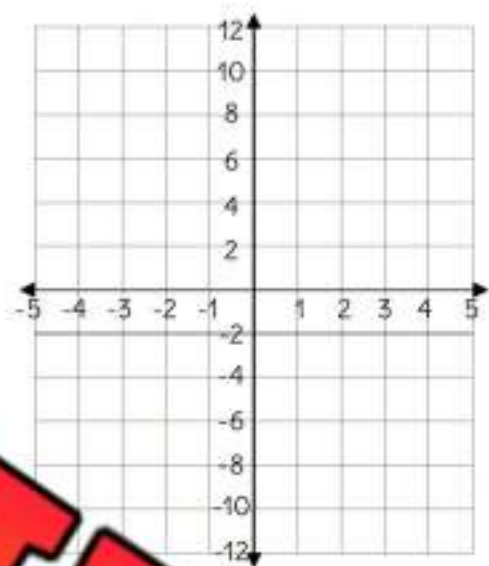
1) $y = -2x - 2$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



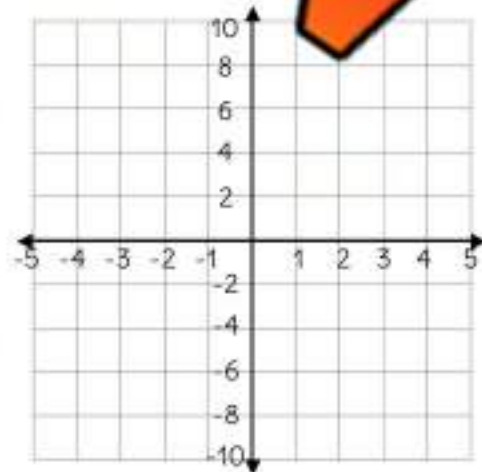
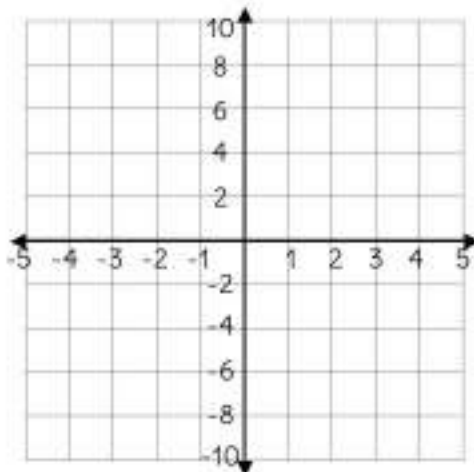
2) $y = -x + 4$

| | | | | | |
|---|---|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 |
| y | | | | | |



Part 8 Graph the linear equations below. Check your work if necessary

3) $y = -3x + 8$



Grade 8
PATTERNS AND RELATIONS

Variables and Equations

| | Curriculum Expectations | Pages That Cover the Expectations |
|-------------|---|-----------------------------------|
| PR.2 | Model and solve problems concretely, pictorially and algebraically, using linear equations of the form: <ul style="list-style-type: none">• $ax = b$• $x/a = b$• $ax + b = c$• $x/a + b = c$• $a(x + b) = c$ where a, b and c are integers. | 77 - 171 |
| TQ | Tests and quizzes | |

PREVIEW

Distributive Property - Addition

The distributive property is used to make difficult problems simpler. It means that when we multiply a number by the sum of two or more addends, we get the same result as multiplying each addend separately by the number.

You can use the distributive property of multiplication to rewrite expressions that have a number outside of a parenthesis.

Example 1

$$7(5 + 3)$$

$$7 \times 5$$

$$7 \begin{array}{|c|c|} \hline 5 & 3 \\ \hline 35 & 21 \\ \hline \end{array}$$

Example 2

$$4(y + 8)$$

$$4 \times y + 4 \times 8$$

$$4y + 32$$

$$4 \begin{array}{|c|c|} \hline y & 8 \\ \hline 4y & 32 \\ \hline \end{array}$$

Evaluate Fill in the boxes to represent the distributive property of the expressions

1) $9(4 + 6)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

2) $6(3 + n)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

3) $8(7 + 3)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

4) $4(n + 8)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

5) $6(f + 11)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

6) $-3(5 + p)$

$$\begin{array}{|c|c|} \hline \square & \square \\ \hline \square & \square \\ \hline \end{array}$$

Expand

Evaluate the expressions below

1) $9(t + 7)$

2) $-2(8 + 12)$

3) $-6(x + 3)$

4) $8(y + 4)$

5) $5(-11 + n)$

6) $-4(-12 + k)$

Distributive Property – Equivalent Expressions

Match Write the letter from column 2 beside the equivalent expression from column 1

1

| Answer | Column 1 | Letter | Column 2 |
|--------|-------------|--------|---------------------------|
| | $3(9 - 5)$ | a | $15 + 27$ |
| | $-3(9 + 5)$ | b | $(-15) + 27$ |
| | $3(5 + 9)$ | c | $3 \times 9 - 3 \times 5$ |
| | $-3(5 - 9)$ | d | $(-27) + (-15)$ |

2

| Answer | Column 1 | Letter | Column 2 |
|--------|-------------|--------|------------|
| | $7(t + 9)$ | a | $-63 - 7t$ |
| | $-7(t + 9)$ | b | $7t + 63$ |
| | $7(t - 9)$ | c | $-7t + 63$ |
| | $-7(t - 9)$ | d | $63 - 7t$ |

3

| Answer | Column 1 | Letter | Column 2 |
|--------|--------------|--------|------------|
| | $8(11 - n)$ | a | $88 - 8n$ |
| | $-8(n + 11)$ | b | $-8n - 88$ |
| | $8(11 + n)$ | c | $-8n - 88$ |
| | $-8(11 - n)$ | d | $88 + 8n$ |

4

| Answer | Column 1 | Letter | Column 2 |
|--------|-------------|--------|------------|
| | $3(y - 5)$ | a | $3y + 15$ |
| | $-3(y + 5)$ | b | $-3y + 15$ |
| | $3(y + 5)$ | c | $3y - 15$ |
| | $-3(y - 5)$ | d | $-3y - 15$ |

Name: _____

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Finger Signals Quiz - Understanding Algebraic Expressions

Objective

What are we learning about?

Students will reinforce their understanding of algebraic expressions through an interactive finger signals quiz.

Materials

What you will need for the activity.

- A list of questions



Instructions

How you will complete the activity

1. Prepare a list of questions with answer choices labeled A, B, C, and D.
2. Explain the finger signals for each answer choice: one finger for A, two fingers for B, three fingers for C, and four fingers for D.
3. Inform the students they will show their answer by raising the appropriate number of fingers when you read each question.
4. Read the first question aloud clearly and repeat if necessary.
5. Give students a few moments to think about their answer and decide independently.
6. After a countdown (e.g., "3, 2, 1"), have all students show their answer simultaneously by raising the appropriate number of fingers.
7. Reveal the correct answer and explain why it is correct.
8. Repeat with different questions to reinforce understanding of algebraic expressions.

Name: _____

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| Question | A | B | C | D |
|---|--------------------|------------------------|--------------------|------------------------|
| A student reads r pages each day for 6 days. What is the total number of pages read? | $6 + r$ | $6 - r$ | $6r$ | $r + 6$ |
| A photographer takes p photos, takes 4 more each day for 6 days, and then deletes 8. How many photos are there now? | $p + (4 \times 6)$ | $(p + 24) - 8$ | $p + 24$ | $p + (4 \times 6) - 8$ |
| A farmer has f cows, buys 18 more, and sells 7. How many cows are there now? | $f + 18 - 7$ | $f \times 18 - 7$ | $f + 18 + 7$ | $f + 18 - 7$ |
| A librarian shelved 40 books over the course of h hours. What is the average number of books shelved per hour? | $40 + h$ | $40 - h$ | $40h$ | $40 \div h$ |
| A farmer plants f trees in each row and has 6 rows. What is the total number of trees? | $6 + f$ | $6 - f$ | $6f$ | $f + 6$ |
| A worker earns w dollars per hour for 7 hours. What is the total earnings? | $7 + w$ | $7 - w$ | $7w$ | $w + 7$ |
| A library has b books, buys 50 more, and loses 20. How many books are there now? | $b + 50 - 20$ | $b \times 50 - 20$ | $b + 50 + 20$ | $b + 50 - 20$ |
| A factory produces p products each day for 10 days. What is the total production? | $10 + p$ | $10 - p$ | $10p$ | $p + 10$ |
| A librarian has b books, receives 7 more each hour for 8 hours, and then donates 10. How many books are there now? | $(b + 8) - 10$ | $(b + 56) - 10$ | $b + (7 \times 8)$ | $b + 7 \times 8 - 10$ |
| A runner runs 40 kilometres over the course of d days. | $40 + d$ | $40 - d$ | $40d$ | $40 \div d$ |
| A school has s students but loses 20. What is the total number of students? | $s + 20$ | $s - 20$ | $20s$ | $s - 20$ |
| A gardener has g plants, plants 5 more each day for 3 days, and then removes 4. How many plants are there now? | $(g + 15) - 4$ | $g + (5 \times 3) - 4$ | $g + 15$ | $(g + 15) - 4$ |
| A chef cooked 120 meals over the course of m days. What is the average number of meals cooked per day? | $120 + m$ | $120 - m$ | $120m$ | $120 \div m$ |
| A baker makes b batches of cookies each day for 4 days. What is the total number of batches? | $4 + b$ | $4 - b$ | $4b$ | $b + 4$ |
| Sarah has s apples and buys 5 more. How many apples does she have now? | $s + 5$ | $s - 5$ | $5s$ | $s + 5$ |
| A store has k kites but sells 30. What is the total number of kites left? | $k + 30$ | $k - 30$ | $30k$ | $k - 30$ |
| An artist has a paintings, paints 2 more each day for 5 days, and then sells 6. How many paintings are there now? | $a + (2 \times 5)$ | $(a + 10) - 6$ | $a + (2 \times 5)$ | $a + (2 \times 5) - 6$ |

Evaluating Algebraic Expressions - Addition**Part 1**Evaluate the following expressions for $x = -7$

| | | | |
|-------------|-------------|------------------|------------------|
| 1) $x + 13$ | 2) $9 + x$ | 3) $25 + x$ | 4) $x + 17$ |
| 5) $39 + x$ | 6) $83 + x$ | 7) $74 + x + 11$ | 8) $87 + x + 24$ |

Part 2Evaluate the following expressions for $y = -7$ and $n = 4$

| | | | |
|-----------------|-------------------|-----------------------|-----------------------|
| 1) $n + y$ | 2) $15 + y + n$ | 3) $20 + y + n$ | 4) $y + 18 + n$ |
| 5) $54 + y + n$ | 6) $n + (y + 20)$ | 7) $25 + n + (y + 4)$ | 8) $75 + n + (y + 4)$ |

Part 3Evaluate the following expressions for $x = -5$ and $p = -1$

| | | | |
|---------------------|-------------------|---------------------|-------------------|
| 1) $(x) + (p) - 23$ | 2) $17 + x + (p)$ | 3) $(19 + x) + (p)$ | 4) $x + (35 + p)$ |
| 5) $(p + 27) + x$ | 6) $x + 49 + (p)$ | 7) $(x + 63) + (p)$ | 8) $88 + p + x$ |

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Evaluate the following expressions
for $x = -5$ and $p = -12$

1) $(19 + x) + (p)$

2) $x + (35 + p)$

3) $(x) + (p) - 23$

Name: _____

Evaluate the following expressions
for $x = -5$ and $p = -12$

1) $(19 + x) + (p)$

2) $x + (35 + p)$

3) $(x) + (p) - 23$

Name: _____

Evaluate the following expressions
for $x = -5$ and $p = -12$

1) $(19 + x) + (p)$

2) $x + (35 + p)$

3) $(x) + (p) - 23$

Name: _____

Evaluate the following expressions
for $x = -5$ and $p = -12$

1) $(19 + x) + (p)$

2) $x + (35 + p)$

3) $(x) + (p) - 23$

Evaluating Algebraic Expressions - Subtraction

Subtraction Integers Rules

To subtract integers, it is easiest to change the operation to addition and then follow the addition rules. We can do this by using the rule - Keep, Flip, Change. We keep the first number the same, flip the operation from subtraction to addition, and then change the third number's sign.

Example: $5 - (-6) = ?$ becomes $5 + 6 = 11$

Keep the
first
integer

Flip the
operation

Change the
sign of the next
integer

Part 1 Evaluate the following expressions for $x = -8$

| | | |
|-------------|-------------|------------------|
| 1) $x - 15$ | 2) $27 - x$ | 4) $x - 31$ |
| 5) $47 - x$ | 6) $61 - x$ | 7) $94 - x - 14$ |

Part 2 Evaluate the following expressions for $y = -12$ and $n = -5$

| | | | |
|-----------------|-------------------|-------------------|-------------------|
| 1) $y - n$ | 2) $(16 - n) - y$ | 3) $15 - (y - n)$ | 4) $y - 11 - n$ |
| 5) $21 - y - n$ | 6) $(n - y) - 36$ | 7) $y - (n - 43)$ | 8) $(28 - n) - y$ |

Evaluating Expressions – Food Truck

Walker works at a food truck selling burgers, hot dogs, fries, and pogos. He uses algebraic expressions to determine the cost of his customer's orders.

| Menu | |
|-----------------|--------|
| Burger (b) | \$4.50 |
| Hot Dog (h) | \$2.75 |
| Fries (f) | \$3.25 |
| Pogo (p) | \$3.50 |



Solve Write the algebraic expression and then evaluate using the menu prices

| Customer Order | Expression | Answer |
|-----------------------------------|--|--------|
| 1) 2 burgers, 1 fry | $2 \times b + f$ $2 \times 4.50 + 3.25$ | |
| 2) 4 hot dogs, 2 pogos | | |
| 3) 5 fries, 2 pogos | | |
| 4) 3 burgers, 2 fries, 2 pogos | | |
| 5) 3 fries, 5 burgers, 4 hot dogs | | |
| 6) 10 burgers, 10 fries | | |
| 7) 5 hot dogs, 7 fries, 3 pogos | | |
| 8) 4 burgers, 9 hot dogs | | |

Evaluating Expressions - Bakery

Gavin works at a bakery selling bread, cookies, and donuts. He calculates the cost of orders (o) and subtracts it from the payment (p) he is given to determine how much change to give his customers.

| Menu | |
|-----------------|--------|
| Bread (b) | \$3.50 |
| Cookies (c) | \$1.25 |
| Donuts (d) | \$1.50 |

Evaluate Solve the subtraction expressions below

| Order Values | Expression - Customer's Change $p - o$ |
|--------------|---|
| P | |
| \$15.70 | |
| \$18.25 | |
| \$9.75 | |
| \$33.65 | |

Evaluate Calculate the order to determine the customer's change

| Order (o) | | | Expression | Payment | Change |
|---------------|-----|-----|---|---------|--------|
| b | c | d | | | |
| 3 | 0 | 1 | $3b + d$ $3 \times 3.50 + 1.50$ $10.50 + 1.50$ $\$12.00$ | \$15.00 | |
| 2 | 1 | 0 | | \$10.00 | |
| 3 | 2 | 1 | | \$20.00 | |
| 1 | 4 | 3 | | \$20.00 | |
| 3 | 5 | 4 | | \$30.00 | |

Evaluating Algebraic Expressions – ($x \div$)

Part 1

Evaluate for $x = -3$. Use brackets to separate the numbers

| | | | |
|----------|---------------|-------------|------------------|
| 1) $7x$ | 2) $6x$ | 3) $4x - 5$ | 4) $12x + 7$ |
| 5) $17x$ | 6) $15x - 10$ | 7) $8x - x$ | 8) $13x + 6 - x$ |

Part 2

Evaluate the following expressions for $y = -8$

| | | |
|-----------------------|-----------------------|---------------------------|
| 1) $\frac{y}{2}$ | 2) $\frac{32}{y}$ | 4) $\frac{y}{2} + 5$ |
| 5) $\frac{48}{y} + 7$ | 6) $\frac{88}{y} + y$ | 7) $\frac{1}{y} \times y$ |

Challenge!

Use three -5 s and any operation or brackets to write an expression with the values provided

| | Your Expressions | Value |
|----|------------------|-------|
| 1) | | -125 |
| 2) | | -5 |
| 3) | | 0 |
| 4) | | 50 |

| | Your Expressions | Value |
|----|------------------|-------|
| 5) | | 5 |
| 6) | | 30 |
| 7) | | 20 |
| 8) | | -6 |

Representing Situations - Division

Part 1

Solve the expressions below using $n = 6$ and $y = 3$

| | Expression | Answer |
|----|---------------------|--------|
| 1) | $(7 + 11) \div y$ | |
| 2) | $\frac{(n + 3)}{y}$ | |
| 3) | $\frac{12}{y}$ | |
| 4) | $\frac{12}{y}$ | |

| | Expression | Answer |
|----|--------------------------|--------|
| 5) | $\frac{(n + y + 6)}{y}$ | |
| 6) | $8 + \frac{(5n - 6)}{y}$ | |
| 7) | $\frac{n}{y}$ | |
| 8) | $\frac{(11 + 4)}{y}$ | |

Part 2

Write an expression for the situation in brackets to represent the situations

- 1) Gianna and her friends sold bracelets for a bracelet. They divided the earnings up equally amongst her (f) friends.

a) Write an expression that represents the situation.

- b) If Gianna worked with 2 other friends, how much would each friend get?



- 2) Zoey made 3 trays of cookies with 12 cookies on each tray. She divided the cookies up equally between (n) number of friends.

a) Write an expression that represents the situation.

- b) If Zoey split the cookies with 8 friends, how much would each friend get?



- 3) Mrs. Hubert has 8 packs of pencil crayons that have 12 crayons inside each pack. She divides the pencil crayons into (g) number of groups.

a) Write an expression that represents the situation.



- b) If Mrs. Hubert gave 6 crayons to each group, how many groups did she give to?

Evaluating Expressions - BEDMAS

Part 1

Evaluate the following expressions for $t = 6$

| | | | |
|----------------------|----------------------------|--------------------------|-----------------------|
| 1) $t + 16 \times 2$ | 2) $10t - (t + 4)$ | 3) $63 - (t)\frac{t}{3}$ | 4) $4t \div (2 + 10)$ |
| 5) $4t \div 2$ | 6) $12 + \frac{2t}{3} - 5$ | 7) $\frac{4t - t}{3}$ | 8) $18 + t \div 3$ |

Part 2

Evaluate the following expressions for $y = -8$ and $n = 2$

| | | |
|----------------------|-------------------------|----------------------|
| 1) $y + n \div (-2)$ | 2) $6n - 7y + (2n - 6)$ | 4) $y \div (-2 - n)$ |
| 5) $4n + 40 \div y$ | 6) $\frac{24n}{y} + 12$ | 7) $(15 + n)(y)$ |

Part 3

Evaluate the following expressions for $x = -10$ and $p = -5$

| | | |
|------------------------|------------------------|-----------------------------|
| 1) $2x(p + 5)$ | 2) $4x + (2p - x)$ | 3) $(-25) - (x)(p)$ |
| 4) $90 \div (p + -5x)$ | 5) $22 + 8x - (p + 5)$ | 6) $12 - \frac{5x}{p} + 5p$ |

Writing Expressions

An equation is a statement that two expressions are equal. An expression has no equal sign, whereas an equation has an equal sign. When we can solve the answer to an expression, it becomes an equation because we add an equal sign.

Expression

Eight more than a number

8
+
n

Equation

Eight more than a number is 14

$$8 + n = 14$$

$$n = 6$$

Part 1 Write equations for each sentence

| | Sentence | Equation | Answer |
|----|--|----------|--------|
| 1) | Eleven less than a number is six | | |
| 2) | Sixty-two more than a number is 10 | | |
| 3) | Eight times a number minus 3 is 15 | | |
| 4) | Twenty-eight divided by a number is four | | |
| 5) | A number plus sixteen divided by two is 10 | | |
| 6) | Nine times a number plus forty is 76 | | |

Part 2 Write a sentence in words for each equation

| Equation | Sentence | Value of n |
|----------------------------|----------|--------------|
| 1) $6n = 24$ | | |
| 2) $11 + n - 8 = 12$ | | |
| 3) $7 + \frac{32}{n} = 15$ | | |
| 4) $9n - 9 = 45$ | | |

Are They Equal? + -

Are the equations equal? Put a slash through the equal sign for any equations that are not equal.

$8 + 4 = 12$

$23 - (-7) \neq 16$

$42 + (-15) = 27$

Part 1

Put a slash through the equal sign (\neq) if it is not balanced

| | | |
|--------------------------|-----------------------|--------------------------|
| | 2) $13 + (-18) = -5$ | 3) $(-21) + 13 = -8$ |
| 4) $35 - (-11) = 26$ | 5) $7 - (-17) = 26$ | 6) $(-22) - 11 = -11$ |
| 7) $53 - (-15) = 68$ | 8) $7 - 4 = 3$ | 9) $(-48) + (-12) = 60$ |
| 10) $(-67) - (-9) = -58$ | 11) $38 + (-144) = 6$ | 12) $212 - (-12) = -224$ |

Part 2

Fill in the missing number to balance the equation

| | | |
|----------------------------|-----------------------------|----------------------------|
| 1) $\square + (-12) = -19$ | 2) $\square - 14 = 23$ | 3) $\square - 7 = -26$ |
| 4) $42 + (-14) = \square$ | 5) $(-62) - \square = -75$ | 6) $\square + (-32) = -61$ |
| 7) $71 + \square = 63$ | 8) $83 + (-19) = \square$ | 9) $(-37) - \square = -89$ |
| 10) $109 + \square = 101$ | 11) $121 - (-14) = \square$ | 12) $100 + \square = -172$ |

Name: _____

Matching Game: Do The Equations Match?

Objective

What are we learning about?

To enhance students' understanding of equivalent equations. Students will identify and match pairs of equations that yield the same result, fostering critical thinking and problem-solving skills in a collaborative group setting.

Materials

What will need for the activity.

- Pre-prepared pre-cut matching cards.
- Small bags or envelopes to hold the cards for each group



Instructions

How you will complete the activity.

1. Before the class, the teacher will cut out the prepared matching game cards.
2. Divide the students into small groups and give each group a bag or envelope containing a set of the matching cards.
3. In their groups, students will spread out the cards face down on their table.
4. Each person takes a turn to try to match two cards. They will need to solve both equations to see if they match (equal the same).
5. If they find a correct match, they keep the cards out and continue with their next turn. If the cards don't match, they turn them back over in the same place, and the next player takes a turn.
6. The activity continues until all pairs are correctly matched within each group.

Name: _____

99

Cards

Matching Game Cards

$$60 + (-15) + 20$$

$$55 - (-10)$$

$$100 + (-25)$$

$$90 + (-20) + 12$$

$$52 + 20 + 30$$

$$-104 + 151 + 112$$

$$366 - 150 + 57$$

$$20 + 180$$

$$250 - 50$$

PREVIEW

Name: _____

101

Cards

Matching Game Cards

$71 + (-26)$

$155 - 110$

$328 + (-10)$

$313 - (-10)$

$160 - 75 - 30$

$100 + (-20) - 25$

$-73 + 145$

$192 - 100$

$102 - 28 + 17$

$147 + (-19) - 37$

Cards

Matching Game Cards

$98 + (-43)$

$75 + 20 - 40$

$290 - 99$

$89 - 49 + 18$

$56 + 42 + 14$

$-83 + 249$

$199 + (-66) + 33$

$77 - 25 + 12$

$40 + 24 - 0$

PREVIEW

Finding The Value of a Variable

When we write an algebraic expression with an equal sign, it becomes an equation. An equation is a statement that two expressions are equal.

We can solve for a variable by balancing an equation, making sure both sides of the equal sign have the same value.



Part 1 Find out the value of the variable

| | | |
|-------------------------------|------------------------------|---------------------------------|
| 1) $n = 15$ $n =$ | 2) $n + 15 = 29$ $n =$ | 3) $36 - n = 28$ $n =$ |
| 4) $45 - 19 = p$ $p =$ | 5) $2 + p = 62$ $p =$ | 6) $p - 13 = (-25)$ $p =$ |
| 7) $13 - y = (-10)$ $y =$ | 8) $10 - y = 2$ $y =$ | 9) $(-32) - 15 = y$ $y =$ |
| 10) $27 + t = (-12)$ $t =$ | 11) $36 - t = (-2)$ $t =$ | 12) $(-2) + t = (-49)$ $t =$ |

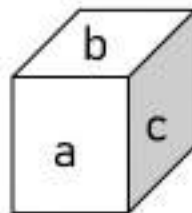
Part 2

The formula for calculating the surface area of a rectangular prism is to add the areas of each side together

Use the following equation to find the surface area (s) of a rectangular prism:

$$s = a + a + b + b + c + c \quad \text{or} \quad s = 2a + 2b + 2c$$

| | | | |
|-------------------------|-----|-------------------------|-----|
| 1) $a=6$ $b=11$ $c=10$ | SA= | 4) $a=26$ $b=15$ $c=41$ | SA= |
| 2) $a=9$ $b=14$ $c=21$ | SA= | 5) $a=35$ $b=32$ $c=49$ | SA= |
| 3) $a=11$ $b=21$ $c=25$ | SA= | 6) $a=29$ $b=19$ $c=52$ | SA= |



Addition Equations – Golf Tournament - Challenge

Zack hosted a 4-round golf tournament. He has the results and needs to find out who won the tournament. The leaderboard is below but is missing numbers.



Directions

Fill in the leaderboard

| Player | Round 1 | Round 2 | Round 3 | Round 4 | Final Score |
|----------|---------|---------|---------|---------|-------------|
| Riley | | -6 | 4 | -5 | |
| Charlie | | -2 | 5 | | -5 |
| Dominic | | | | 9 | -6 |
| Kayden | -3 | -7 | -1 | -5 | |
| Silas | 5 | 3 | 6 | | -1 |
| Lillian | 5 | 8 | | | 9 |
| Brooklyn | -4 | -2 | | | -5 |
| Natalie | | 7 | 2 | -6 | -4 |
| Andrew | -5 | 4 | 1 | - | |
| Santiago | | -3 | -8 | | -22 |

Results

Who won the golf tournament?

1) Who won the golf tournament?

2) The entry fee for the tournament was \$75. All the money went to the prize (p). Write an equation that determines the value for (p).

3) More golfers joined the tournament. The prize ended up being \$1125. Write an equation that determines how many golfers (g) participated in the tournament.

Integer Patterns – Average Temperatures

Directions

Answer the questions below



6 friends participated in a 4-round golf tournament. The table below shows what each friend scored.

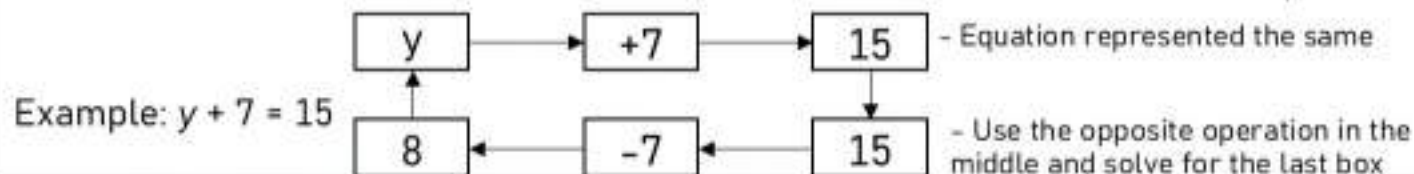
| Player | Round 1 | Round 2 | Round 3 | Round 4 | Final Score |
|------------|---------|---------|---------|---------|-------------|
| Kylie | -3 | -5 | +4 | -4 | |
| Finn | -3 | +2 | +5 | -6 | |
| Maggie | | -3 | +1 | +7 | |
| Dawson (d) | | -9 | -2 | -4 | |
| Zayn (z) | | | -8 | +5 | |
| Leon (l) | | | -6 | +4 | |

- a) Fill in their final score.
- b) Write an equation that shows the difference between Finn's (f) final score and Zayn's (z) final score. Use variables before you solve.
- c) Suppose Kylie and Maggie played on a team against Dawson. Write an equation that shows the difference between their team scores.
- d) Suppose Dawson and Zayn were on a team against Leon and Maggie. Write an equation that shows the difference between their team scores.
- e) Suppose Kylie, Finn, and Maggie played on a team against Dawson, Zayn, and Leon. Write an equation that shows the difference between their team scores.
- f) Use the variables b for best round and w for worst round to write an equation that finds the difference between the best and worst players.



Adding and Subtracting Equations – Flow Chart

We can use a reverse flow chart to calculate the value of a variable in an equation.



Direction Use the flow chart to find the value of the variable

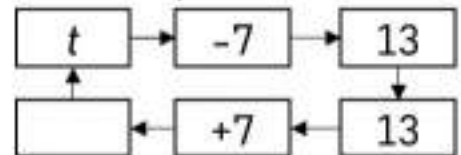
| | | | |
|------------------|---|-------------------|---|
| 1) $t - 7 = 12$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> t -7 12 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> +7 12 </div> | 7) $t - 13 = -5$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> t -13 -5 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> +13 -5 </div> |
| 2) $r - 9 = 16$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> r -9 16 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> +9 16 </div> | 8) $r - 16 = 38$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> r +16 38 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -16 38 </div> |
| 3) $c + 11 = 17$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> c +11 17 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -11 17 </div> | 9) $c + 11 = 17$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> c +11 17 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -11 17 </div> |
| 4) $b + 12 = 5$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> b +12 5 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -12 5 </div> | 10) $b + 14 = 31$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> b +14 31 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -14 31 </div> |
| 5) $p - 9 = 21$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> p -9 21 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> +9 21 </div> | 11) $p + 8 = 5$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> p +8 5 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -8 5 </div> |
| 6) $x + 16 = 11$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> x +16 11 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> -16 11 </div> | 12) $x - 7 = -3$ | <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> x -7 -3 </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> +7 -3 </div> |

Adding and Subtracting Equations – Flow Chart

Steps to fill in a flow chart:

- 1) Write the variable in the first box
- 2) Write the second value in the second box
- 3) Write the answer in the third box
- 4) We are working in reverse now. Write the answer in the first box
- 5) We do the opposite to the next box as we did with the second box
- 6) Fill in the last box to find the value of the variable, which it points to

Example: $t - 7 = 13$



Directions: Fill in the blanks in the flow chart

| | | |
|------------------|--|--|
| 1) $t - 4 = 9$ | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> |
| 2) $r - 6 = -8$ | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> |
| 3) $c + 9 = 5$ | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> |
| 4) $b + 11 = -2$ | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> |
| 5) $p - 8 = -5$ | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 40px; height: 20px; margin: 0 auto;"></div> </div> </div> |

Adding and Subtracting Equations – Flow Chart

Directions

Fill in the blanks in the flow chart

| | |
|-----------------------|---|
| 1) $t - 7 + 9 = 15$ | <pre> t → -7 → +9 → 15 ↑ 13 ← +7 ← -9 ← 15 </pre> |
| 2) r | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 3) $c + 7 - 14 = 1$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 4) $b - 11 + 7 = -5$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 5) $p - 5 + 13 = 2$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 6) $c + 16 - 13 = -4$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 7) $b + 11 + 6 = 15$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |
| 8) $p - 9 - 15 = -13$ | <pre> [] → [] → [] → [] ↑ [] ← [] ← [] ← [] </pre> |

Name: _____

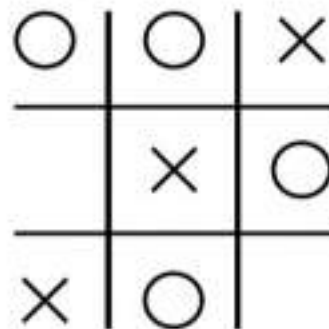
111

Math Tic-Tac-Toe: Balance The Equations

Objective

What are we learning about?

To help students practice solving and balancing equations involving variables in a fun and interactive way through a Tic-Tac-Toe game.



Materials

What you will need for the activity.

- Tic-Tac-Toe boards provided

Instructions

How you will complete the activity

1. Find a partner to play the game.
2. The goal is to solve and balance the algebraic equations in each square to place your marker (X or O).
3. One player will be "X" and the other will be "O".
4. Take turns choosing a square and solving the equation in that square to find the value of the variable.
5. Write down the solution below the equation and place your marker (X or O) in the square.
6. If a player chooses a square and solves the equation incorrectly, they do not get to place their marker in that square. The other player gets a chance to solve it correctly and place their marker.
7. The first player to get three markers in a row (horizontally, vertically, and diagonally) wins the game. Continue playing with different tic-tac-toe grids on the sheet.

Tic-Tac-Toe

Use the following tic-tac-toe grids for the game.

| | | |
|---------------------------------------|---|-------------------------------------|
| $72 \div \underline{\quad} = 8$ | $(-18) \times \underline{\quad} = 54$ | $\underline{\quad} + 7 = 10$ |
| $(-15) \times \underline{\quad} = 45$ | $84 \div (-12) = \underline{\quad}$ | $\underline{\quad} \times 13 = 104$ |
| $99 \div \underline{\quad} = (-9)$ | $\underline{\quad} \times (-5) = \underline{\quad}$ | $\underline{\quad} + 6 = (-9)$ |

| | | |
|---------------------------------------|---|------------------------------------|
| $300 \div \underline{\quad} = 25$ | $(-20) \times \underline{\quad} = 100$ | $\underline{\quad} + 4 = 6$ |
| $(-24) \times \underline{\quad} = 72$ | $56 \div (-8) = \underline{\quad}$ | $\underline{\quad} \times 15 = 75$ |
| $88 \div \underline{\quad} = (-11)$ | $(-30) \times (-3) = \underline{\quad}$ | $\underline{\quad} + 5 = (-7)$ |

| | | |
|---------------------------------------|---|---|
| $144 \div \underline{\quad} = 122$ | $(-25) \times \underline{\quad} = 100$ | $\underline{\quad} + 5 = 10$ |
| $(-21) \times \underline{\quad} = 63$ | $90 \div (-10) = \underline{\quad}$ | $\underline{\quad} \times 20 = \underline{\quad}$ |
| $120 \div \underline{\quad} = (-10)$ | $(-28) \times (-7) = \underline{\quad}$ | $\underline{\quad} + 10 = (-4)$ |

| | | |
|---------------------------------------|---|-------------------------------------|
| $64 \div \underline{\quad} = 8$ | $(-22) \times \underline{\quad} = 110$ | $\underline{\quad} + 5 = 10$ |
| $(-18) \times \underline{\quad} = 54$ | $49 \div (-7) = \underline{\quad}$ | $\underline{\quad} \times 18 = 108$ |
| $81 \div \underline{\quad} = 33$ | $\underline{\quad} \times (-3) = \underline{\quad}$ | $\underline{\quad} + 8 = (-5)$ |

| | | |
|---------------------------------------|---|-------------------------------------|
| $108 \div \underline{\quad} = 9$ | $(-16) \times \underline{\quad} = 64$ | $\underline{\quad} + 12 = 8$ |
| $(-27) \times \underline{\quad} = 81$ | $72 \div (-6) = \underline{\quad}$ | $\underline{\quad} \times 25 = 125$ |
| $132 \div \underline{\quad} = (-11)$ | $(-40) \times (-5) = \underline{\quad}$ | $\underline{\quad} \div 3 = (-15)$ |

| | | |
|--|--|-------------------------------------|
| $84 \div \underline{\quad} = 12$ | $(-14) \times \underline{\quad} = \underline{\quad}$ | $\underline{\quad} + 2 = 20$ |
| $(-35) \times \underline{\quad} = 105$ | $63 \div (-9) = \underline{\quad}$ | $\underline{\quad} \times 10 = 100$ |
| $150 \div \underline{\quad} = (-15)$ | $(-45) \times (-6) = \underline{\quad}$ | $\underline{\quad} + 7 = (-8)$ |

Tic-Tac-Toe

Use the following tic-tac-toe grids for the game.

| | | |
|--|---|-----------------------------------|
| $96 \div \underline{\quad} = 16$ | $(-12) \times \underline{\quad} = 60$ | $\underline{\quad} + 6 = 12$ |
| $(-42) \times \underline{\quad} = 84$ | $48 \div (-8) = \underline{\quad}$ | $\underline{\quad} \times 5 = 35$ |
| $180 \div \underline{\quad} = \underline{\quad}$ | $\underline{\quad} \div (-4) = \underline{\quad}$ | $\underline{\quad} + 9 = (-9)$ |

| | | |
|--|---|-----------------------------------|
| $128 \div \underline{\quad} = 16$ | $(-18) \times \underline{\quad} = 72$ | $\underline{\quad} + 4 = 8$ |
| $(-36) \times \underline{\quad} = 108$ | $75 \div (-15) = \underline{\quad}$ | $\underline{\quad} \times 6 = 36$ |
| $110 \div \underline{\quad} = (-11)$ | $(-25) \times (-8) = \underline{\quad}$ | $\underline{\quad} + 10 = (-6)$ |

| | | |
|---------------------------------------|---|---------------------------------|
| $192 \div \underline{\quad} = 16$ | $(-24) \times \underline{\quad} = 8$ | $\underline{\quad} + 3 = 12$ |
| $(-30) \times \underline{\quad} = 90$ | $54 \div (-6) = \underline{\quad}$ | $\underline{\quad} \div 6 = 16$ |
| $200 \div \underline{\quad} = (-10)$ | $(-44) \times (-3) = \underline{\quad}$ | $\underline{\quad} + 2 = (-10)$ |

| | | |
|---------------------------------------|---------------------------------------|------------------------------------|
| $72 \div \underline{\quad} = 9$ | $(-15) \times \underline{\quad} = 60$ | $\underline{\quad} + 4 = 10$ |
| $(-12) \times \underline{\quad} = 16$ | $80 \div (-8) = \underline{\quad}$ | $\underline{\quad} \times 14 = 98$ |
| $135 \div \underline{\quad} = 15$ | $\underline{\quad} \div 3 = 16$ | $\underline{\quad} + 6 = (-5)$ |

| | | |
|---------------------------------------|---|------------------------------------|
| $48 \div \underline{\quad} = 8$ | $(-21) \times \underline{\quad} = 105$ | $\underline{\quad} \div 7 = 9$ |
| $(-16) \times \underline{\quad} = 48$ | $60 \div (-10) = \underline{\quad}$ | $\underline{\quad} \times 11 = 88$ |
| $72 \div \underline{\quad} = (-6)$ | $(-40) \times (-4) = \underline{\quad}$ | $\underline{\quad} + 3 = (-8)$ |

| | | |
|---------------------------------------|--|-----------------------------------|
| $64 \div \underline{\quad} = 16$ | $(-20) \times \underline{\quad} = \underline{\quad}$ | $\underline{\quad} + 8 = 5$ |
| $(-28) \times \underline{\quad} = 56$ | $100 \div (-25) = \underline{\quad}$ | $\underline{\quad} \times 7 = 28$ |
| $90 \div \underline{\quad} = (-9)$ | $(-36) \times (-2) = \underline{\quad}$ | $\underline{\quad} + 12 = (-6)$ |

PIRATED

Writing Multiplication Equations – Gas Station

Tyler works at a gas station. He sells fuel by the litre, chips, drinks, and chocolate bars.

| Fuel (f) | Chips (c) | Drinks (d) | Chocolate Bars (b) |
|---|---|---|---|
| \$1.33/L | \$1.75 | \$1.25 | \$1.99 |
|  |  |  |  |

Instructions:

Complete the table below. The first one is done for you

| # | F | C | D | B | Equation | Answer |
|---|----|---|---|---|------------|---|
| 1 | 20 | 2 | 0 | 0 | $20f + 2c$ | $t = 20 \times 1.33 + 2 \times 1.75$ $t = 26.6 + 3.50$ $t = \$30.1$ |
| 2 | 50 | 0 | 3 | 2 | | |
| 3 | 0 | 2 | 1 | 0 | | |
| 4 | 60 | 1 | 2 | 2 | | |
| 5 | 0 | 2 | 0 | 0 | | |
| 6 | 0 | 1 | 1 | 0 | | |
| 7 | 25 | 2 | 1 | 2 | | |
| 8 | 70 | 0 | 1 | 3 | | |

Multiplying Decimals – Solve The Variable

Practice

Find the value of the variables below

| | | |
|--------------------------------|--------------------------------------|---|
| 1) $2.5n = -15.0$ $n =$ | 2) $5.2n = 15.6$ $n =$ | 3) $(-2.2s) = 11$ $s =$ |
| 4) $1.3p = 3$ $p =$ | 5) $\frac{p}{4.5} = -4$ $p =$ | 6) $\frac{-45.5}{r} = -7$ $r =$ |
| 7) $(-8.3n) = 4$ $n =$ | 8) $(-10.2s) = 61.2$ $s =$ | 9) $\frac{-18.6}{n} = 3.1$ $n =$ |

Word Problem

Write the equation for the variable and then solve the equation

- It rained 4.6mm every hour. In total, it rained 32.2mm. How many hours (h) did it rain?
- A football team loses 4 yards every minute. How many yards did the football team lose in 20 minutes?
- Dean went for lunch 5 times last week. He spent \$42.50 in total on lunch. How much did he spend on each lunch (l)?
- Lilly, Samantha, and Aspen all went out for dinner. They split the bill 3 ways. Each of them left the restaurant with -\$25.22 in their pockets. How much was the bill?



Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Write the equation using the variable
and then solve the equation

A bicycle rental costs \$12.50 per
hour. How much (c) will it cost to rent
the bicycle for 6.5 hours?

Name: _____

Write the equation using the variable
and then solve the equation

A bicycle rental costs \$12.50 per
hour. How much (c) will it cost to rent
the bicycle for 6.5 hours?

Name: _____

Write the equation using the variable
and then solve the equation

A bicycle rental costs \$12.50 per
hour. How much (c) will it cost to rent
the bicycle for 6.5 hours?

Name: _____

Write the equation using the variable
and then solve the equation

A bicycle rental costs \$12.50 per
hour. How much (c) will it cost to rent
the bicycle for 6.5 hours?

Activity: Decimal Multiplication Race

Objective

What are we learning about?

Students will practice multiplication of decimals to solve for a variable by racing to solve equations quickly and accurately.

Materials

What you will need for the activity.

- Index cards or paper
- Markers or pens
- Timer (optional)



Instructions

How to complete the activity

1. Prepare a stack of index cards with a variety of decimal equations involving variables. Include a mix of problems to ensure variety.
2. Have students line up in a single file.
3. Call the first two students in line to the front of the line to race to answer the multiplication algebraic equation question that the teacher pulls from the stack.
4. Pull a card from the stack and read the question aloud.
5. The first student to answer correctly wins the round. If a student says the wrong answer, they are out and go to the end of the line.
6. The student who answers correctly stays at the front to compete against the next student in line.
7. The student who loses goes to the end of the line.
8. Optional: If a student wins five rounds in a row, they move to the back of the line to give others a chance to play.
9. Continue the game until all students have had a chance to compete multiple times or until the designated game time is up.

Multiplication Equations

Use these for the race

$3.5m = 17.5$

$4.2a = -21.0$

$1.5n = 9.0$

$-4.8b = 14.4$

$-3.3x = 6.6$

$-2.7k = 8.1$

$p / -4 = 5.5$

$-5.4y = 27.0$

$-1.5x =$

$z = -1.1$

$-4.4 / w = -2.2$

$7.2y = -28.8$

$2.8 / z = -1.1$

$3.6t = -18.0$

$-6.6 / z = 2.2$

$9.0 / p = -1.0$

$7.5k = 22.5$

$t / -3 = -2.2$

$-8.1v = -24.3$

$1.2z =$

$-8.5w = 34.0$

$5.5 / s = -1.1$

$7.4b = 29.6$

$v / 4.4 = -5$

$2.2c = -11.0$

$4.0d = -16.0$

$-9.0k = 18.0$

$-6.4j = 19.2$

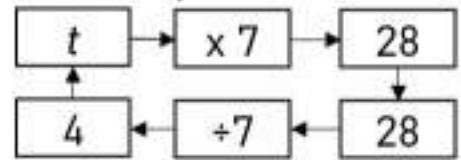
$3.3h = -9.9$

Multiplying Equations – Flow Chart

Steps to fill in a flow chart:

- 1) Write the variable in the first box
- 2) Write the second value in the second box
- 3) Write the answer in the third box
- 4) We are working in reverse now. Write the answer in the first box
- 5) We do the opposite to the next box as we did with the second box
- 6) Fill in the last box to find the value of the variable, which it points to

Example: $7t = 28$



Directions: Fill in the blanks in the flow chart

| | | | |
|----------------|--|------------------|--|
| 1) $7t = 28$ | | 2) $12t = -84$ | |
| 2) $3r = 15$ | | 3) $-55 = -55$ | |
| 3) $-9c = 36$ | | 4) $-7c = 63$ | |
| 4) $-6b = -42$ | | 5) $-12b = -132$ | |
| 5) $8p = -72$ | | 6) $-9n = 63$ | |

Multiplying Equations – Flow Chart

Directions

Fill in the blanks in the flow chart

| | |
|---------------------------|--|
| 1) $7t + (-7) = 28$ | <pre> graph LR t[t] --> x7[x 7] x7 --> m7[-7] m7 --> n28[28] n28 --> n28_2[28] n28_2 --> p7_2[+7] p7_2 --> p7_1[+7] p7_1 --> q5[5] q5 --> t </pre> |
| 2) $6x - 5 = 5$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 3) $9c - 8 = 73$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 4) $(-4b) + 9 = (-35)$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 5) $5p - (-7) = 37$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 6) $(-8c) + (-6) = (-38)$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 7) $(-10b) + 12 = 72$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |
| 8) $11p - 9 = (-86)$ | <pre> graph LR A[] --> B[] B --> C[] C --> D[] D --> D_2[] D_2 --> E_2[] E_2 --> E_1[] E_1 --> F[] F --> A </pre> |

Writing Division Equations - Sharing

Mark is the best boss! Every week, he brings in treats for his staff to share. Each week, there are different treats and a different number of staff members working at the office.



Instructions

Use a formula to find out how many treats (t) each person gets

| # | | # of Staff (s) | Formula | Answer |
|----|------------------------|----------------|-------------------|--------------------|
| 1 | 18 donuts (d) | 6 | $\frac{d}{s} = t$ | $\frac{18}{6} = 3$ |
| 2 | 12 cookies (c) | 6 | $\frac{c}{s} = t$ | $\frac{12}{6} = 2$ |
| 3 | 28 muffins (m) | 4 | | |
| 4 | 88 slices of pizza (p) | 22 | | |
| 5 | 56 bagels (b) | 7 | | |
| 6 | 48 donuts (d) | 12 | | |
| 7 | 12 cookies (c) | 4 | | |
| 8 | 72 muffins (m) | 9 | | |
| 9 | 25 pastries (p) | 10 | | |
| 10 | 50 cookies (c) | 20 | | |
| 11 | 64 slices of pizza (p) | 8 | | |
| 12 | 30 bagels (b) | 20 | | |
| 13 | 75 muffins (m) | 50 | | |

Writing Division Equations - Investments

An investment club is a group of investors who pool their money to make investments. Each member of the group helps study new investment opportunities. When an investment earns money, they split the earnings. When an investment loses money, they split the losses.



Instruction

Use a formula to find out the balance for each person in the club

| # | Investment | # of People in the Club (n) | Formula | Answer |
|----|--------------|-----------------------------|-------------------|------------------------|
| 1 | \$400 loss | 8 | $\frac{i}{n} = t$ | $\frac{-400}{8} = -50$ |
| 2 | \$600 gain | | | |
| 3 | \$800 loss | 5 | | |
| 4 | \$1200 loss | 8 | | |
| 5 | \$ 750 gain | 5 | | |
| 6 | \$5000 gain | 20 | | |
| 7 | \$2500 loss | 25 | | |
| 8 | \$3600 loss | 24 | | |
| 9 | \$12500 gain | 5 | | |
| 10 | \$8000 gain | 40 | | |
| 11 | \$6800 loss | 17 | | |
| 12 | \$25000 loss | 20 | | |
| 13 | \$84000 gain | 16 | | |

Division Equations – Flow Chart

Directions

Fill in the blanks in the flow chart



| | | | |
|-------------------------|--|--------------------------|--|
| 1) $\frac{t}{-6} = 4$ | <pre> graph TD A[t] --> B[÷ -6] B --> C[4] D[-24] --> E[x -6] E --> F[4] C --> F </pre> | 7) $\frac{t}{8} = -4$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |
| 2) $\frac{r}{-7} = 8$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> | 8) $\frac{r}{-12} = 9$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |
| 3) $\frac{c}{4} = -7$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> | 9) $\frac{c}{-6} = -7$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |
| 4) $\frac{b}{11} = 6$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> | 10) $\frac{b}{-15} = 4$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |
| 5) $\frac{p}{-7} = -12$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> | 11) $\frac{p}{8} = 12$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |
| 6) $\frac{n}{-2} = -33$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> | 12) $\frac{n}{-13} = -6$ | <pre> graph TD A[] --> B[] B --> C[] D[] --> E[] E --> F[] C --> F </pre> |

Evaluating Equations

Instructions

Evaluate the equations below

1)

$$x = 9 + 14 - 5$$

2)

$$x = 7 \times 4 - 11$$

3)

$$x = 5 - 5$$

4)

$$x = 25 - 4 \times 3$$

5)

$$x = 6 + 5 - 5 \times 3$$

6)

$$x = 3 - 23$$

7)

$$x = 8 \times 5 \div (-2)$$

8)

$$x = (2 - 5) \div 7$$

9)

$$x = 24 \div 6 \times (-5)$$

10)

$$x = 61 - 6 + (-15)$$

Evaluating Equations – Isolating The Variable

Steps to isolate a variable:

1. Add or subtract the same amount from both sides so that the variable is by itself
2. If the number that is with the variable is positive, you will subtract the same number from both sides.
3. If it is negative, you will add the number to both sides.
4. Leave your answer with the variable on the left (examples 2/3)

Ex

$$x + 10 = 23$$

Example 2

$$\begin{aligned}15 &= x + 9 \\15 - 9 &= x + 9 - 9 \\6 &= x \\x &= 6\end{aligned}$$

Example 3

$$\begin{aligned}-34 &= 6x - 4 \\-34 + 4 &= 6x - 4 \\-\frac{30}{6} &= \frac{6x}{6} \\-5 &= x \\x &= -5\end{aligned}$$

Instructions

Evaluate the equation below

1)

$$x - 5 = 15$$

$$x + 17 = 31$$

3)

$$x + 12 = 25$$

4)

$$x - 3 = 20$$

5)

$$9 = x + 13$$

6)

$$24 = x - 15$$

7)

$$x + 32 = 25$$

8)

$$48 = x + 56$$

Evaluating Equations – Isolating The Variable**Instructions**

Evaluate the equations below

1)

$$(-6) + x = 3$$

2)

$$x - 7 = -4$$

3)

$$x - 5 = 12$$

4)

$$(-7) + x = 15 - 7$$

5)

$$14 + x = 11 \times 4 - 5$$

6)

$$96 \div 15 = x$$

7)

$$x + 6 = 6 \times (-2)$$

8)

$$x + (3 \times 4) = 60 \div (-10)$$

Name: _____

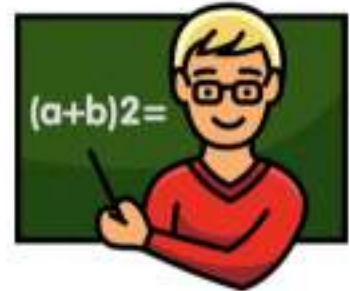
130

Activity – Math Hot Seat: Evaluating Equations

Objective

What are we learning about?

Students will practice evaluating equations by participating in a fun and interactive game, enhancing their arithmetic skills and quick thinking.



Materials

What you will need for the activity.

- List of equations provided
- Chairs arranged in a circle
- Stopwatch or timer
- Whiteboard and markers

Instructions

How you will complete the activity.

1. Prepare a stack of index cards with various equations.
2. Arrange chairs in a circle with one "hot seat" chair.
3. Explain the rules of the game to the students. One student will sit in the hot seat while the rest sit in the surrounding chairs.
4. The teacher will read equations from the provided sheet (alternatively, the teacher can write the questions on the board). The student in the hot seat has a limited time (e.g., 30 seconds) to solve for the variable.
5. If the student in the hot seat answers correctly within the time limit, they stay in the hot seat for the next round. If they answer incorrectly or run out of time, they switch places with another student from the circle.
6. Continue the game until each student has had the opportunity to sit in the hot seat multiple times, or until the designated game time is up.
7. Keep track of the number of correct answers each student provides while in the hot seat. The student with the most correct answers at the end of the game wins.

Equations

Use the equations below


| Equation | Solution |
|----------------------------|-----------|
| $x + 5 - 8 = 9$ | $x = 12$ |
| $6x + (-3) = 45$ | $x = 8$ |
| $x/(-7) + (-13) = -21$ | $x = 56$ |
| $x = 8 + 5 - 7$ | $x = 6$ |
| $x = 16 - 4$ | $x = 5$ |
| $x = 25$ | $x = 13$ |
| $x - 5 = 15$ | $x = 20$ |
| $x + 32 = 25$ | $x = -7$ |
| $x - 7 = -4$ | $x = 3$ |
| $x - 17 = -5$ | $x = 12$ |
| $(-6) + x = 3$ | $x = 9$ |
| $(-7) + x = 15 - 7$ | $x = 15$ |
| $x + 6 = 6 \times (-2)$ | $x = -18$ |
| $14 + x = 11 \times 4 - 5$ | $x = 2$ |
| $3x + 2 = 17$ | $x = 5$ |
| $x/2 - 7 = 3$ | $x = 20$ |
| $x + 9 - 4 = 12$ | $x = 7$ |
| $2x - 5 = 11$ | $x = 8$ |
| $x/5 + 3 = 6$ | $x = 15$ |
| $4x + (-8) = 12$ | $x = 5$ |
| $x - 9 + 3 = -1$ | $x = 5$ |
| $5x - 2 = 18$ | $x = 4$ |
| $x/3 - 5 = -2$ | $x = 9$ |
| $x - 7 = 0$ | $x = 7$ |

| | |
|------------------|----------|
| $7x + (-4) = 24$ | $x = 4$ |
| $x/6 + (-1) = 5$ | $x = 36$ |
| $8 + x - 3 = 7$ | $x = 2$ |
| $6x - 7 = 29$ | $x = 6$ |
| $x/4 - 2 = 0$ | $x = 8$ |
| $x + 6 - 4 = 5$ | $x = 3$ |
| $3x - 9 = 15$ | $x = 8$ |
| $x/5 - 2 = 20$ | $x = 20$ |
| $9 + x - 5 = 22$ | $x = 8$ |
| $4x - 3 = 13$ | $x = 4$ |
| $x/7 + (-2) = 1$ | $x = 21$ |
| $5 + x - 2 = 9$ | $x = 6$ |
| $2x - 6 = 10$ | $x = 8$ |
| $x/3 - 5 = -1$ | $x = 12$ |
| $7 + x - 4 = 6$ | |
| $3x - 5 = 10$ | $x = 5$ |
| $x/4 - 3 = 2$ | $x = 20$ |
| $x + 8 - 3 = 10$ | $x = 5$ |
| $2x - 7 = 9$ | $x = 8$ |
| $x/2 - 4 = 3$ | $x = 14$ |
| $5 + x - 7 = 6$ | $x = 8$ |
| $4x - 8 = 16$ | $x = 6$ |
| $x/3 - 2 = 4$ | $x = 18$ |
| $9 + x - 6 = 5$ | $x = 2$ |
| $6x - 8 = 16$ | $x = 4$ |




Representing Linear Equations ($ax = b$)

Instructions

Write a pictorial representation of the linear equations provided

| # | Linear Equation ($ax = b$) | Pictorial Representation |
|-----|------------------------------|--|
| Ex) | $4x = 28$ $x = 7$ |  4 groups of 7 = 28 |
| 1) | $5x = 45$ $x =$ | |
| 2) | $7x = 49$ $x =$ | |
| 3) | $9x = 72$ $x =$ | |
| 4) | $8x = 96$ $x =$ | |
| 5) | $2x = 144$ $x =$ | |
| 6) | $6x = 84$ $x =$ | |
| 7) | $4x = 64$ $x =$ | |


Representing Problems with Linear Equations ($ax = b$)**Instructions**Represent the problems with linear equations ($ax = b$) and solve for x

| | |
|----|--|
| 1) | Gianna drove 110km per hour for many hours to get to her cottage that is 770km away. How many hours did she drive for? Linear equation: _____ $x =$ _____ |
| 2) | She drinks 15 full bottles of water each day. She drinks a total of 4500mL of water every day. How many mL are in her bottle? Linear equation: _____ $x =$ _____  |
| 3) | Avery ran 7 laps around her neighbourhood. She ended up running 4200m in total. What is the distance of her neighbourhood? Linear equation: _____ |
| 4) | Mason just finished a video game he had just bought. He played it every day for 10 days. He played for a total of 1250 minutes. How many minutes did he play each day? Linear equation: _____ $x =$ _____  |
| 5) | Levi finished recording 6 songs with his band. It took them 174 minutes to record all 6 songs. On average, how many minutes did it take them to record each song? Linear equation: _____ $x =$ _____ |
| 6) | Owen types 32 words per minute. He typed an essay that was 256 words long. How many minutes did it take him to type the essay? Linear equation: _____ $x =$ _____  |

Representing Linear Equations ($ax + b = c$)

Instructions

Write a pictorial representation of the linear equation provided

| # | Linear Equation | Pictorial Representation |
|-----|--------------------------|--|
| Ex) | $3x + 5 = 23$ $x = 6$ |  3 groups of 6 + 5 = 23 |
| 1) | $6x + 9 = 45$ $x =$ | |
| 2) | $8x + 9 = 99$ $x =$ | |
| 3) | $5x + 8 = 43$ $x =$ | |
| 4) | $7x + 8 = 50$ $x =$ | |
| 5) | $2x + 12 = 42$ $x =$ | |
| 6) | $4x + 22 = 66$ $x =$ | |
| 7) | $8x + 15 = 79$ $x =$ | |

Representing Problems with Linear Equations ($ax + b = c$)**Instructions**Represent the problems with linear equations ($ax + b = c$) and solve for x

1) Dylan went to an arcade. He had to pay for each game he played. He ended up playing 8 games. He also had to pay \$12 to enter the arcade. In total, it cost him \$36 at the arcade. How much does each game cost?

Linear equation: _____

 $x =$ _____

2) For babysitting, Ashley charges a flat fee of \$10, plus \$4 per hour. Ashley earned \$46 babysitting. How long did she babysit for?

Linear equation: _____

 $x =$ _____

3) Riley has \$30 saved to buy a new coat. She is able to save \$7 a week from her allowance. How many weeks will it be until she has the \$128 she needs for her new coat?

Linear equation: _____

 $x =$ _____

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Represent the problems with linear equations ($ax + b = c$) and solve for x .

A car rental company charges a flat fee of \$25 plus \$5 per hour for renting a car. If the total cost for renting the car was \$60, for how many hours did the customer rent the car?

Name: _____

Represent the problems with linear equations ($ax + b = c$) and solve for x .

A car rental company charges a flat fee of \$25 plus \$5 per hour for renting a car. If the total cost for renting the car was \$60, for how many hours did the customer rent the car?

Name: _____

Represent the problems with linear equations ($ax + b = c$) and solve for x .

A car rental company charges a flat fee of \$25 plus \$5 per hour for renting a car. If the total cost for renting the car was \$60, for how many hours did the customer rent the car?

Name: _____

Represent the problems with linear equations ($ax + b = c$) and solve for x .

A car rental company charges a flat fee of \$25 plus \$5 per hour for renting a car. If the total cost for renting the car was \$60, for how many hours did the customer rent the car?


Solving Linear Equations ($ax=b$, $ax+b=c$)**Instructions**Solve the linear equations below by determining the value of x

| | | |
|-----------------------------------|-----------------------------------|-----------------------------------|
| 1) $8x = 56$ $x =$ | 2) $6x + 8 = 50$ $x =$ | 3) $9x + 11 = 83$ $x =$ |
| 4) $5x = 20$ $x =$ | 5) $4x + 17 = 45$ $x =$ | 6) $8x + 15 = 71$ $x =$ |
| 7) $11x = 55$ $x =$ | 8) $17x + 24 = 94$ $x =$ | 9) $9x = 108$ $x =$ |
| 10) $15x + 40 = 115$ $x =$ | 11) $7x + 31 = 94$ $x =$ | 12) $6x + 2 = 110$ $x =$ |
| 13) $16x = 96$ $x =$ | 14) $11x + 60 = 115$ $x =$ | 15) $12x + 42 = 126$ $x =$ |
| 16) $25x + 70 = 245$ $x =$ | 17) $14x + 25 = 123$ $x =$ | 18) $100x = 1200$ $x =$ |

Representing Linear Equations ($x/a = b$)

Instructions

Write a pictorial representation of the linear equations provided

| # | Linear Equation | Pictorial Representation | Verification |
|-----|----------------------------|--|-------------------------------------|
| Ex) | $\frac{x}{6} = 7$ $x = 42$ |  <p>42 divided by 6 = 7</p> | $\frac{42}{6} = 7 \quad \checkmark$ |
| 1) | $\frac{x}{3} = 8$ $x =$ | | |
| 2) | $\frac{x}{5} = 6$ $x =$ | | |
| 3) | $\frac{x}{8} = 9$ $x =$ | | |
| 4) | $\frac{x}{7} = 11$ $x =$ | | |
| 5) | $\frac{x}{6} = 7$ $x =$ | | |
| 6) | $\frac{x}{4} = 12$ $x =$ | | |
| 7) | $\frac{x}{3} = 15$ $x =$ | | |

Representing Problems with Linear Equations ($x/a = b$)**Questions**Represent the problems with linear equations ($\frac{x}{a} = b$) and solve for x

1)

Mya is having a party with 95 guests. She is serving soda to drink. She bought enough soda for each guest to have 3. How many sodas did she buy?

Linear equation:

 $x =$

2)

Patricia is making money today cutting grass in her neighbourhood. She charges \$10 for every lawn she cuts and she cut 7 yards. How much money did she earn today?

Linear equation:

 $x =$ 

3)

Neill collected a bunch of candy after trick-or-treating for Halloween. He divided his candy equally between himself and his 3 other brothers. Each person got 24 candies. How many candies did he collect?

Linear equation:

4)

Amelia is in a running challenge. She will complete the challenge if she needs to run over 6 days. Each day she will run 12km. How many kilometers does she need to run for the challenge?

Linear equation:

 $x =$ 

5)

Connor is one of the best 3-point shooters around. Each week, he takes a certain amount of 3-point shots during practice. He practices 6 days a week and takes 85 shots per session. How many shots in total does he take for the week?

Linear equation:

 $x =$

6)

Hani has to do a bunch of push-ups for a fitness challenge. He divides the pushups into 8 sets of 25. How many total pushups does he need to do for the challenge?

Linear equation:

 $x =$ 

Representing Problems with Linear Equations ($x/a = b$)**Directions** Represent the problems with linear equations ($\frac{x}{a} = b$) and solve for a

1)

A school has 300 students, and they want to divide the students into equal groups for a competition. If each group has 30 students, how many groups are there?

Linear equation:

a =

2)

A baker has 40 cookies and wants to distribute them evenly among some friends. If each friend gets 5 cookies, how many friends are there?

Linear equation:

a =



3)

A water tank has a capacity of 2000 liters. It takes a certain number of equal containers to fill the tank completely. If each container holds 25 liters, how many containers are needed to fill the tank?

Linear equation:

4)

A charity fundraiser has a goal of raising \$500. Each person contributes \$25. How many people need to donate to reach the fundraising goal?

Linear equation:

a =



5)

A factory produces 180 bottles of juice per day. The juice is packaged in crates, with each crate holding 9 bottles. How many crates does the factory fill each day?

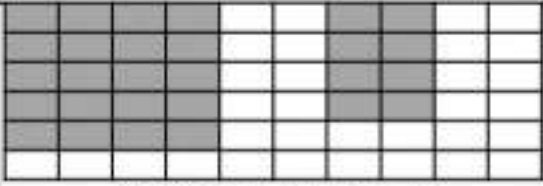
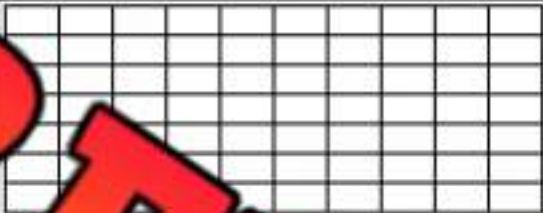

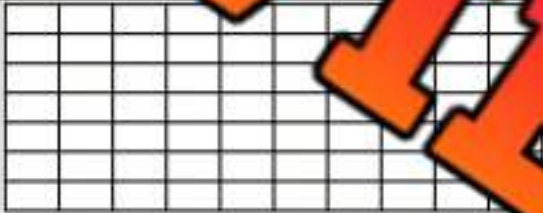
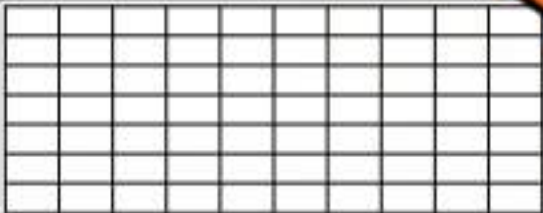
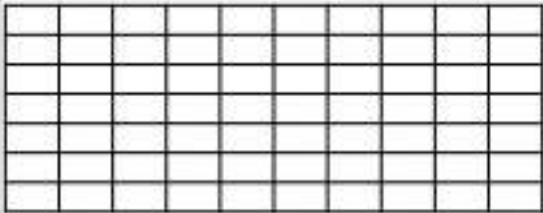
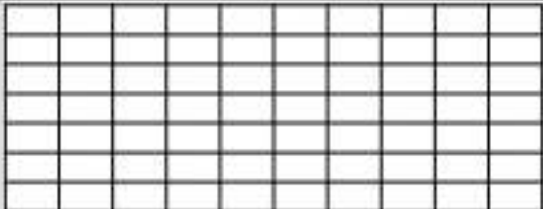
Linear equation:

a =

Representing Linear Equations ($x/a + b = c$)

Instructions

Write a pictorial representation of the linear equations provided

| # | Linear Equation | Pictorial Representation | Verification |
|-----|---------------------------------|--|--|
| Ex) | $\frac{x}{4} + 8 = 13$ $x = 20$ |  <p style="text-align: center;">20 divided by 4 + 8 = 13</p> | $\frac{20}{4} + 8 = 13 \quad \checkmark$ |
| 1) | $x + 6 =$ |  | |
| 2) | $\frac{x}{5} + 10 = 13$ $x =$ |  | |
| 3) | $\frac{x}{8} + 5 = 9$ $x =$ |  | |
| 4) | $\frac{x}{7} + 15 = 17$ $x =$ |  | |
| 5) | $\frac{x}{6} + 14 = 18$ $x =$ |  | |
| 6) | $\frac{x}{4} + 12 = 19$ $x =$ |  | |

PREVIEW

Representing Linear Equations ($x/a + b = c$)

Directions

Represent the problems with linear equations ($x/a + b = c$) and solve for x

1)

Ivy's teacher had a box of pencils to give out to the class. Each of the 30 students in the class received 3 pencils. Ivy also brought 8 pencils from home and now she has 11 pencils. How many pencils did Ivy's teacher have in the box?



Linear equation:

 $x =$

2)

A group of 5 friends earned some money today selling bracelets. Leah took home \$45 and added it to the \$95 she already had, which means she now has \$135. How much did each friend earn today?



Linear equation:

 $x =$

3)

Hailey made spaghetti and meatballs for her friends. She made enough meatballs for 6 of her friends to have 7 each. One friend brought extra meatballs from home. That friend now has 10 meatballs. How many meatballs did Hailey make?

Linear equation:

4)

A group of 6 friends drove to Ottawa to see the Parliament Buildings. One friend drove 120km. After everyone drove 120km, one friend finished the trip by driving an extra 55km. That friend drove 175km in total. How far was the trip before the one friend drove the extra 55km?

Linear equation:

 $x =$ 

5)

A bag of carrots was divided into 8 groups for 8 bunnies to eat. Each bunny got 6 carrots, however, one of the bunnies found a different bag of carrots and ate 15 extra carrots before being caught. That bunny was able to eat 21 carrots in total. How many carrots were in the original bag of carrots?

Linear equation:

 $x =$

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Represent the problems with linear equations ($x/a + b = c$) and solve for x .

A bag of candies was divided among 5 children equally. Each child received 10 candies. One child found another bag and ate an extra 5 candies. That child ate 15 candies in total. How many candies were in the original bag?

Name: _____

Represent the problems with linear equations ($x/a + b = c$) and solve for x .

A bag of candies was divided among 5 children equally. Each child received 10 candies. One child found another bag and ate an extra 5 candies. That child ate 15 candies in total. How many candies were in the original bag?

Name: _____

Represent the problems with linear equations ($x/a + b = c$) and solve for x .

A bag of candies was divided among 5 children equally. Each child received 10 candies. One child found another bag and ate an extra 5 candies. That child ate 15 candies in total. How many candies were in the original bag?

Name: _____

Represent the problems with linear equations ($x/a + b = c$) and solve for x .

A bag of candies was divided among 5 children equally. Each child received 10 candies. One child found another bag and ate an extra 5 candies. That child ate 15 candies in total. How many candies were in the original bag?


Solving Linear Equations ($x/a=b$, $x/a+b=c$)**Instructions**Solve the linear equations below by determining the value of x

| | | |
|---|--|--|
| 1) $\frac{x}{6} = 7$ $x =$ | 2) $\frac{x}{6} + 5 = 13$ $x =$ | 3) $\frac{x}{3} = 8$ $x =$ |
| 4) $\frac{x}{4} + 17 = 2$ $x =$ | 5) $\frac{x}{4} = 9$ $x =$ | 6) $\frac{x}{8} + 4 = 12$ $x =$ |
| 7) $\frac{x}{11} + 13 = 21$ $x =$ | 8) $\frac{x}{12} + 8 = 13$ $x =$ | 9) $\frac{x}{12} + 8 = 13$ $x =$ |
| 10) $\frac{x}{7} = 7$ $x =$ | 11) $\frac{x}{15} + 5 = 9$ $x =$ | 12) $\frac{x}{15} + 5 = 9$ $x =$ |
| 13) $\frac{x}{10} + 27 = 40$ $x =$ | 14) $\frac{x}{8} = 7$ $x =$ | 15) $\frac{x}{8} + 11 = 20$ $x =$ |
| 16) $\frac{x}{3} + 15 = 26$ $x =$ | 17) $\frac{x}{5} + 22 = 42$ $x =$ | 18) $\frac{x}{12} = 7$ $x =$ |

Representing Linear Equations – $a(x + b) = c$

Instructions

Write a pictorial representation of the linear equation provided

| # | Linear Equation | Pictorial Representation | Verification |
|-----|----------------------------|--|-------------------------------------|
| Ex) | $6(x + 4) = 42$ $x = 3$ | <div style="text-align: center;"> 3 4 </div>  | $6(3 + 4) =$ $6 \times 7 = 42$ ✓ |
| 1) | $x + 5)$ | | |
| 2) | $4(x + 3) = 36$ $x =$ | | |
| 3) | $2(x + 6) = 22$ $x =$ | | |
| 4) | $7(x + 4) = 77$ $x =$ | | |
| 5) | $8(x + 5) = 72$ $x =$ | | |
| 6) | $6(x + 3) = 48$ $x =$ | | |

Representing Linear Equations – $a(x + b) = c$ **Instructions**Represent the problems with linear equations $a(x + b) = c$ and solve for x

3 students were comparing what they had in their lunch today. All 3 students had the same number of pieces of fruit. They had 6 strawberries each and some raspberries as well. In total, the 3 students had 42 pieces of fruit. How many raspberries did each student have?

1)

Linear equation:

 $x =$ 

A uniform consists of a jersey and a pair of shorts. The jersey costs \$22. A team ordered 15 uniforms and paid a total of \$85. How much did each pair of shorts cost?

2)

Linear equation:

 $x =$ 

Ralph ordered 7 slices of pizza and 7 drinks for him and his friends. The pizza slices were \$4 each. Ralph paid \$49 in total. How much did each drink cost?

3)

Linear equation:

 $x =$ 

Representing Linear Equations – $a(x + b) = c$ **Instructions**Represent the problems with linear equations $a(x + b) = c$ and solve for x

1) Lisa worked out 5 times last week. She did weight training for 30 minutes each session and ran each session as well. In total, she exercised for 250 minutes last week. How long did she run for each session?

1)

Linear equation:

 $x =$ 

2) A bakery sells donuts and cookies. Gabe ordered 7 cookies and 7 donuts and spent \$35. If the cookies cost \$2 each, how much were the donuts?

2)

Linear equation:

 $x =$ 

3) Gabe orders 9 burgers and fries for him and his friends. He spends \$108 in total on the order. If the burgers cost \$7 each, how much is one order of fries?

3)

Linear equation:

 $x =$ 

Solving Linear Equations: $a(x + b) = c$ **Instructions**Solve the linear equations below by determining the value of x

| | | |
|------------------------------------|-------------------------------------|------------------------------------|
| 1) $8(x + 4) = 56$ $x =$ | 2) $6(x + 7) = 66$ $x =$ | 3) $4(x + 5) = 32$ $x =$ |
| 4) $4(x + 7) = 56$ $x =$ | 5) $11(x + 9) = 121$ $x =$ | 6) $12(x + 6) = 96$ $x =$ |
| 7) $6(x + 3) = 96$ $x =$ | 8) $5(x + 4) = 40$ $x =$ | 9) $4(x + 6) = 52$ $x =$ |
| 10) $7(x + 11) = 105$ $x =$ | 11) $4(x + 12) = 88$ $x =$ | 12) $6(x + 8) = 90$ $x =$ |
| 13) $11(x + 7) = 110$ $x =$ | 14) $50(x + 5) = 450$ $x =$ | 15) $20(x + 4) = 220$ $x =$ |
| 16) $6(x + 6) = 150$ $x =$ | 17) $15(x + 11) = 225$ $x =$ | 18) $25(x + 3) = 375$ $x =$ |

Name: _____

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Math Basketball: Linear Equations Challenge

Objective

What are we learning about?

To reinforce students' understanding and application of solving linear equations in the form of $a(x+b)=c$ through a fun basketball shooting game.

Materials

What you will need for the activity.

- Index cards with problems
- Recording sheet for each team
- Paper ball (one per team)
- Bins or baskets (one per team)
- Desks (one per team)



Instructions

How you will complete the activity.

1. Arrange the classroom so that there is enough space for multiple teams to work simultaneously. Place a desk about 6 feet from a wall and a bin.
2. Place a stack of index cards with problems on each desk.
3. Provide each team with a recording sheet and a paper ball.
4. Divide the students into teams of about five members each.
5. Each team stands in a line behind their respective desk.
6. The first student in line flips over an index card and solves the problem.
7. Once the answer is recorded, the student attempts to shoot the paper ball into the bin.
8. If the student makes the shot, they place a tally mark on the team's tally sheet for a point. If they miss, no tally is given.
9. The student then goes to the end of the line, and the next student steps up to the desk to repeat the process.
10. The activity continues until all index cards have been solved.
11. Once all index cards are completed, the teacher collects the recording sheets and reviews the answers with the class.
12. For each incorrect answer, the team loses one point.
13. The team with the highest number of points after deductions is declared the winner.

Name: _____

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Index Cards

Use the following table for the game.

$7(x + 5) = 84$

$5(x + 10) = 75$

$2(x + 15) = 42$

$4(x + 8) = 64$

$6(x + 7) = 96$

$12(x + 6) = 156$

$8(x + 7) = 104$

$11(x + 4) = 121$

$9(x + 7) = 144$

$3(x + 12) = 78$

$7(x + 6) = 91$

$6(x + 4) = 72$

$4(x + 11) = 68$

$21(x + 5) = 110$

$5(x + 8) = 85$

$3(x + 13) = 48$

$2(x + 18) = 36$

$3(x + 12) = 51$

$7(x + 9) = 126$

$8(x + 6) = 112$

$10(x + 3) = 130$

$10(x + 4) = 140$

$5(x + 9) = 80$

PREVIEW

Algebraic Puzzle

Steps

Fill in the table below to complete the puzzle

| In the year 2024, use these steps: | |
|--|--|
| <input type="checkbox"/> Pick the number of times a week that you would like to go out to eat (more than once but less than 10). | |
| <input type="checkbox"/> Multiply this number by 2 (just to be bold). | |
| <input type="checkbox"/> Add 5. | |
| <input type="checkbox"/> Multiply it by 50. | |
| <input type="checkbox"/> If you have already had your birthday this year, add 1774. If you have not, add 1773. | |
| <input type="checkbox"/> Now subtract the year you were born. | |
| <input type="checkbox"/> You should have a three-digit number. The first digit of this was your original number. The next two digits are your age. | |

Explain

How does this puzzle work?

| Break down the algebra in each step. Let x be the number of times a week you want to go out. | |
|--|---------|
| Steps | Algebra |
| Multiply this number by 2 (just to be bold). | |
| Add 5. | |
| Multiply it by 50. | |
| If you have already had your birthday this year, add 1774. If you have not, add 1773. | |
| Subtract the year you were born, let's call it Y . | |

Algebraic Puzzle

Steps

Fill in the table below to complete the puzzle

In the year 2027, use these steps:

- | | |
|--|--|
| <input type="checkbox"/> Pick the number of times a week that you would like to go out to eat (more than once but less than 10). | |
| <input type="checkbox"/> Multiply this number by 2 (just to be bold). | |
| <input type="checkbox"/> Add 5. | |
| <input type="checkbox"/> Multiply it by 50. | |
| <input type="checkbox"/> If you have already had your birthday this year, add 1777. If you have not, add 1776. | |
| <input type="checkbox"/> Now subtract the year you were born. | |
| <input type="checkbox"/> You should have a three-digit number. The first digit of this was your original number. The next two digits are your age. | |

Explain

How does this puzzle work?

Break down the algebra in each step. Let x be the number of times a week you want to go out.

| Steps | Algebra |
|---|---------|
| Multiply this number by 2 (just to be bold). | |
| Add 5. | |
| Multiply it by 50. | |
| If you have already had your birthday this year, add 1777. If you have not, add 1776. | |
| Subtract the year you were born, let's call it Y . | |

Unit Test – Variables and Equations**Part 1**Evaluate the following expression for $x = 5$ and $p = -7$

| | | | |
|---------------------|------------------------|-----------------------------|--------------------|
| 1) $(x) + (p) - 11$ | 2) $17 + x + (p)$ | 3) $(19 - x) - (p)$ | 4) $x + (26 + p)$ |
| 5) $54 +$ | 6) $22 + 8x - (p + 5)$ | 7) $12 - \frac{7x}{p} + 5p$ | 8) $9x + (2p - x)$ |

Part 2Put a slash through the equation (\neq) if it is not balanced

| | | |
|--------------------------|-------------------------|----------------------|
| 1) $(-9) + 7 = 2$ | 2) $1 + 18 =$ | 3) $(-21) + 13 = -8$ |
| 4) $\frac{50}{10} = -10$ | 5) $\frac{36}{-9} = (-$ | $\frac{48}{-8} = 6$ |

Part 3

Simplify the equations below. Make sure the variable

1) $x = 9 + 14 - 5$

2) $x = 24 + 6$

3) $48 = x + 56$

4) $x + (3 \times 4) = 60 + (-10)$

Part 4

Solve the linear equations below by determining the value of x

1) $6x = 84$

 $x =$

2) $4x + 14 = 62$

 $x =$

3) $11x + 24 = 79$

 $x =$

4) $2x = 12$

 $x =$

5) $\frac{x}{6} = 12$

 $x =$

6) $\frac{x}{6} + 7 = 18$

 $x =$

7) $8(x + 5) = 96$

 $x =$

8) $3(x - 5) = 21$

 $x =$

9) $7(x + 12) = 140$

Part 5

Represent the problems with linear equations

1)

A hot tub repair technician charges \$125 for a service call plus an additional hourly rate. The technician just earned \$245 for a 4-hour call. How much does the technician earn per hour?

Linear equation:

 $x =$

2)

Jordan has 5 children. He bought them all the same 2 Christmas presents. He bought them each a new hockey stick for \$45. He also bought them each a new sweater. In total, Jordan spent \$560 on the sweaters and hockey sticks. How much does each sweater cost?

Linear equation:

 $x =$

3)

Ava and her friends earned some money today selling lemonade. Leah took home \$142. She already had \$142, which means she now has \$177. How much did the

Linear equation:

 $x =$

4)

Ava has 4 bags of oranges, and each bag contains the same number of oranges. She also has 7 more oranges that she picked from her backyard tree. In total, Ava has 39 oranges. How many oranges are in each bag?

Linear equation:

 $x =$

5)

Samantha went to the gym for 4 days last week. She spent 20 minutes on the elliptical machine and lifted weights for the rest of her workout. In total, she spent 2 hours and 20 minutes at the gym last week. How many minutes did she spend lifting weights each day?

Linear equation:

 $x =$



Google Slides Lessons Preview





Alberta Math Curriculum Number – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

Learning Goal

We are learning to multiply and divide whole numbers by other whole numbers so we can accurately solve problems involving measurements, money, and real-world situations.

Discussion Questions

- 1) If you had 4 bags with 25 marbles in each, how could you quickly figure out the total without counting one by one?
- 2) If you double a number and then double it again, what operation are you really doing?
- 3) If 5 friends split a \$100 bill evenly, will everyone get a whole number amount? How do you know?

Multiplying Whole Numbers

Use the standard algorithm to solve the multiplication problems below.

| | | | |
|----|---|---|--|
| 1) | | | |
| | 4 | 7 | |
| x | | 3 | |
| | | | |

| | | | |
|----|---|---|--|
| 2) | | | |
| | 7 | 7 | |
| x | | 5 | |
| | | | |

| | | | |
|----|---|---|--|
| 3) | | | |
| | 9 | 4 | |
| x | | 7 | |
| | | | |

| | | | | |
|----|---|---|---|--|
| 4) | | | | |
| | 1 | 2 | 5 | |
| x | | 3 | 4 | |
| | | | | |

| | | | | |
|----|---|---|---|--|
| 5) | | | | |
| | 5 | 6 | 1 | |
| x | | 2 | 6 | |
| | | | | |

| | | | | |
|----|---|---|---|--|
| 6) | | | | |
| | 8 | 4 | 2 | |
| x | | 6 | 3 | |
| | | | | |

Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Division – Word Problems

- 1) A delivery company needs to ship 1,865 packages using trucks that each carry 35 packages. How many full trucks will be used? How many packages will be left over?
- 2) A factory produces 7,820 bottles of juice in 15 hours. Assuming a constant rate, how many bottles are produced per hour?



Alberta Math Curriculum Number – Grade 8

Area of a Square – Square Root

When we calculate the area of a square, we use a square number to determine the area.
Example: If the area of a square is 9, its side length is $\sqrt{9}$ or 3.

What is the area? Write the side lengths as square roots and units.

| # | Question | Area | Side Length |
|----|----------|------|----------------------|
| 1) | | | $\sqrt{\quad}$ units |
| 2) | | | $\sqrt{\quad}$ units |

| # | Question | Area | Side Length |
|----|----------|------|----------------------|
| 3) | | | $\sqrt{\quad}$ units |
| 4) | | | $\sqrt{\quad}$ units |

Rational Numbers

Is the number a rational or irrational number?

| | | | |
|----|---------------|----------|------------|
| 1) | $\sqrt{36}$ | Rational | Irrational |
| 2) | 0.121212... | Rational | Irrational |
| 3) | $\sqrt{8}$ | Rational | Irrational |
| 4) | $\frac{7}{9}$ | Rational | Irrational |
| 5) | π | Rational | Irrational |
| 6) | $\sqrt{3}$ | Rational | Irrational |

Fill in the boxes.

$\sqrt{48}$

$\sqrt{48} = \frac{\square}{\square}$ or \square

$\sqrt{117}$

$\sqrt{117} = \frac{\square}{\square}$ or \square



Alberta Math Curriculum Number – Grade 8

Fractions, Decimals, and Percents

What fraction, decimal, and percent of the area is shaded in?

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |

+
-
÷
×

A ratio shows the relationship between two amounts.
 Example:
 The ratio of chips to juices can be written in 3 ways:
 Words: 1 to 4 Ratio: 1:4 Fraction: $\frac{1}{4}$

Write the ratio for the questions below.

| | Words | Ratio | Fraction |
|---------------------------------|-------|-------|----------|
| 1) Cellphones to telephones | | | |
| 2) Coffee to croissants | | | |
| 3) Eggs to bread slices | | | |

| | |
|----|--|
| 12 | |
| 16 | |
| 20 | |
| 24 | |

Is the relationship proportional?

| | |
|-----|----|
| Yes | No |
|-----|----|

Grade 8
Number

| | Curriculum Expectations | Pages |
|-----|--|-----------|
| N.1 | Demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers) | 5 - 36 |
| N.2 | Determine the approximate square root of numbers that are not perfect squares (limited to whole | 37 - 56 |
| N.3 | Preview of 120 pages from this product that contains 426 pages total. | |
| N.4 | Demonstrate an understanding of ratio and rate. | 83 - 94 |
| N.5 | Solve problems that involve rates, ratios and proportional reasoning. | 95 - 111 |
| N.6 | Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically. | 112 - 178 |
| N.7 | Demonstrate an understanding of multiplication and division of integers, concretely, pictorially and symbolically | 179 - 214 |

Multiplication Review – (1)

Part 1

Use the standard algorithm to solve the multiplication problems below

| | | | | | | | | | | | | | | | |
|----|---|---|--|----|---|---|--|----|---|---|---|----|---|---|--|
| 1) | | | | 2) | | | | 3) | | | | 4) | | | |
| | 8 | 3 | | | 7 | 4 | | | 2 | 3 | | | 4 | 7 | |
| x | | 6 | | x | | 3 | | x | | 5 | | x | | 8 | |
| | | | | | | | | | | | | | | | |
| 5) | | | | 7) | | | | 8) | | | | | | | |
| | 9 | | | | 5 | 3 | | | | 4 | 5 | | | | |
| x | 3 | 2 | | x | 9 | 1 | | x | 2 | 7 | | | | | |
| | | | | | | | | | | | | | | | |

Part 2

Use the standard algorithm to solve the multiplication problems below

| | | | | | | | | | |
|----|-----|----|----|----|----|----|----|-----|----|
| 1) | 65 | 2) | 84 | 3) | 72 | 4) | 37 | 5) | 68 |
| x | 2 | x | 3 | x | 6 | x | 5 | x | 0 |
| 6) | 337 | 7) | 53 | 8) | 73 | 9) | 58 | 10) | 36 |
| x | 24 | x | 17 | x | 35 | x | 78 | x | 56 |

Multiplication – 3-Digit by 1-Digit

Step 1: Setup up the Area Model

$$235 \times 3 = \underline{\quad}$$

| | | | |
|---|-----|----|---|
| | 200 | 30 | 5 |
| 3 | | | |

Step 2: Multiply

$$235 \times 3 = \underline{\quad}$$

| | | | |
|---|-----------------------|---------------------|--------------------|
| | 200 | 30 | 5 |
| 3 | 200×3 600 | 30×3 90 | 5×3 15 |

Step 3: Add

$$235 \times 3 = 705$$

| | | | |
|---|-----|----|----|
| | 200 | 30 | 5 |
| 3 | 600 | 90 | 15 |

$$600 + 90 + 15 = 705$$

Question: Use the area model to solve the multiplication problems below

1) $452 \times 2 = \underline{\quad}$

| | | | |
|--|--|--|--|
| | | | |
| | | | |

2) $626 \times 2 = \underline{\quad}$

| | | | |
|--|--|--|--|
| | | | |
| | | | |

3) $347 \times 4 = \underline{\quad}$

| | | |
|--|--|--|
| | | |
| | | |

4) $512 \times 3 = \underline{\quad}$

| | | |
|--|--|--|
| | | |
| | | |

5) $312 \times 7 = \underline{\quad}$

| | | |
|--|--|--|
| | | |
| | | |

6) $682 \times 8 = \underline{\quad}$

| | | |
|--|--|--|
| | | |
| | | |

Multiplication Word Problems

Questions

Solve the word problems below

1) Ivy sold 262 lemonades from her lemonade stand last month. She sells her lemonade for \$3 each. How much money did she make last month?



2) Kelly works at a call center where she asks people to try to sell a product. Each phone call she makes is an average of 1.5 minutes long. If she makes 375 calls a shift, how long is she on the phone?



3) A bag of candy has 213 candies in it. Each candy is 6 grams. How many grams is the bag of candy?



Multiplication – 2 x 2 Digits

Step 1: Setup up the Area Model

$$32 \times 17 = \underline{\hspace{2cm}}$$

| | | |
|----|----|---|
| | 30 | 2 |
| 10 | | |
| 7 | | |

Step 2: Multiply

$$32 \times 17 = \underline{\hspace{2cm}}$$

| | | |
|----|-----------------------|---------------------|
| | 30 | 2 |
| 10 | 30×10 300 | 10×2 20 |
| 7 | 30×7 210 | 7×2 14 |

Step 3: Add

$$32 \times 17 = 544$$

| | | |
|----|-----|----|
| | 30 | 2 |
| 10 | 300 | 20 |
| 7 | 210 | 14 |

$$300 + 210 + 20 + 14 = 544$$

Question 1 Use the area model to solve the multiplication problems below

1) $59 \times 12 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

2) $74 \times 26 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

3) $93 \times 25 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

4) $27 \times 41 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

5) $82 \times 34 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

6) $44 \times 37 = \underline{\hspace{2cm}}$

| | | |
|--|--|--|
| | | |
| | | |

Multiplication Word Problems

Questions

Solve the word problems below

- 1) Kyle is a marathon runner. He takes 170 steps per minute while he runs. During his last marathon race, he ran for 4 hours and 3 minutes. How many steps did he take during the race?



- 2) A company called, "Chewy Cookies", makes cookies that have 12 grams of sugar in it. In each box, there are 48 cookies.

- a) How many grams of sugar are needed to make _____ of cookies?

- b) Chewy Cookies sent a truckload of cookies to grocery stores in Toronto this morning. They fit 30 cookie boxes onto each crate. Then, 20 crates went into the truck. How many grams of sugar are in the truck?



Division – Area Model

Questions

Use the area model to answer the division questions below

1) $243 \div 6 = 40r3$ (16+4)

33 7 0

| | | | |
|---|------------|----------|---------|
| 6 | 200 198 | 40 42 | 3 r3 |
|---|------------|----------|---------|

2) $284 \div 4$

| | | | |
|---|-----|----|---|
| 4 | 200 | 80 | 4 |
|---|-----|----|---|

3) $513 \div 2$

| | | | |
|---|-----|----|---|
| 2 | 500 | 10 | 3 |
|---|-----|----|---|

4) $428 \div 6$

| | | | |
|---|-----|----|---|
| 6 | 400 | 20 | 8 |
|---|-----|----|---|

5) $636 \div 6$

| | | | |
|---|-----|----|---|
| 6 | 600 | 30 | 6 |
|---|-----|----|---|

6) $778 \div 5$

| | | | |
|---|-----|----|---|
| 5 | 700 | 70 | 8 |
|---|-----|----|---|

Division – 3 by 1 – With Remainders**Questions**

How many times can you divide the bigger number by the smaller number?

1)
$$\begin{array}{r} 20 \text{ r}2 \\ 6 \overline{) 122} \end{array}$$

2)
$$\begin{array}{r} \\ 3 \overline{) 110} \end{array}$$

3)
$$\begin{array}{r} \\ 2 \overline{) 111} \end{array}$$

4)
$$\begin{array}{r} \\ 5 \overline{) 129} \end{array}$$

5)
$$\begin{array}{r} \\ 4 \overline{) 154} \end{array}$$

7)
$$\begin{array}{r} \\ 8 \overline{) 121} \end{array}$$

8)
$$\begin{array}{r} \\ 6 \overline{) 136} \end{array}$$

9)
$$\begin{array}{r} \\ 9 \overline{) 139} \end{array}$$

10)
$$\begin{array}{r} \\ 5 \overline{) 173} \end{array}$$

11)
$$\begin{array}{r} \\ 3 \overline{) 130} \end{array}$$

13)
$$\begin{array}{r} \\ 7 \overline{) 177} \end{array}$$

14)
$$\begin{array}{r} \\ 4 \overline{) 174} \end{array}$$

15)
$$\begin{array}{r} \\ 8 \overline{) 187} \end{array}$$

16)
$$\begin{array}{r} \\ 6 \overline{) 182} \end{array}$$

Division Practice**Questions**

Use any method to solve the division questions below

1) $\frac{278}{3}$

2) $\frac{325}{6}$

3) $\frac{132}{4}$

4) $\frac{403}{8}$

5) $\frac{885}{7}$

6) $\frac{726}{5}$

7) $\frac{427}{4}$

8) $\frac{639}{9}$

PREVIEW

Division Word Problems

Questions

Solve the word problems below

- 1) Connor made 153 three-pointers in his last 9 games. How many three-pointers did he average in those 9 games?



- 2) A group of 4 friends earned \$91 today selling their artwork at a flea market. If they split it equally, how much will each friend get? How much will be remaining?



- 3) Jane has 990mL of juice to divide equally into 9 cups. How many mL will she be able to fit into each cup? How many mL will she have left over?



- 4) Cheryl is planting a garden. She has 8 rows and 234 seeds. How many seeds should she plant in each row? How many seeds will she have left?



Perfect Squares – Square Numbers

A **perfect square** is any number that is a product of two identical numbers. In other words, when we multiply two of the same numbers together, the answer is a perfect square. Perfect squares are also referred to as square numbers.

Examples - 9 is a perfect square (3×3)

4 is a perfect square (2×2)

Part 1 Solve by determining the perfect square

| | Question | Perfect Square |
|----|----------------|----------------|
| 1) | $1 \times 1 =$ | |
| 2) | $2 \times 2 =$ | |
| 3) | $3 \times 3 =$ | |
| 4) | $4 \times 4 =$ | |
| 5) | $5 \times 5 =$ | |
| 6) | $6 \times 6 =$ | |

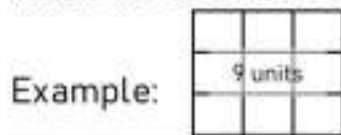
| | Question | Perfect Square |
|-----|------------------|----------------|
| 7) | $7 \times 7 =$ | |
| 8) | $8 \times 8 =$ | |
| 9) | $9 \times 9 =$ | |
| 10) | $10 \times 10 =$ | |
| 11) | $11 \times 11 =$ | |
| 12) | $12 \times 12 =$ | |

Part 2 Solve the word problem below

- Richard built a square deck. One of the side lengths is 9m. What is the area of the deck?
- The area of a square tile is 121cm^2 . What are the side lengths?

Area of a Squares – Square Root


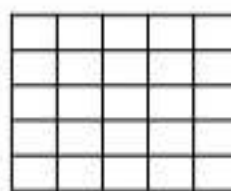


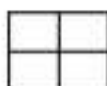

When we calculate the area of a square, we use a square number to determine the area.



If the area of a square is 9, its side length is $\sqrt{9}$ or 3.

Part 1

What is the area? Write the side lengths as square roots and units

| 1) | Area | Side Length | 4) | Question | Area | Side Length |
|----|---|-------------------------------|----|--|------|-------------------------------|
| |  | _____ units | |  | | _____ units $\sqrt{\quad}$ |
| |  | _____ units $\sqrt{\quad}$ | |  | | _____ units $\sqrt{\quad}$ |
| |  | _____ units $\sqrt{\quad}$ | |  | | _____ units $\sqrt{\quad}$ |

Part 2

Fill in the table

| 1) | Area | Side Length (Units) | Side Length |
|----|------|---------------------|----------------|
| | | | $\sqrt{64}$ |
| | | 7 | $\sqrt{\quad}$ |
| | 144 | | $\sqrt{\quad}$ |
| | | 11 | $\sqrt{\quad}$ |

Part 3

Is the number a perfect square?

| 1) | Area | Yes/No |
|----|------|--------|
| | 12 | |
| | 81 | |
| | 42 | |
| | 100 | |

Perfect Squares – Exponents

When we multiply a number by itself, we can use an exponent. An **exponent** refers to the number of times a number is multiplied by itself. A **perfect square** is the square of an integer. This means it is the number that is the product of two equal factors. Therefore, it is when we use an exponent to the power of 2.



Example – 16 is a perfect square (4×4) or 4^2



Part 1 _____ by determining the perfect square



| | Question | Perfect Square |
|----|----------|----------------|
| 1) | 1^2 | |
| 2) | 2^2 | |
| 3) | 3^2 | |
| 4) | 4^2 | |
| 5) | 5^2 | |
| 6) | 6^2 | |

| | Question | Perfect Square |
|-----|----------|----------------|
| 7) | 7^2 | |
| 8) | 8^2 | |
| 9) | 9^2 | |
| 10) | 10^2 | |
| 11) | 11^2 | |
| 12) | 12^2 | |

Part 2 Find out the area of the squares below

When we calculate the area of a square, we are multiplying the length by the width or base times height. Since a square has the same side lengths, the formula is: s^2

| | Question | Area |
|----|--|------|
| 1) |  6cm | |
| 2) | 11cm  | |

| | Question | Area |
|----|---|------|
| 3) |  7mm | |
| 4) | 9m  | |

Perfect Squares & Square Roots



Part 1

Fill in the table below

| | Equation | Exponent | Answer | Square Root of Answer |
|-----|--------------------|----------|--------|-----------------------|
| 1) | $1 \times 1 =$ | 1^2 | 1 | 1 |
| 2) | $\quad \times 5 =$ | | | |
| 3) | | | 36 | |
| 4) | | | | 9 |
| 5) | 8 | | | |
| 6) | | | 9 | |
| 7) | | | 20 | |
| 8) | | 2^2 | | |
| 9) | | | | 7 |
| 10) | $11 \times 11 =$ | | | |
| 11) | | | | |
| 12) | | | 144 | |

PREVIEW

Part 2

Solve the word problem below

- 1) You have a square rug that has an area of 10 000cm. What is the length of one side of the carpet?



- 2) A square flower garden has a side length of 9m. What is the area of the flower garden?



Comparing Square Roots & Perfect Squares

Part 1 Which number is larger? Use $<$ $>$ or $=$ to compare the numbers

| | | | | | | | | |
|----|-------------|----------------------|--------------|--|-----|--------------|----------------------|--------------|
| 1) | 3^2 | <input type="text"/> | $\sqrt{100}$ | | 6) | $\sqrt{121}$ | <input type="text"/> | 11^2 |
| 2) | $\sqrt{4}$ | <input type="text"/> | 6 | | 7) | $\sqrt{25}$ | <input type="text"/> | -6 |
| 3) | 4^2 | <input type="text"/> | 5^2 | | 8) | 50 | <input type="text"/> | 7^2 |
| 4) | 2^2 | <input type="text"/> | 5 | | 9) | 4^2 | <input type="text"/> | $\sqrt{144}$ |
| 5) | $\sqrt{36}$ | <input type="text"/> | 8 | | 10) | 2 | <input type="text"/> | $\sqrt{4}$ |

Part 2 Order from least to greatest

| | |
|--|---|
| 1) $\sqrt{4}$, 4, $\sqrt{16}$, -16, $\sqrt{9}$, $\sqrt{81}$ | 3) $\sqrt{144}$, 49, $\sqrt{100}$ |
| 2) $\sqrt{64}$, $\sqrt{36}$, -3, 9, $\sqrt{121}$ | 4) $\sqrt{4}$, 16, $\sqrt{64}$, 9, $\sqrt{100}$ |

Part 3 Challenge: find the square root for each number

| | |
|-----------------|-----------------|
| 1) $\sqrt{289}$ | 5) $\sqrt{400}$ |
| 2) $\sqrt{225}$ | 6) $\sqrt{324}$ |
| 3) $\sqrt{169}$ | 7) $\sqrt{256}$ |
| 4) $\sqrt{361}$ | 8) $\sqrt{625}$ |

Perfect Squares - Word Problems**Word Problems**

Answer the word problems below

- 1) Which whole numbers between 100 and 150 are perfect squares?
- 2) Which whole numbers between 150 and 200 are perfect squares?
- 3) I am a square number. The sum of my digits is 7. What square numbers might I be?
- 4) What three square numbers have a sum that is equal to 9?
- 5) Archer is planning to make a square garden this year. The garden needs to have an area less than 50m^2 .
 - a) What is the largest area the garden could be?
 - b) What is the side length of the garden?
 - c) How many metres of fencing will be needed?
 - d) If one metre of fencing costs Archer \$2.50, how much would the entire fence cost him?



PREVIEW





Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

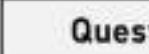

- 1) Find out the area of the squares below

| Question | Area |
|---|------|
|  5cm | |
|  | |

- 2) What two square numbers have digits that add up to 13?
-
- _____

Name: _____

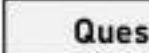

- 1) Find out the area of the squares below

| Question | Area |
|--|------|
|  5cm | |
|  12m | |

- 2) What two square numbers have digits that add up to 13?
-
- _____

Name: _____

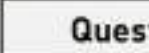

- 1) Find out the area of the squares below

| Question | Area |
|---|------|
|  5cm | |
|  12m | |

- 2) What two square numbers have digits that add up to 13?
-
- _____

Name: _____

- 1) Find out the area of the squares below

| Question | Area |
|--|------|
|  5cm | |
|  12m | |

- 2) What two square numbers have digits that add up to 13?
-
- _____

Rational vs Irrational Numbers

A **rational number** can be written as a ratio of two integers (a simple fraction). If a decimal number has a repeating or terminating decimal, it is a rational number.

Examples

5 can be written as $5/1$

$\sqrt{16}$ can be written as 4 ($4/1$)

0.333... can be written as $1/3$

An **irrational number** cannot be written as a ratio of two integers. Another clue is that the decimal goes on forever without repeating.

Examples

π (Pi)

$\sqrt{2} - 1.414213562373095...$

$\sqrt{10} - 3.162277660168379...$

Part 1

Classify the number as rational or irrational?

| | Question | Rational/Irrational | | Question | Rational/Irrational |
|----|---------------|---------------------|-----|---------------|---------------------|
| 1) | $\sqrt{18}$ | | 7) | $\sqrt{49}$ | |
| 2) | 9 | | 8) | $0.3\bar{3}$ | |
| 3) | $\frac{5}{8}$ | | 9) | $\sqrt{2}$ | |
| 4) | $\sqrt{16}$ | | 10) | $\frac{2}{6}$ | |
| 5) | $2.\bar{3}$ | | 11) | $\frac{2}{6}$ | |
| 6) | $\sqrt{24}$ | | 12) | $\sqrt{72}$ | |

Part 2

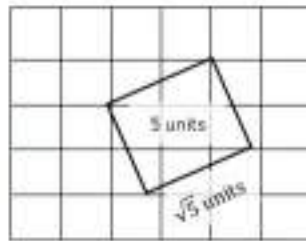
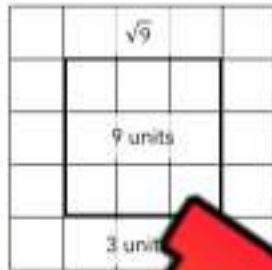
Write at least 10 rational and irrational numbers below

Rational Numbers

Irrational Numbers

Estimating Square Roots

Perfect squares can be calculated. Imperfect squares can only be estimated.



An imperfect square and its square root is an irrational number with a decimal number that never ends.

We can estimate a square root by determining the two perfect squares that are closest to it.

Example: $\sqrt{31}$ is between $\sqrt{25}$ and $\sqrt{36}$, which means it is in between 5 and 6. This means that the square of $\sqrt{31}$ is around 5.5. Since 31 is closer to 36 than 25, the answer should be 5.6.

Practice

Estimate the square root of the numbers below by filling in the table

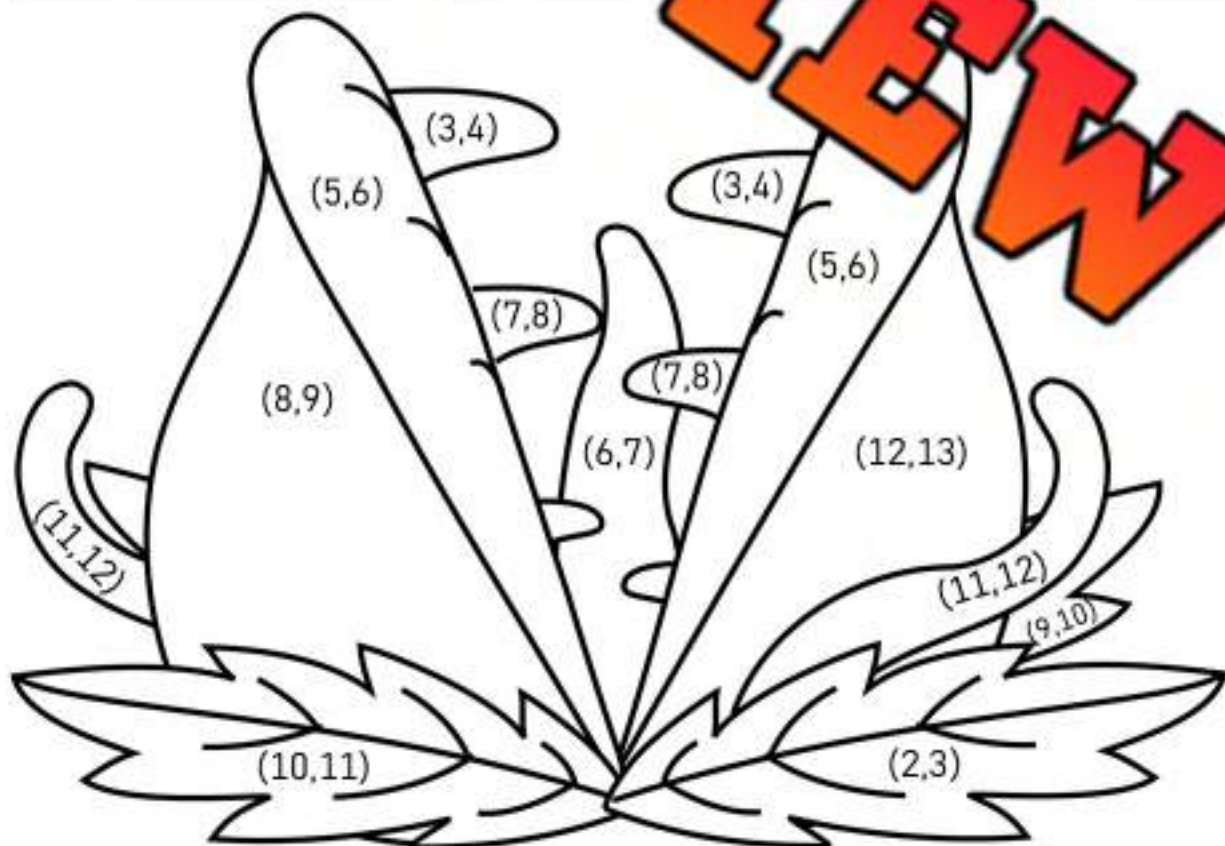
| | Non-Perfect Square | Lower Perfect Square | Higher Perfect Square | Estimate | Calculate round to tenth |
|-----|--------------------|----------------------|-----------------------|----------|--------------------------|
| 1) | $\sqrt{19}$ | $\sqrt{16} = 4$ | $\sqrt{25}$ | 4.4 | 4.4 |
| 2) | $\sqrt{42}$ | | | | |
| 3) | $\sqrt{68}$ | | | | |
| 4) | $\sqrt{91}$ | | | | |
| 5) | $\sqrt{29}$ | | | | |
| 6) | $\sqrt{13}$ | | | | |
| 7) | $\sqrt{55}$ | | | | |
| 8) | $\sqrt{73}$ | | | | |
| 9) | $\sqrt{6}$ | | | | |
| 10) | $\sqrt{130}$ | | | | |

Estimating Square Roots - Colouring

Practice

Find the two square roots between the irrational numbers and colour the picture with the matching colour

| | Irrational Number | Square Root 1 | Square Root 2 | Colour |
|-----|-------------------|----------------|----------------|-------------|
| 1) | $\sqrt{32}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Light Green |
| 2) | $\sqrt{11}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Yellow |
| 3) | $\sqrt{47}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Purple |
| 4) | $\sqrt{6}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Green |
| 5) | $\sqrt{54}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Light Green |
| 6) | $\sqrt{7}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Dark Green |
| 7) | $\sqrt{54}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Yellow |
| 8) | $\sqrt{8}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Dark Green |
| 9) | $\sqrt{152}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Green |
| 10) | $\sqrt{89}$ | $\sqrt{\quad}$ | $\sqrt{\quad}$ | Dark Green |



Estimating Square Roots - Riddle

Practice

Find the lower and higher perfect squares and write the corresponding letter above the numbers below

| | Non-Perfect Square | Lower Perfect Square | Higher Perfect Square |
|---|--------------------|----------------------|-----------------------|
| B | $\sqrt{11}$ | | |
| Z | $\sqrt{10}$ | | |
| S | $\sqrt{5}$ | | |
| R | $\sqrt{55}$ | | |
| A | $\sqrt{2}$ | | |
| A | $\sqrt{6}$ | | |
| A | $\sqrt{77}$ | | |
| D | $\sqrt{125}$ | | |
| E | $\sqrt{18}$ | | |

What's black and white and blue

(64,81)_____
(81,100)_____
(4,9)_____
(121,144)_____
(36,49)_____
(16,25)_____
(9,16)_____
(49,64)_____
(1,4)

Square Roots - Area

Part 1 Assume the side lengths and area below are of squares. Fill in the table

| | Side Length | Area |
|----|-------------|-------|
| 1) | | 81cm |
| 2) | | |
| 3) | | |
| 4) | | 144cm |
| 5) | 10 | |

| | Side Length | Area |
|-----|-------------|------|
| 6) | | 4m |
| 7) | 11cm | |
| 8) | 4km | |
| 9) | | 9m |
| 10) | | 36km |

Part 2 Find the side length of each square below. You will need to estimate one square

| | | | | | | | |
|----|---------------|---------------|---------------|----|---------------|---------------|---------------|
| 1) | $A = 49$ | $A = 54$ | $A = 64$ | 4) | $A = 36$ | $A = 45$ | $A = 49$ |
| | side length = | side length = | side length = | | side length = | side length = | side length = |
| | | | | | | | |
| 2) | $A = 9$ | $A = 15$ | $A = 16$ | 5) | $A = 81$ | $A = 85$ | $A = 100$ |
| | side length = | side length = | side length = | | side length = | side length = | side length = |
| | | | | | | | |
| 3) | $A = 64$ | $A = 66$ | $A = 81$ | 6) | $A = 16$ | $A = 20$ | $A = 25$ |
| | side length = | side length = | side length = | | side length = | side length = | side length = |
| | | | | | | | |

Estimating Square Roots

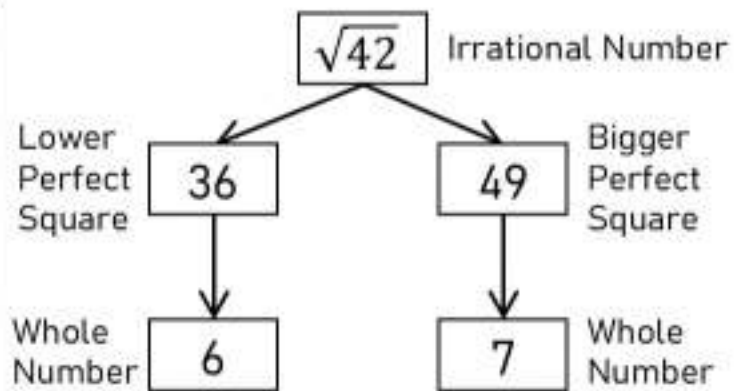
Step 1: Find the two perfect squares above and below the irrational number.

Step 2: Use the following formula to find the decimal number that will go with the whole number. Simplify the fraction.

Irrational Number Lower Perfect Square
Bigger Perfect Square Lower P.S.

Step 3: Take the whole number using the lower perfect square and the simplified fraction from above.

Step 4: Change the fraction to a decimal (rounded to the nearest hundredth).



$$\frac{42 - 36}{49 - 36} = \frac{6}{13}$$

$$= 6 \frac{6}{13} \text{ or } 6.46$$

Practice

Fill in the blanks by following the steps above

$\sqrt{19}$

- =

- =

$\sqrt{19}$ $\frac{\text{input}}{\text{input}}$ =

$\sqrt{68}$

- =

- =

$\sqrt{68}$ $\frac{\text{input}}{\text{input}}$ =

$\sqrt{28}$

- =

- =

$\sqrt{28}$ $\frac{\text{input}}{\text{input}}$ =

$\sqrt{57}$

- =

- =

$\sqrt{57}$ $\frac{\text{input}}{\text{input}}$ =

Comparing Square Roots & Perfect Squares

Part 1

Which number is larger? Use < > or = to compare the numbers

| | | | | | | | |
|----|-------------|---|--------------|----|-------------|---|--------------|
| 1) | 3^2 | <input style="width: 40px; height: 25px;" type="text"/> | $\sqrt{110}$ | 6) | $\sqrt{45}$ | <input style="width: 40px; height: 25px;" type="text"/> | 7 |
| 2) | $\sqrt{5}$ | <input style="width: 40px; height: 25px;" type="text"/> | 10 | 7) | $\sqrt{7}$ | <input style="width: 40px; height: 25px;" type="text"/> | 3 |
| 3) | $\sqrt{5}$ | <input style="width: 40px; height: 25px;" type="text"/> | 8 | 8) | $\sqrt{14}$ | <input style="width: 40px; height: 25px;" type="text"/> | 3 |
| 4) | 7 | <input style="width: 40px; height: 25px;" type="text"/> | 5 | 9) | 12 | <input style="width: 40px; height: 25px;" type="text"/> | $\sqrt{138}$ |
| 5) | $\sqrt{29}$ | <input style="width: 40px; height: 25px;" type="text"/> | 6 | | 11 | <input style="width: 40px; height: 25px;" type="text"/> | $\sqrt{127}$ |

Part 2

Order from least to greatest

| | |
|--|---|
| 1) $\sqrt{8}$, 2, $\sqrt{10}$, 3, $\sqrt{5}$ | 3) $\sqrt{82}$, 7, 8, |
| 2) $\sqrt{32}$, $\sqrt{41}$, -11, 6, $\sqrt{35}$ | 4) $\sqrt{140}$, 12, $\sqrt{147}$, 11, 23 |

Part 3

Circle which numbers are imperfect squares

1) 25, 4, 12, 24, 36, 50, 100, 68, 56, 64, 88, 96, 1, 6, 20

2) 16, 10, 28, 35, 9, 0, 81, 144, 110, 108, 121, 64, 62, 18

Square Roots – Number Line

Part 1 Place each square root on the number line to show its approximate value

1) $\sqrt{38}$

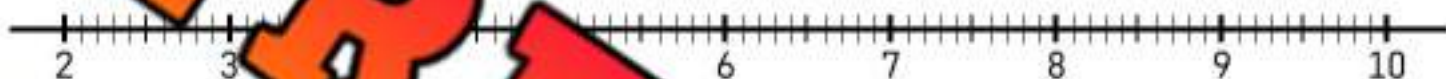
2) $\sqrt{10}$

3) $\sqrt{28}$

4) $\sqrt{42}$

5) $\sqrt{65}$

6) $\sqrt{87}$



7) $\sqrt{62}$

8) $\sqrt{100}$

9) $\sqrt{132}$

10) $\sqrt{141}$

11) $\sqrt{98}$

12) $\sqrt{22}$



Part 2 Which value is larger? Use < > or = to compare the values

1) 5 $\sqrt{21}$

4) 8.5 $\sqrt{66}$

7) 7.5 $\sqrt{52}$

2) 3 $\sqrt{14}$

5) 9.5 $\sqrt{95}$

8) 12.5 $\sqrt{145}$

3) 6 $\sqrt{31}$

6) 7.5 $\sqrt{60}$

9) 11.5 $\sqrt{142}$

Square Roots - Word Problems

Word Problems

Answer the word problems below

1) Jade painted a beautiful square painting. She would like to frame it, so she needs the dimensions of the sides. The area of the painting is 5m^2 . What are the side lengths? Round to the nearest two decimal places.



2) Weston is creating a fence around his square yard. The area of his yard is 140m^2 .

a) What are the side lengths? Round to the nearest hundredth?

b) The fencing comes in metre lengths. How many metres should he buy?



3) Livia made a rectangular painting for her friend. It has an area of 196cm^2 . Livia's friend loves it but needs a square painting to fit the space. If Livia recreates a square painting with the same area, what should the side lengths be?



4) An estimate for a square root is 8.49. Is the whole number (square) closer to 64 or 81? Explain.



Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Which value is larger?

a) 4 $\sqrt{20}$

b)

2) Order from least to greatest

 $\sqrt{50}$, 8, $\sqrt{60}$, 7, $\sqrt{48}$

Name: _____

1) Which value is larger?

a) 4 $\sqrt{20}$

b) 9 $\sqrt{85}$

2) Order from least to greatest

 $\sqrt{50}$, 8, $\sqrt{60}$, 7, $\sqrt{48}$

Name: _____

1) Which value is larger?

a) 4 $\sqrt{20}$

b) 9 $\sqrt{85}$

2) Order from least to greatest

 $\sqrt{50}$, 8, $\sqrt{60}$, 7, $\sqrt{48}$

Name: _____

1) Which value is larger?

a) 4 $\sqrt{20}$

b) 9 $\sqrt{85}$

2) Order from least to greatest

 $\sqrt{50}$, 8, $\sqrt{60}$, 7, $\sqrt{48}$

Adding Square Roots

We can simplify expressions with square roots by evaluating the square root and performing the addition operation afterwards.

Example 1

$$\begin{aligned}\sqrt{9} + \sqrt{25} \\ &= 3 + 5 \\ &= 8\end{aligned}$$

Example 3

$$\begin{aligned}\sqrt{22 + 27} \\ &= \sqrt{49} \\ &= 7\end{aligned}$$

Example 3

$$\begin{aligned}\sqrt{40 + \sqrt{81}} \\ &= \sqrt{40 + 9} \\ &= \sqrt{49} \\ &= 7\end{aligned}$$

Example 4

$$\begin{aligned}\sqrt{\sqrt{49} + \sqrt{100}} \\ &= \sqrt{7 + 10} \\ &= \sqrt{17} \\ &= 4.12\end{aligned}$$

Questions: Simplify the expressions below

1) $\sqrt{16} + \sqrt{49}$

2) $\sqrt{13}$

3) $\sqrt{81} + \sqrt{64}$

4) $\sqrt{8} + \sqrt{64}$

5) $\sqrt{\sqrt{25} + 20}$

6) $\sqrt{5} + \sqrt{81}$

7) $\sqrt{\sqrt{36} + \sqrt{100}}$

8) $\sqrt{\sqrt{100} + 111}$

9) $\sqrt{\sqrt{49} + 51}$

10) $\sqrt{144} + \sqrt{100}$

11) $\sqrt{\sqrt{4} + \sqrt{49}}$

12) $\sqrt{95} + 26$

Adding and Subtracting Square Roots

We can simplify expressions with square roots by evaluating the square root and performing the addition and subtraction operations afterwards.

Example 1

$$\begin{aligned}\sqrt{36} - \sqrt{25} \\ &= 6 - 5 \\ &= 1\end{aligned}$$

Example 3

$$\begin{aligned}\sqrt{75} - 11 \\ &= \sqrt{64} \\ &= 8\end{aligned}$$

Example 3

$$\begin{aligned}\sqrt{23 - \sqrt{49}} \\ &= \sqrt{23 - 7} \\ &= \sqrt{16} \\ &= 4\end{aligned}$$

Example 4

$$\begin{aligned}\sqrt{\sqrt{144} - \sqrt{64}} \\ &= \sqrt{12 - 8} \\ &= \sqrt{4} \\ &= 2\end{aligned}$$

Questions 1-12: Simplify the expressions below

1) $\sqrt{25} - \sqrt{9}$

2) $\sqrt{49} + 18$

3) $\sqrt{64} + \sqrt{36}$

4) $\sqrt{89} - \sqrt{64}$

5) $\sqrt{15} - \sqrt{36}$

6) $\sqrt{16} + \sqrt{81}$

7) $\sqrt{\sqrt{100} - \sqrt{36}}$

8) $\sqrt{\sqrt{100} + 111}$

9) $\sqrt{\sqrt{144} - \sqrt{9}}$

10) $\sqrt{121} + \sqrt{81}$

11) $\sqrt{\sqrt{81} - \sqrt{25}}$

12) $\sqrt{168} - 24$

Task Cards: Square Root Operations

Objective

What are we learning about?

Students will practice adding, subtracting, multiplying, and dividing square roots using simplified expressions to enhance their understanding of operations with square roots.

Materials

What you will need for the activity.

- Task cards
- Separate sheet of paper for answers
- Pencils



Instructions

How to complete the activity

1. Begin by reviewing the concepts of adding, subtracting, multiplying, and dividing square roots, and the importance of simplifying expressions.
2. Organize the students into pairs and provide each pair with their sets of task cards containing square root operations.
3. Give each pair an answer recording sheet to note down their answers.
4. Encourage teamwork by having students collaborate with their partner to solve the square root operations on each task card.
5. Allow students to select any task card to begin with, emphasizing that they can complete the cards in any order they prefer.
6. Instruct students to solve the operation on their chosen card and write the simplified answer on their answer sheet.
7. If using a timer, set it for 30 minutes to encourage focus and manage classroom time effectively.
8. After the activity, review the answers collectively, discussing any challenging operations and the strategies used to solve them.
9. Have students reflect on the activity, sharing the methods they applied and obstacles they overcame.

Task Cards

Cut out the task cards below

Task Card 21:

Calculate:

$$\sqrt{\sqrt{16} \times \sqrt{4}} = \underline{\quad}$$

Task Card 26:

Calculate:

$$\sqrt{81} + \sqrt{16} = \underline{\quad}$$

Task Card 22:

$$\sqrt{36} \times 6 = \underline{\quad}$$

Task Card 27:

Calculate:

$$\sqrt{\sqrt{\sqrt{49}} + \sqrt{81}} = \underline{\quad}$$

Task Card 23:

Calculate:

$$\sqrt{\sqrt{100} + \sqrt{36}} = \underline{\quad}$$

Task Card 28:

Calculate:

$$\sqrt{\sqrt{\sqrt{9}}} = \underline{\quad}$$

Task Card 24:

Calculate:

$$\sqrt{\sqrt{144} + \sqrt{49}} = \underline{\quad}$$

Task Card 29:

Calculate:

$$\sqrt{\sqrt{144} \div \sqrt{9}} = \underline{\quad}$$

Task Card 25:

Calculate:

$$\sqrt{\sqrt{81} - 3} = \underline{\quad}$$

Task Card 30:

Calculate:

$$\sqrt{\sqrt{169} \div 13} = \underline{\quad}$$

PREVIEW

Task Cards: Square Root Operations**Answers**

Record your answers below

| | |
|----|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |

| | |
|----|--|
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |

PREVIEW

Fractions, Decimals, and Percents

Part 1


Fill in the table with the converted decimal, fraction, and percent


| Fraction | Decimal | Percent |
|----------|---------|---------|
| 100/1000 | | 10.0% |
| 200/1000 | | 20.0% |
| | 0.300 | % |
| | | 40.0% |
| 50/100 | | % |
| | | 60.0% |
| | | % |
| | | % |
| 900/1000 | | % |
| | 1.000 | 100.0% |


Part 2

Answer the word problems below

- Cole played in a doubles tennis match with Lilly. Cole scored 60% of the points. What percentage of the points did Lilly score?


- Leon won a chili cooking competition. He received 150 of the 200 first place votes. What percentage of first place votes did Leon get?


- Samantha finished 90% percent of the triathlon she competed in. Write what fraction of the race she completed in its simplest form.



Name: _____

58

Fraction/Decimal/Percent Bottle Flip Challenge

Objective

What are we learning about?

To practise and reinforce understanding of converting between fractions, decimals, and percents through the engaging and physically active bottle flip game.



Materials

What you will need for the activity.

- Plastic bottles (pair/group) filled to approximately one-third with water (or use cups with water)
- Set of fraction, decimal, and percent conversion question cards
- Answer sheets (with group)

Instructions

How you will complete the activity

1. Start with a short lesson on converting between fractions, decimals, and percents.
2. Arrange the students into pairs or small groups and distribute a bottle and a set of question cards to each.
3. Each pair or group receives an answer sheet to record their answers.
4. Explain the rules: One student draws a question card and poses the conversion problem between fractions, decimals, or percents.
5. Once they believe they have the correct answer, they write it down on the answer sheet.
6. The student then gets to attempt a bottle flip. A successful flip means they get a point; an unsuccessful flip means they need to try to solve another question card before flipping again.
7. Alternate turns within each group or pair until they have completed all the question cards.
8. Groups or pairs tally their successful flips and compare with the rest of the class to determine the winning team.
9. Go through the answer sheet with the class to ensure understanding and correct any misconceptions.

Questions

Cut out the questions below and use them for the game.

$$\frac{50}{1000} = \underline{\quad\quad} \%$$

$$\frac{902}{1000} = 0 \underline{\quad\quad}$$

$$33.5\% = 0. \underline{\quad\quad}$$

$$72\% = \underline{\quad\quad} / 1000$$

$$0.523 = \underline{\quad\quad} \%$$

$$\frac{902}{1000} = 0 \underline{\quad\quad}$$

$$86.7\% = 0. \underline{\quad\quad}$$

$$93.1\% = \underline{\quad\quad} / 1000$$

$$\frac{475}{1000} = \underline{\quad\quad} \%$$

$$\frac{150}{1000} = 0 \underline{\quad\quad}$$

$$12\% = 0. \underline{\quad\quad}$$

$$43\% = \underline{\quad\quad} / 100$$

$$0.789 = \underline{\quad\quad} \%$$

$$0.947 = \underline{\quad\quad} \%$$

$$45.8\% = 0. \underline{\quad\quad}$$

$$58.2\% = \underline{\quad\quad} / 1000$$

PREVIEW

Questions

Cut out the questions below and use them for the game.

A student read 180 pages out of a 300-page book. What is the fraction, decimal, and percent of the book read?

A store sold 75 out of 150 items on sale. What fraction, decimal, and percent of the items were sold?

A runner completed 6 out of 8 laps in a race. What is the fraction, decimal, and percent of the laps completed?

A survey showed 120 out of 400 people prefer coffee over tea. What is the fraction, decimal, and percent of people who prefer coffee?

A garden has 70 plants out of 60 plants that are flowers. What fraction, decimal, and percent of the plants are flowers?

A chef used 2 out of 3 cups of sugar in a recipe. What fraction, decimal, and percent of the sugar was used?

A student answered 45 out of 60 questions correctly on a test. What fraction, decimal, and percent of the questions were answered correctly?

A printer has printed 480 out of 600 pages. What is the fraction, decimal, and percent of pages printed?

A car was driven for 320 miles out of a 400-mile journey. What is the fraction, decimal, and percent of the journey completed?

A basketball team won 15 out of 25 games this season. What fraction, decimal, and percent of the games were won?

A factory produced 1,200 units with 200 defects. What is the fraction, decimal, and percent of defect-free units?

An athlete drank 750 milliliters out of a 1,000-milliliter bottle. What fraction, decimal, and percent of the bottle was drunk?

A class of 30 students had 9 students who received an A grade. What fraction, decimal, and percent of the class received an A?

A library lent out 350 of its 500 books. What fraction, decimal, and percent of the books were lent out?

A worker finished 80 out of 100 tasks for the day. What is the fraction, decimal, and percent of tasks completed?

A swimmer swam 800 meters out of a 1,000-meter race. What is the fraction, decimal, and percent of the race completed?

Name: _____

61

Conversions Bottle Flip Challenge

Answers

Record your answers below.

| | |
|----|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |

| | |
|----|--|
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

PREVIEW

Class List - Decimal, Fraction, Percent

Mrs. Hansen just finished marking a math test. Her class list with the results of the test are below. She has simplified some of the fractions, and some students wrote a different test, meaning they are out of a different total.

Grades
 A = 80% and up
 B = 70% - 79%
 C = 60% - 69%
 D = 50% - 59%
 F = 49% or less

Questions

Fill in the class list



| Student | Mark | Decimal | Percent | Grade |
|----------|----------|---------|---------|-------|
| Madis | | | | |
| River | 5/100 | | | |
| Parker | 5 | | | |
| Zara | 14/20 | | | |
| Lorenzo | 1/2 | | | |
| Damian | 1/7 | | | |
| Matteo | 5/5 | | | |
| Everly | 2/5 | | | |
| Evan | 79.5/100 | | | |
| Skylar | 93.5/100 | | | |
| Luka | 9.5/12 | | | |
| Josie | 2.5/9 | | | |
| Cora | 2/10 | | | |
| Kaylee | 3.5/5 | | | |
| Savannah | 75 | | | |

Percents Greater Than 100

Percentages are out of 100. In other words, 100% is 100/100. In some cases, it may be impossible to get over 100%. For example, you can't watch TV more than 100% of your time. This is impossible because 100% is all the time you have.

On the other hand, it is very possible to have percentages over 100%. For example, you may get 100% of the vitamin C you need from eating an orange. But suppose you ate 3 oranges. You would receive 300% of the vitamin C you need for the day.



Part 1 Complete the table using fractions out of 100

| Fraction | Decimal | Percent |
|-----------|---------|---------|
| 105/100 | 1.05 | 105.0% |
| 150/100 | | |
| | | 400.0% |
| 510/100 | | |
| | 7.02 | |
| 900.5/100 | | |

Part 2 Fill in the table using fractions out of 1000

| Fraction | Decimal | Percent |
|------------|---------|---------|
| 2005/1000 | 2.005 | 200.5% |
| | | 301% |
| | 3.582 | |
| 4486/1000 | | |
| | | 672.3% |
| | 8.08 | |
| 10500/1000 | | |

Percents Greater Than 100

Situations can be described as over 100% when we can define what 100 means. For example, an athlete can give more than 100% when we define 100% as how much effort they can give for an entire game. There may be times during the game where the athlete can give 110% when they can rest at 90% during another time.

Part 1

Write your own scenarios that would result in over 100%

| | Scenario Using More Than 100% |
|------|---|
| Ex.1 | Rob scored 10 points and I scored 20. I scored 200% more points than Rob. |
| Ex.2 | There was 50% more rainfall in April as there was in March. |
| 1) | |
| 2) | |
| 3) | |
| 4) | |
| 5) | |

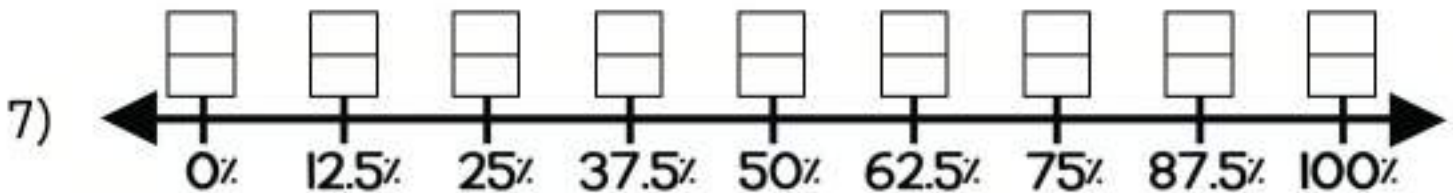
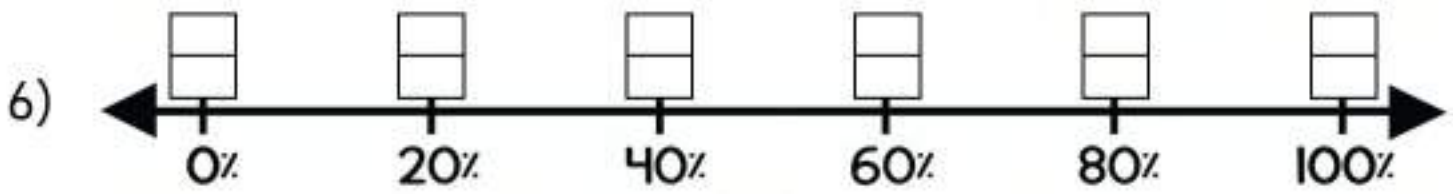
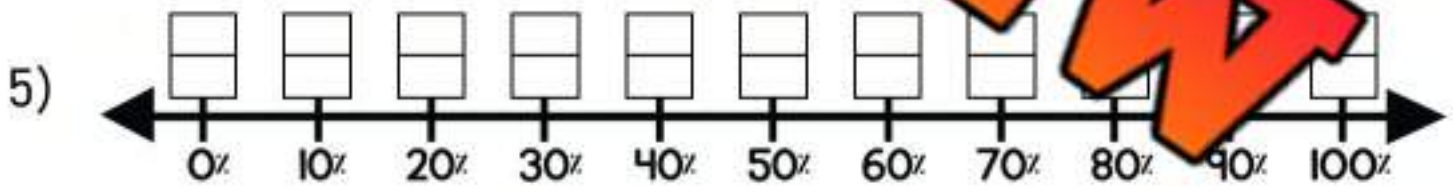
Part 2

Does the scenario make sense?

| | Scenario | Yes or No |
|----|--|-----------|
| 1) | My workday is 8 hours. I worked 120% of a workday today. | |
| 2) | 120% of the world's population has been sick at least once | |
| 3) | 125% of the sky is covered in clouds | |
| 4) | My investment of \$100 has grown 300%! | |
| 5) | There was one birthday cake, and I ate 150% of it! | |
| 6) | The teacher marked 110% of the tests she received. | |
| 7) | You got 110% on a test because you answered the bonus question | |
| 8) | You sold 20 drinks in the morning and 200% more in the afternoon | |

Fraction & Percent - Number Line**Questions**

Write the fraction above the percent.



Sport Statistics – Fractions, Decimals, and Percents

Questions

Baseball Statistics – 2021 Regular Season Offensive Statistics

1) Vladamir Guerrero Jr. had 600 at bats in the 2021 season. His stats are listed in the table below.

| | Hits | Runs | Doubles | Triples | Home Runs |
|--------------------------|---------|---------|---------|---------|-----------|
| Totals - Fraction | 188/600 | 124/600 | 21/600 | 1/600 | 51/600 |
| Decimal | | | | | |
| Percent | | | | | |

- a) If Guerrero had 100 at bats, how many home runs would he have?
- b) If Guerrero had 1000 at bats, how many doubles would he have?
- c) If Guerrero had 50 at bats, how many hits would he have?
- d) Write the probability as a percentage that Guerrero will get a hit at his next at bat?



2) Bo Bichette had 700 at bats in the 2021 season. His stats are listed in the table below.

| | Hits | Runs | Doubles | Triples | Home Runs |
|--------------------------|---------|---------|---------|---------|-----------|
| Totals - Fraction | 195/700 | 118/700 | 29/700 | 1/700 | 28/700 |
| Decimal | | | | | |
| Percent | | | | | |

- a) If Bichette had 100 at bats, how many home runs would he have?
- b) If Bichette had 1000 at bats, how many doubles would he have?
- c) If Bichette had 50 at bats, how many hits would he have?
- d) Write the probability as a percentage that Bichette will get a home run at his next at bat?

Sport Statistics – Fractions, Decimals, and Percents

Questions

Basketball Statistics – Shooting Percentages



1) Pascal Siakam played power forward for the Toronto Raptors in 2021. His shooting percentages for the 2021 season are listed in the table below.

| | 2 pointers | 3 pointers | Free Throws |
|----------|------------|------------|-------------|
| Fraction | $437/961$ | $73/246$ | $249/301$ |
| Decimal | | | |
| Percent | | | |

a) If Siakam had taken 100 free throws, how many would he have made?

b) If Siakam had taken 100 three pointers, how many would he have made?

c) If Siakam had taken 550 free throws, how many would he have made?

d) If Siakam took 500 three pointers, how many would he have made?

2) OG Anunoby played small forward for the Toronto Raptors in 2021. His shooting percentages for the 2021 season are listed in the table below.

| | 2 pointers | 3 pointers | Free Throws |
|----------|------------|------------|-------------|
| Fraction | $249/519$ | $104/261$ | $249/301$ |
| Decimal | | | |
| Percent | | | |

a) If OG had only taken 100 free throws, how many would he have made?

b) If OG had taken 850 free throws, how many would he have made?

c) If OG had taken 650 three pointers, how many would he have made?

d) If OG had taken 1000 three pointers, how many would he have made?

Fractions, Decimals, and Percents - Word Problems

Questions

Answer the word problems below

1) Finn scored 82% on a math test. Aspen scored $20/25$ on the same test. Who received a higher percentage?



2) Gracie and Blakely all ran for student president. Gracie received 35% of the 200 votes and Gael received 0.31 of the votes and Blakely received $68/200$ votes.

How many votes did each student get?

| Gracie | Gael | Blakely |
|--------|------|---------|
| | | |

3) Daisy's goal is to walk 10,000 steps each day. Today she walked 9253 steps. What percentage of her goal did she reach?

4) Tyler's investment of \$100 gained \$10. His investment increased by $10/100$. What percentage has his investment increased?

5) Zayden and his friend Norah drove 500km to Canada's Wonderland. Zayden drove 335km and Norah drove the rest.

- What percentage of the trip did Zayden drive?
- What percentage of the trip did Norah drive?

6) Arthur can throw a football 66 yards. A Canadian football field is 110 yards. What percentage of the football field can Arthur throw?



Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Fill in the table with the converted decimal, fraction, and percent

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | 95% |
| 62.5/100 | | |
| | 0.4 | |

2) Lucas scored 18/20 on a science test, while Emma scored 85% on the same test. Who received a higher percentage?

Name: _____

1) Fill in the table with the converted decimal, fraction, and percent

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | 95% |
| 62.5/100 | | |
| | 0.4 | |

2) Lucas scored 18/20 on a science test, while Emma scored 85% on the same test. Who received a higher percentage?

Name: _____

1) Fill in the table with the converted decimal, fraction, and percent

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | 95% |
| 62.5/100 | | |
| | 0.4 | |

2) Lucas scored 18/20 on a science test, while Emma scored 85% on the same test. Who received a higher percentage?

Name: _____

1) Fill in the table with the converted decimal, fraction, and percent

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | 95% |
| 62.5/100 | | |
| | 0.4 | |

2) Lucas scored 18/20 on a science test, while Emma scored 85% on the same test. Who received a higher percentage?

Percents Greater Than 100**Part 1**

Fill in the table

| | Fraction | Decimal | Percent |
|----|----------------|---------|---------|
| 1) | $1\frac{1}{2}$ | 1.50 | 150% |
| 2) | $2\frac{1}{4}$ | | |
| 3) | | 3.50 | |
| 4) | | | 475% |
| 5) | $\frac{1}{1}$ | | |
| 6) | | | 750% |
| 7) | | 7.25 | |

Part 2

Convert the fractions to a decimal and a

| | Fraction | Decimal |
|----|-----------|---------|
| 1) | $25/20$ | |
| 2) | $50/25$ | |
| 3) | $88/50$ | |
| 4) | $125/100$ | |
| 5) | $200/150$ | |
| 6) | $300/200$ | |
| 7) | $475/325$ | |

Fractions, Decimals, Percents – Word Problems

Questions

Answer the word problems below

1) Kylie bakes cakes and sells them. It costs her \$5 to make a cake. She sells the cake for \$18. What percentage is the selling price in comparison to the cost price?



2) Gavin earned \$40 an hour. He received a raise from his boss and is now earning \$60 an hour. What percentage does Gavin earn now in relation to what he earned before the raise?



3) Maeve did well on her test. She got 17 of the 20 questions correct and answered 3 bonus questions. What was her mark as a fraction and percentage?

| Fraction | Percentage |
|----------|------------|
| | |



4) Elliott ran a 10km race last week. The winner finished in 30 minutes. It took Elliot 45 minutes. What percentage of the winner's time did Elliot take in relation to the winner's time?



5) Calvin sold a baseball card for \$88. He bought it for \$20. How much did Calvin sell it for in relation to what he paid as a percentage?



6) Luke hit the golf ball 200 yards. Scott drove the golf ball 300 yards right after. Write how much further Scott hit the ball than Luke as a fraction, decimal, and percent.

| Fraction | Decimal | Percent |
|----------|---------|---------|
| | | |



Fractions, Decimals, Percents – Word Problems**Questions**

Answer the word problems below

1) Tristan earns \$30 each time he cuts his neighbour's grass. Last week, his neighbour paid him 150% of the \$30. How much did he get paid?



2) Walker makes tables and sells them. It costs him \$50 to make one table. If he wants to earn 20% of his cost, how much should he sell the tables for?

3) Colt won the long drive contest. The second place golfer drove the ball 310 yards. Colt drove it 132% further than the second-place golfer. How far did he drive the ball?



4) Alaina and her friend Londyn both sell clothes. Alaina earned $2\frac{1}{4}$ more money than Londyn yesterday. Londyn earned \$38. How much did Alaina earn?

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Arrange the following from least to greatest below

1) 450%, 4.5, 232%, $1\frac{5}{6}$

2) 80%, $\frac{7}{10}$, 0.85, $1\frac{4}{8}$

3) 1.2, 125%, $1\frac{2}{5}$, 1.5, 115%

Name: _____

Arrange the following from least to greatest below

1) 450%, $\frac{16}{4}$, 4.5, 232%, $1\frac{5}{6}$

2) 80%, $\frac{7}{10}$, 0.85, $\frac{5}{8}$, $1\frac{4}{8}$

3) 1.2, 125%, $1\frac{2}{5}$, 1.5, 115%

Name: _____

Arrange the following from least to greatest below

1) 450%, $\frac{16}{4}$, 4.5, 232%, $1\frac{5}{6}$

2) 80%, $\frac{7}{10}$, 0.85, $\frac{5}{8}$, $1\frac{4}{8}$

3) 1.2, 125%, $1\frac{2}{5}$, 1.5, 115%

Name: _____

Arrange the following from least to greatest below

1) 450%, $\frac{16}{4}$, 4.5, 232%, $1\frac{5}{6}$

2) 80%, $\frac{7}{10}$, 0.85, $\frac{5}{8}$, $1\frac{4}{8}$

3) 1.2, 125%, $1\frac{2}{5}$, 1.5, 115%

Test – Squares, Multiplication/Division, and Percent

Part 1 Provide the positive and negative square root

| | Question | Square Root | |
|----|------------|-------------|-----|
| | | (+) | (-) |
| 1) | $\sqrt{3}$ | | |
| 2) | $\sqrt{4}$ | | |
| 3) | $\sqrt{9}$ | | |

| | Question | Square Root | |
|----|--------------|-------------|-----|
| | | (+) | (-) |
| 4) | $\sqrt{121}$ | | |
| 5) | $\sqrt{25}$ | | |
| 6) | $\sqrt{64}$ | | |

Part 2 Which number is greater, less, or = to compare the number

| | | | | | | | |
|----|-------------|----------------------|--------------|----|-------|----------------------|--------|
| 1) | 5^2 | <input type="text"/> | $\sqrt{100}$ | 4) | 9^2 | <input type="text"/> | 11^2 |
| 2) | $\sqrt{64}$ | <input type="text"/> | 7 | 5) | 3 | <input type="text"/> | -6 |
| 3) | $\sqrt{49}$ | <input type="text"/> | 2^2 | 6) | -50 | <input type="text"/> | |

Part 3 Order from least to greatest

| | |
|--|---|
| 1) $\sqrt{49}$, 49, $\sqrt{16}$, -16, $\sqrt{9}$, $\sqrt{81}$ | 3) $\sqrt{16}$, 16, $\sqrt{64}$, -1, $\sqrt{100}$ |
| 2) $\sqrt{144}$, $\sqrt{36}$, -6, 6, $\sqrt{121}$ | 4) $\sqrt{9}$, 4, $\sqrt{81}$, 10, $\sqrt{4}$ |
| | |

Part 4

Solve the multiplication and division questions below

| | | | | |
|----|--|---|---|---|
| 1) | | | | |
| | | 2 | 7 | 7 |
| x | | 4 | 5 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|----|--|---|---|---|
| 2) | | | | |
| | | 7 | 0 | 9 |
| x | | 5 | 7 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | | |
|----|--|---|---|---|---|
| 7) | | | | | |
| | | 4 | 8 | 2 | 6 |
| x | | 7 | 5 | 8 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| | | | | | |
|----|--|---|---|---|---|
| 8) | | | | | |
| | | 7 | 4 | 9 | 6 |
| x | | 8 | 2 | 0 | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

1) 395×15

2) 4372×26

3) $\frac{278}{3}$

4) $\frac{325}{6}$

Part 5

Answer the word problems below

1) LeBron James earns \$9720 every minute that he plays basketball. A basketball game is 48 minutes long. How much money does LeBron earn per game?



Part 8

Answer the word problems below

1) John's investment of \$200 gained \$40. His return as a fraction is $\frac{40}{200}$. What percentage has his investment increased?



2) Farah bakes 100 cookies and sells them. It costs her \$1 to make a cookie. She sells each cookie for \$1.50. What percentage is the selling price in comparison to the cost price?



3) Jonah earns \$25 an hour. He received a raise from his employer and is now earning \$45 an hour. What percentage does Jonah earn now in comparison to what he earned before the raise?



4) Sienna did well on her math test. She got all of the 50 questions correct and answered 5 bonus questions correct as well. What was her mark as a fraction and percentage?



Equivalent Ratios – Scaling Up and Down**Questions**

Circle two equivalent ratios for each of the questions below

| | | | | | |
|----------|-------|-------|-------|-------|-------|
| 1) 2:8 | 2:6 | 4:8 | 4:16 | 1:4 | 1:2 |
| 2) 2:12 | 1:8 | 4:22 | 1:6 | 1:4 | 4:24 |
| 3) 6:8 | 12:14 | 12:18 | 12:16 | 3:8 | |
| 4) 2:4 | 4:6 | 4:7 | 4:8 | 1:4 | 1:2 |
| 5) 10:12 | 20:24 | 5:16 | 5:12 | 10:24 | 5:6 |
| 6) 5:10 | 1:2 | 5:20 | 10:15 | 10:20 | 10:30 |
| 7) 4:14 | 2:10 | 8:28 | 2:7 | 7:2 | 8:24 |
| 8) 10:30 | 10:60 | 20:15 | 5:15 | 20:60 | 20:10 |
| 9) 2:20 | 6:60 | 6:80 | 1:20 | 1:30 | 1:10 |
| 10) 4:8 | 8:12 | 8:16 | 8:14 | 2:4 | 2:6 |

Equivalent Rates

Multiple Choice

Circle the equivalent rates below

1) 3 burgers per person

- a) 4 burgers for 10 people
- b) 8 burgers for 12 people
- c) 15 burgers for 5 people
- d) 6 burgers for 10 people



2) 5 pencils per 5 people

- a) 5 pencils for 8 people
- b) 8 pencils for 8 people
- c) 6 pencils for 12 people
- d) 10 pencils for 15 people



3) \$1 per person

- a) \$30 for 5 people
- b) \$25 for 3 people
- c) \$20 for 2 people
- d) \$50 for 10 people

4) 30 minutes per show

- a) 40 minutes for 3 shows
- b) 90 minutes for 3 shows
- c) 60 minutes for 3 shows
- d) 120 minutes for 2 shows

5) 3 games per day

- a) 12 games in 3 days
- b) 15 games in 5 days
- c) 10 games in 2 days
- d) 6 games in 3 days



6) 4 ice cubes per drink

- a) 12 ice cubes for 2 drinks
- b) 8 ice cubes for 4 drinks
- c) 16 ice cubes for 5 drinks
- d) 6 ice cubes for 3 drinks



7) 8 minutes per book

- a) 30 minutes for 3 books
- b) 50 minutes for 4 books
- c) 20 minutes for 3 books
- d) 32 minutes for 4 books

8) 2 pillows per person

- a) 4 pillows for 4 people
- b) 8 pillows for 8 people
- c) 16 pillows for 8 people
- d) 20 pillows for 5 people

9) 7 basketballs per team

- a) 21 basketballs for 3 teams
- b) 25 basketballs for 5 teams
- c) 10 basketballs for 3 teams
- d) 16 basketballs for 2 teams



10) 5 snacks per student

- a) 9 snacks for 3 students
- b) 13 snacks for 3 students
- c) 25 snacks for 5 students
- d) 16 snacks for 4 students



Memory Game: Matching Equivalent Rates

Objective

What are we learning about?

Students will learn to identify and match equivalent rates through a fun and interactive game.

Materials

What you will need for the activity.

- Memory game cards. Each card will have a different rate. Some can be matched to another equivalent rate.
- A small table or clear floor space.



Instructions

How you will complete the activity.

1. Divide the class into groups of 3 or 4. Give each group a set of Memory Game cards. (provided)
2. Have each group lay all the cards face down in a grid on a table.
3. The students take turns flipping over two cards at a time, trying to find a matching equivalent rate.
4. If a student finds a match, they remove those cards from the grid and keep them.
5. If the cards do not match, they are turned back over, and the next student takes a turn.
6. The game continues until all the cards have been matched.
7. After the game, review the equivalent fractions with the class.

Name: _____

90

Cards

Memory Game Cards

 $\$36/6$ $\$18/3$

8 for \$4.00

6 for \$8.00

 $\$50/2$ $\$100/4$

9 for \$3.00

18 for \$6.00

 $\$150/3$ $\$300/6$

Name: _____

91

Cards

Memory Game Cards

7 for \$2.10

14 for \$4.20

\$9²

\$48/6

20 for \$8.00

1 for \$4.00

\$180/15

\$90/15

\$250/10

\$125/5

Ratio In 3 Ways

Part 1

Write the ratios for the questions below

| | | | |
|---|---|---|---|
| 1) Ratio of 35 balls to 78 strikes. | Words: _____ Ratio: _____ Fraction: _____ | 5) Ratio of sitting for 30 minutes to standing for 60 | Words: _____ Ratio: _____ Fraction: _____ |
| 2) Ratio of _____ dunks to _____ three pointers | Words: _____ Ratio: _____ Fraction: _____ | 6) Ratio of 1 grade 8 to 1 grade 7 | Words: _____ Ratio: _____ Fraction: _____ |
| 3) Ratio of 10 cars to 3 trucks | Words: _____ Ratio: _____ Fraction: _____ | 7) Ratio of 3 _____ to 1 shot | Words: _____ Ratio: _____ Fraction: _____ |
| 4) Ratio of 2 coffees to 6 waters | Words: _____ Ratio: _____ Fraction: _____ | 8) _____ treat to _____ healthy snacks | Words: _____ Ratio: _____ Fraction: _____ |

Part 2

Answer the questions below

1) A baseball pitcher threw a ratio of 1 ball to 3 strikes. The pitcher threw 75 strikes. How many balls did they throw?



2) A hockey player has a ratio of 1 goal for every 8 shots they took. The player scored 5 goals today. How many shots did they take?



Equivalent Ratios – Scaling Up and Down

Questions

Circle two equivalent ratios for each of the questions below

| | | | | | |
|--------------------|---------------|---------------|---------------|-----------------|-----------------|
| 1) 5:10 | $\frac{1}{3}$ | 2:5 | 1 to 2 | 3:5 | $\frac{10}{20}$ |
| 2) 4:12 | 1:3 | 8 to 36 | 12:36 | $\frac{2}{3}$ | 8:36 |
| 3) $\frac{6}{16}$ | 12:32 | 3:32 | 18:16 | 3:8 | |
| 4) $\frac{3}{6}$ | 1:4 | 5:10 | 2:8 | 5 to 15 | |
| 5) 9:12 | $\frac{2}{3}$ | 3:4 | 18:24 | $\frac{27}{36}$ | 18:48 |
| 6) 6:8 | 2:4 | $\frac{1}{3}$ | 3:4 | 36:48 | $\frac{60}{76}$ |
| 7) 4 to 10 | 1:3 | 2:6 | $\frac{3}{7}$ | 2 to 5 | 12:30 |
| 8) 15:20 | 5 to 10 | 10:15 | 3:4 | 30:50 | $\frac{45}{60}$ |
| 9) $\frac{25}{40}$ | 1:3 | 5 to 8 | 50:80 | 3 to 6 | 10:30 |
| 10) 8:12 | 5 to 8 | 7:11 | $\frac{4}{6}$ | 28:42 | 24 to 36 |

Simplifying Proportions

Questions

Write a ratio in its simplest form for each of the situations below

1) A farm sells 15 apples for every 10 bananas.

2) A restaurant sells 25 sandwiches for every 5 steaks.



3) Ben counts 30 vehicles driving on his road. 21 of the vehicles were cars and 9 were trucks.

4) Owen owns 4 racing video games and 2 adventure games.



5) Hugh counted his socks and discovered that he has 15 black socks and 25 white socks.

6) A hockey team practices 36 times a year and plays 18 games.



7) A café sells 18 coffees for every 6 teas.

8) Silas can perform 21 push-ups and 7 pull-ups.



9) Allison noticed that 36 songs played on a jukebox were rock songs and 48 songs were pop songs.

10) At Wellington Intermediate School, a survey determined that 96 students took a bus to school and 128 students walked.



Ratios – Word Problems**Questions**

Answer the word problems below

1) There are 27 students in a grade 8 class. The ratio of boys to girls is 5:4.

a) Write the ratio in words and as a fraction.

b) How many boys are in the class?

c) How many girls are in the class?



2) A car dealership has 100 vehicles. The ratio of cars to vans to trucks is – 10:4:6.

a) How many cars do they have?

b) How many vans do they have?

c) How many trucks do they have?



3) A banquet hall has 15 tables. The ratio of tables to chairs is 15:90.

a) How many chairs are there at each table?



b) The banquet hall bought 12 more tables. How many more chairs will they need?

Proportional vs Non-Proportional Relationship

A **proportional relationship** is when two variables change at the same rate.

Example - 1 cookie per 1 student ($1/1$) is proportional to 10 cookies per 10 students ($10/10$). Both variables (cookie and student), were multiplied by the same number - 10.

A **non-proportional relationship** is when two variables do not change at the same rate.

Example - \$100 per 1 month ($1/100$) is different than \$500 per 7 months ($500/7$)

Question: Are the following relationships proportional or non-proportional?

| | |
|-------------------------------------|-------------------------------------|
| 1) $\frac{9}{2}$ and $\frac{18}{4}$ | 2) $\frac{2}{6}$ and $\frac{5}{15}$ |
| Proportional | Non-Proportional |

| | |
|---------------------------------------|---------------------------------------|
| 3) $\frac{14}{5}$ and $\frac{98}{35}$ | 4) $\frac{3}{8}$ and $\frac{75}{125}$ |
| Proportional | Non-Proportional |

| | |
|--------------------------------------|-------------------------------------|
| 5) $\frac{5}{8}$ and $\frac{45}{64}$ | 6) $\frac{2}{6}$ and $\frac{5}{15}$ |
| Proportional | Proportional |

| | |
|---------------------------------------|---------------------------------------|
| 7) $\frac{12}{7}$ and $\frac{84}{56}$ | 8) $\frac{7}{3}$ and $\frac{210}{90}$ |
| Proportional | Proportional |

| | |
|--|---|
| 9) $\frac{60}{7}$ and $\frac{300}{35}$ | 10) $\frac{8}{17}$ and $\frac{56}{102}$ |
| Proportional | Non-Proportional |

| | |
|---|---|
| 11) $\frac{9}{22}$ and $\frac{54}{132}$ | 12) $\frac{15}{35}$ and $\frac{120}{245}$ |
| Proportional | Non-Proportional |

Proportional vs Non-Proportional Relationship

When representing variables, we can use a table to determine if the relationship is proportional or non-proportional.

Example - Erica earned a pay cheque each week from her employer. Her earnings go up \$250 each week, which makes the relationship between weeks and earnings proportional.

| | | | | | | |
|---------------------|-----|-----|-----|------|------|------|
| Weeks (x) | 1 | 2 | 3 | 4 | 5 | 6 |
| Earnings (y) | 250 | 500 | 750 | 1000 | 1250 | 1500 |

Question: Are the following relationships proportional or non-proportional?

1)

| | | | | |
|-----|----|-----|-----|-----|
| (x) | 1 | 2 | 3 | 4 |
| (y) | 75 | 150 | 225 | 300 |

Proportional Non-Proportional

2)

| | | | | |
|-----|----|-----|-----|-----|
| (x) | 5 | 10 | 15 | 20 |
| (y) | 50 | 100 | 150 | 200 |

Proportional Non-Proportional

3)

| | | | | |
|-----|----|----|----|----|
| (x) | 3 | 6 | 9 | 12 |
| (y) | 15 | 30 | 45 | 60 |

Proportional Non-Proportional

4)

| | | | |
|-----|----|-----|-----|
| (x) | 12 | 16 | 20 |
| (y) | 32 | 114 | 136 |

Proportional Non-Proportional

5)

| | | | | |
|-----|----|-----|-----|-----|
| (x) | 10 | 20 | 30 | 40 |
| (y) | 70 | 140 | 210 | 280 |

Proportional Non-Proportional

6)

| | | | |
|-----|-----|-----|------|
| (x) | 10 | 20 | 30 |
| (y) | 200 | 400 | 1200 |

Proportional Non-Proportional

7)

| | | | | |
|-----|----|----|----|----|
| (x) | 20 | 40 | 60 | 80 |
| (y) | 5 | 10 | 15 | 20 |

Proportional Non-Proportional

8)

| | | | | |
|-----|----|----|----|----|
| (x) | 7 | 14 | 21 | 28 |
| (y) | 21 | 42 | 64 | 86 |

Proportional Non-Proportional

9)

| | | | | |
|-----|----|-----|-----|-----|
| (x) | 1 | 11 | 21 | 31 |
| (y) | 10 | 110 | 210 | 310 |

Proportional Non-Proportional

10)

| | | | | |
|-----|-----|-----|-----|------|
| (x) | 5 | 15 | 25 | 35 |
| (y) | 150 | 450 | 750 | 1050 |

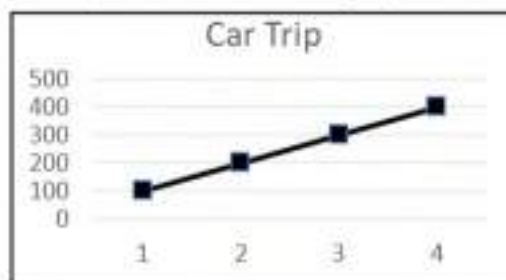
Proportional Non-Proportional

Proportional Relationship - Graph

When a proportional relationship is represented on a graph, the result is a straight line. This is called a linear graph.

Example:

Kim drove from Kingston to Toronto. She kept track of her distance every hour.



| Hours | Distance (km) |
|-------|---------------|
| 1 | 100 |
| 2 | 200 |
| 3 | 300 |
| 4 | 400 |

Questions: Write a table of values based on the graph. Is the relationship proportional?

1)

| (x) | (y) |
|-----|-----|
| 1 | |
| 2 | |
| 3 | |
| 4 | |



Proportional

Non-Proportional

2)

| (x) | (y) |
|-----|-----|
| 5 | |
| 10 | |
| 15 | |
| 20 | |



Proportional

Non-Proportional

3)

| (x) | (y) |
|-----|-----|
| 15 | |
| 30 | |
| 45 | |
| 60 | |



Proportional

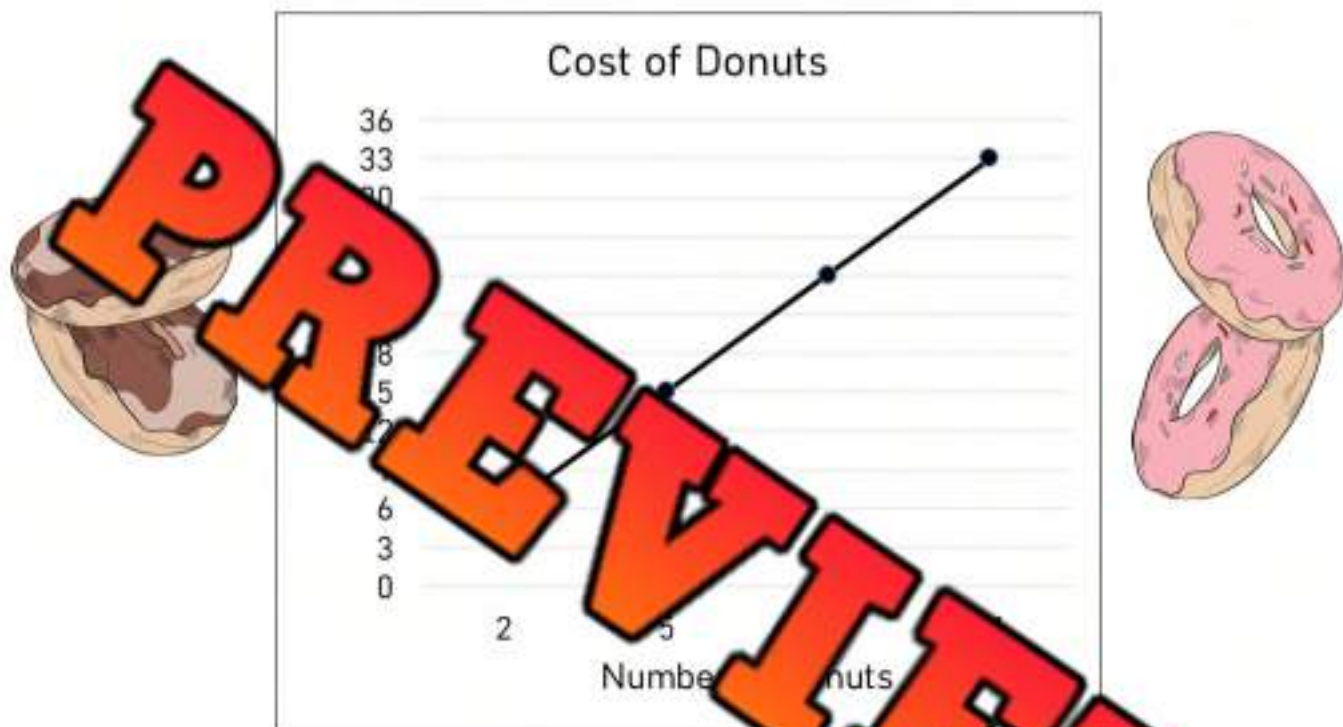
Non-Proportional

Proportional Relationship – Donut Problem

Questions

Solve the problem below

Hailey is buying donuts for a party. The graph below represents the relationship between the cost of the donuts and the number of donuts.



1) Is the graph proportional or non-proportional?

2) What is the unit rate? (cost per donut)

3) How much does 8 donuts cost?

4) How many donuts could Hailey buy for \$33?

5) Use the graph to determine how many donuts you could buy for \$12

6) Use the graph to determine how much 9 donuts would cost.

7) If Hailey needs 150 donuts for her party, how much will it cost her?

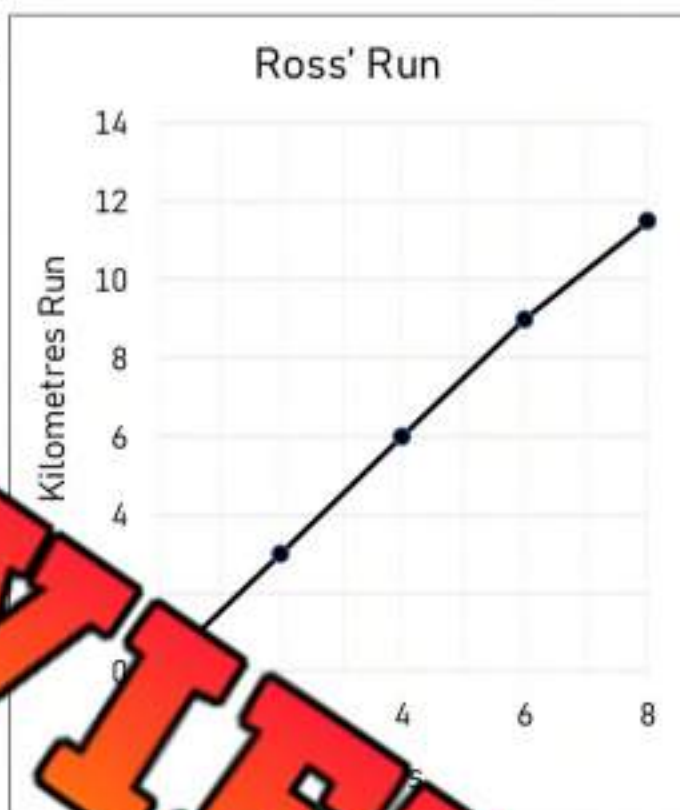
Proportional Relationship – Run

Questions

Solve the problem below

Ross goes for an 8-hour run. He tries to maintain a pace where he runs the same speed.

| | Distance (km) |
|---|---------------|
| 2 | |
| 6 | |
| 8 | |



- 1) Is the relationship between hours and distance proportional or non-proportional?
- 2) What was the unit rate for the first 6 hours of Ross' run?
- 3) How far did Ross travel after 3 hours?
- 4) How long did it take Ross to run 7 kilometres?
- 5) What was Ross' unit rate during his 6–8 hour interval?
- 6) Ross paced most of the race perfectly. What might have happened at the end of his race?

Proportional Relationship – Bike Race

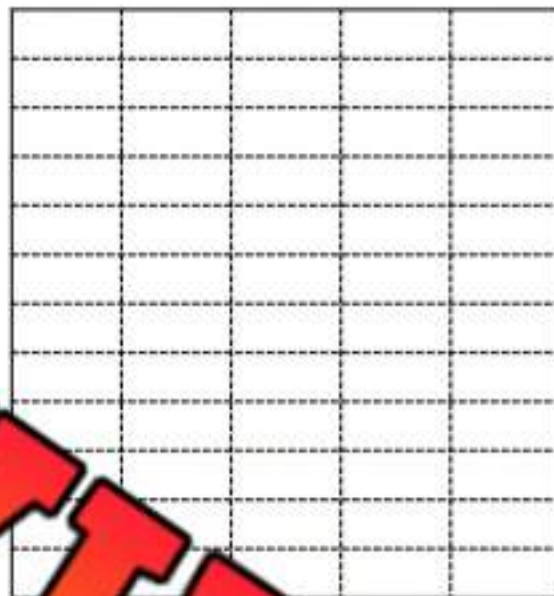
Questions

Draw a line graph that represents the data in the table

Nick was in a bike race yesterday. They raced an 11km course. The relationship between his time and distance is listed in the table below.



| Minutes | Distance (km) |
|---------|---------------|
| 30 | 3 |
| 60 | 4 |
| 90 | 6 |
| 120 | 8 |
| 150 | 11 |



- 1) Is the relationship between minutes and distance proportional or non-proportional?
- 2) What was the unit rate for the first 120 minutes of Nick's bike ride?
- 3) How far did Nick travel after 45 minutes?
- 4) How long did it take Nick to bike 7 kilometres?
- 5) What was Nick's unit rate during his 120-150 minute time interval?
- 6) Nick paced most of the race perfectly. What happened at the end of his race?

Proportional Reasoning - Quiz

Part 1

Write the ratios for the questions below

| | |
|---|---|
| 1) Ratio of 41 balls to 67 strikes. | Words: _____ Ratio: _____ Fraction: _____ |
| 2) Ratio of 27 green marbles to 15 red marbles. | Words: _____ Ratio: _____ Fraction: _____ |
| 3) Ratio of 27 cars to 12 trucks. | Words: _____ Ratio: _____ Fraction: _____ |
| 4) Ratio of 25 students to 1 teacher. | Words: _____ Ratio: _____ Fraction: _____ |

Part 2

Circle the equivalent ratio for each of the questions below

| | | | | | |
|-------------------|--|---------------------------------|---------------------------------|-------------------------------|--|
| 1) 3 to 9 | <input type="checkbox"/> $\frac{1}{3}$ | <input type="checkbox"/> 2:5 | <input type="checkbox"/> 1 to 6 | <input type="checkbox"/> 9:27 | <input type="checkbox"/> $\frac{10}{33}$ |
| 2) 4:16 | <input type="checkbox"/> 1:3 | <input type="checkbox"/> 1 to 4 | <input type="checkbox"/> 6 | <input type="checkbox"/> 1 | <input type="checkbox"/> 12:48 |
| 3) $\frac{5}{20}$ | <input type="checkbox"/> 2:8 | <input type="checkbox"/> 6:40 | <input type="checkbox"/> 7:28 | <input type="checkbox"/> 3:1 | <input type="checkbox"/> 10:50 |

Part 3

Answer the word problems below

There are 35 students in a grade 8 class. The ratio of girls to boys is 3:2.

- a) Write the ratio in words and as a fraction.
- b) How many boys are in the class?
- c) How many girls are in the class?

Part 4

Are the relationships proportional or non-proportional?

| | |
|---------------------------------------|--|
| 1) $\frac{8}{2}$ and $\frac{18}{4}$ | 2) $\frac{4}{7}$ and $\frac{16}{28}$ |
| Proportional Non-Proportional | Proportional Non-Proportional |
| 3) $\frac{16}{5}$ and $\frac{64}{20}$ | 4) $\frac{9}{12}$ and $\frac{81}{109}$ |
| Proportional Non-Proportional | Proportional Non-Proportional |

Part 5 Use proportional rates by determine the value of the variable

| | |
|---|---|
| 1) $\frac{3}{8}$ and $\frac{18}{r}$ r = _____ | 2) $\frac{2}{7}$ and $\frac{m}{63}$ m = _____ |
| 3) $\frac{11}{t}$ and $\frac{121}{44}$ t = _____ | 4) $\frac{48}{9}$ and $\frac{y}{9}$ y = _____ |
| 5) $\frac{15}{6}$ and $\frac{105}{p}$ p = _____ | 6) $\frac{37}{s}$ and $\frac{37}{s}$ s = _____ |

Part 6

Are the relationships proportional or non-proportional?

| | | | | | | | | | | | | | | | | | | | | | |
|---|-----|-----|-----|-----|----|-----|----|-----|-----|-----|--|-----|---|----|----|----|-----|-----|-----|-----|-----|
| 1) <table border="1"> <tbody> <tr> <td>(x)</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>(y)</td> <td>33</td> <td>66</td> <td>99</td> <td>123</td> </tr> </tbody> </table> Proportional Non-Proportional | (x) | 1 | 2 | 3 | 4 | (y) | 33 | 66 | 99 | 123 | 2) <table border="1"> <tbody> <tr> <td>(x)</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> </tr> <tr> <td>(y)</td> <td>45</td> <td>90</td> <td>135</td> <td>170</td> </tr> </tbody> </table> Proportional Non-Proportional | (x) | 5 | 10 | 15 | 20 | (y) | 45 | 90 | 135 | 170 |
| (x) | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | |
| (y) | 33 | 66 | 99 | 123 | | | | | | | | | | | | | | | | | |
| (x) | 5 | 10 | 15 | 20 | | | | | | | | | | | | | | | | | |
| (y) | 45 | 90 | 135 | 170 | | | | | | | | | | | | | | | | | |
| 3) <table border="1"> <tbody> <tr> <td>(x)</td> <td>3</td> <td>6</td> <td>9</td> <td>12</td> </tr> <tr> <td>(y)</td> <td>65</td> <td>130</td> <td>195</td> <td>260</td> </tr> </tbody> </table> Proportional Non-Proportional | (x) | 3 | 6 | 9 | 12 | (y) | 65 | 130 | 195 | 260 | 4) <table border="1"> <tbody> <tr> <td>(x)</td> <td>8</td> <td>12</td> <td>16</td> <td>20</td> </tr> <tr> <td>(y)</td> <td>125</td> <td>250</td> <td>375</td> <td>500</td> </tr> </tbody> </table> Proportional Non-Proportional | (x) | 8 | 12 | 16 | 20 | (y) | 125 | 250 | 375 | 500 |
| (x) | 3 | 6 | 9 | 12 | | | | | | | | | | | | | | | | | |
| (y) | 65 | 130 | 195 | 260 | | | | | | | | | | | | | | | | | |
| (x) | 8 | 12 | 16 | 20 | | | | | | | | | | | | | | | | | |
| (y) | 125 | 250 | 375 | 500 | | | | | | | | | | | | | | | | | |

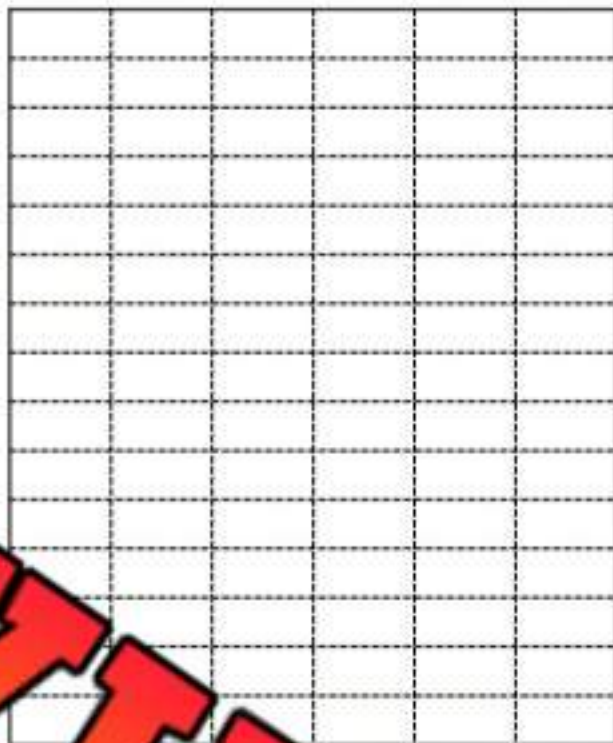
Part 7

Draw a line graph and fill in the table to represent the situation

Stuart earns \$225 a week from his job. Fill in his earnings over a 10-week period and graph his earnings.



| Week | Total Saving |
|------|--------------|
| 1 | |
| 4 | |
| 8 | |
| 10 | |



- | | |
|---|--|
| 1) Is the relationship between week and savings proportional or non-proportional? | |
| 2) How much did Stuart earn after 5 weeks? | |
| 3) What is the unit rate? (earnings per week) | |
| 4) How much does he earn after 4.5 weeks? | |
| 5) After 20 weeks, how much would Stuart have earned? | |
| 6) After 30 weeks, Stuart saved all his money and then spent \$2650. How much does he have now? | |

Converting Mixed Numbers to Improper Fractions**Questions**

Convert the mixed numbers to improper fractions

1) $8\frac{2}{4} =$

2) $5\frac{1}{5} =$

3) $7\frac{3}{5} =$

4) $3\frac{5}{5} =$

5) $4\frac{3}{7} =$

6) $8\frac{3}{4} =$

7) $3\frac{1}{4} =$

8) $2\frac{2}{5} =$

9) $7\frac{5}{7} =$

10) $6\frac{2}{3} =$

11) $4\frac{2}{8} =$

12) $2\frac{1}{2} =$

13) $6\frac{3}{5} =$

14) $5\frac{3}{7} =$

15) $8\frac{1}{8} =$

16) $9\frac{1}{2} =$

17) $3\frac{1}{4} =$

18) $4\frac{3}{4} =$

19) $2\frac{1}{2} =$

20) $5\frac{3}{5} =$

21) $6\frac{3}{5} =$

Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Convert between improper fractions and mixed numbers.

1)

$$\frac{47}{8} =$$

2) $6 \frac{2}{9} =$

3) $\frac{27}{6} =$

Name: _____

Convert between improper fractions and mixed numbers.

1) $\frac{47}{8} =$

2) $6 \frac{2}{9} =$

3) $\frac{27}{6} =$

Name: _____

Convert between improper fractions and mixed numbers.

1) $\frac{47}{8} =$

2) $6 \frac{2}{9} =$

3) $\frac{27}{6} =$

Name: _____

Convert between improper fractions and mixed numbers.

1) $\frac{47}{8} =$

2) $6 \frac{2}{9} =$

3) $\frac{27}{6} =$

Adding Fractions With Common Denominators

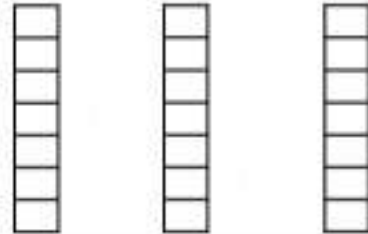
Questions

Add the fractions below using the models

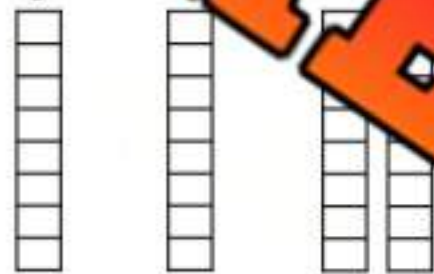
1) $\frac{4}{5} + \frac{2}{5} = \frac{6}{5}$ or $1 \frac{1}{5}$



2) $\frac{3}{7} + \frac{2}{7} = \underline{\quad}$



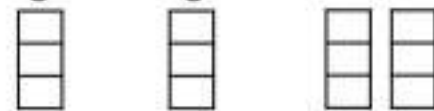
3) $\frac{5}{8} + \frac{\quad}{\quad} = \underline{\quad}$



4) $\frac{3}{4} + \frac{2}{4} = \underline{\quad}$



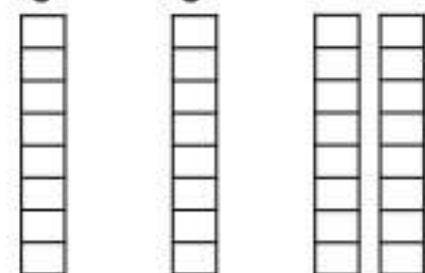
5) $\frac{2}{3} + \frac{3}{3} = \underline{\quad}$



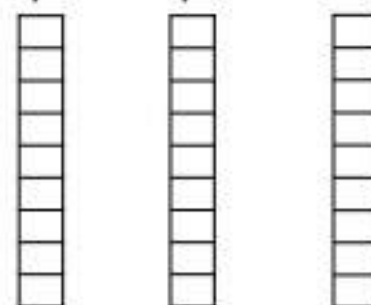
6) $\frac{3}{6} + \frac{3}{6} = \underline{\quad}$



7) $\frac{4}{8} + \frac{5}{8} = \underline{\quad}$



8) $\frac{7}{9} + \frac{1}{9} = \underline{\quad}$



Adding Fractions With Common Denominators

Questions

Solve the word problems

1) At the end of the birthday party, there were 4 pizza boxes left. The first box had $\frac{5}{8}$ slices left. The second box had $\frac{3}{8}$ slices left. The third box had $\frac{4}{8}$ slices remaining and the last box had $\frac{6}{8}$ left.

- a) How much pizza is left in total?
- b) How many pizzas are left?
- c) How many slices are left if there were 8 slices in each box?



2) Thomas is starting a 5-day running program. The distances he ran are presented in the table.

| Day | Distance (km) |
|-----------|----------------|
| Monday | $\frac{3}{8}$ |
| Tuesday | $\frac{6}{8}$ |
| Wednesday | $1\frac{3}{8}$ |
| Thursday | $2\frac{4}{8}$ |
| Friday | $2\frac{1}{8}$ |

- a) How far did he run after the 5 days?
- b) Which day did he run the farthest?



3) Shelly bought $\frac{38}{6}$ metres of red fabric, $3\frac{7}{6}$ metres of blue fabric, and $1\frac{2}{6}$ metres of green fabric.

- a) How much fabric did she buy in total?
- b) Which colour of fabric did she buy the most of?



Adding Mixed Fractions

When adding a mixed fraction, we have two options we can use to solve.

- 1) We can keep the wholes and add them together first and then add the fractional parts after.
- 2) We can convert the mixed fractions to improper fractions and then add them

Part 1

Add the mixed fractions together using option 1

| | | |
|--------------------------------------|--------------------------------------|---------------------------------------|
| Ex) $7\frac{7}{8} + 10\frac{1}{8} =$ | 1) $6\frac{2}{5} + 3\frac{1}{5} =$ | 2) $5\frac{3}{9} + 11\frac{5}{9} =$ |
| 3) $8\frac{4}{8} + 5\frac{3}{8} =$ | 4) $7\frac{5}{6} + 4\frac{1}{6} =$ | 5) $2\frac{4}{5} + 6\frac{3}{5} =$ |
| 6) $12\frac{5}{9} + 10\frac{8}{9} =$ | 7) $8\frac{9}{12} + 4\frac{5}{12} =$ | 8) $15\frac{8}{10} + 3\frac{4}{10} =$ |

Part 2

Add the mixed fractions together using option 2

| | |
|---|--|
| Ex) $3\frac{2}{8} + 7\frac{4}{8} = \frac{26}{8} + \frac{60}{8} = \frac{86}{8}$ or $10\frac{6}{8}$ | 1) $3\frac{4}{8} + 4\frac{2}{8} =$ |
| 2) $6\frac{1}{4} + 8\frac{2}{4} =$ | 3) $11\frac{7}{9} + 7\frac{5}{9} =$ |
| 4) $10\frac{8}{11} + 9\frac{5}{11} =$ | 5) $12\frac{6}{14} + 6\frac{10}{14} =$ |

Cooking With Fractions - Adding

**Questions**

Solve the word problems

1) Alice baked 100 pies last month. Of the 100 pies, $\frac{1}{5}$ were blueberry, $\frac{2}{10}$ were apple, and $\frac{8}{25}$ were peach.

a) What fraction of pies were blueberry, apple, or peach?



b) How many pies were either blueberry, apple, or peach?

2) Melanie sells donuts at her bakery last month, $\frac{2}{6}$ of the customers bought chocolate donuts, $\frac{1}{12}$ bought vanilla donuts, and $\frac{2}{9}$ bought caramel donuts.



What fraction of customers bought either vanilla or caramel donuts?

3) Ruben owns a restaurant. He likes to keep track of what his customers are buying. His top 3 sellers are sandwiches, salads, and pizza. He knows that $\frac{2}{8}$ of his customers buy a sandwich, $\frac{1}{4}$ buy a salad, and $\frac{2}{6}$ buy a pizza.

What fraction of customers buy one of his top 3 sellers?



4) Evan has 4 methods of payment for his restaurant. He accepts credit cards, debit cards, cash, and cheque. Out of his last 100 customers, $\frac{2}{6}$ paid with a credit card, $\frac{1}{3}$ paid with a debit card, and $\frac{2}{9}$ paid with cash.

a) What fraction of customers paid with credit, debit, or cash?

b) What fraction paid with a cheque?



Exit Cards

Cut Out

Cut out the exit cards below and have students complete them at the end of class

Name: _____

Solve the problem below

In a school play, $\frac{1}{4}$ of the students acted, $\frac{1}{3}$ helped with props, and $\frac{1}{6}$ managed the lights. What fraction of students participated in the play?

Name: _____

Solve the problem below

In a school play, $\frac{1}{4}$ of the students acted, $\frac{1}{3}$ helped with props, and $\frac{1}{6}$ managed the lights. What fraction of students participated in the play?

Name: _____

Solve the problem below

In a school play, $\frac{1}{4}$ of the students acted, $\frac{1}{3}$ helped with props, and $\frac{1}{6}$ managed the lights. What fraction of students participated in the play?

Name: _____

Solve the problem below

In a school play, $\frac{1}{4}$ of the students acted, $\frac{1}{3}$ helped with props, and $\frac{1}{6}$ managed the lights. What fraction of students participated in the play?

Activity – Math Hot Seat: Addition Challenge

Objective

What are we learning about?

Students will practice solving a variety of fraction addition problems, including fractions with common denominators, mixed fractions, and fractions with unlike denominators, by participating in an engaging, interactive game.

$$\frac{3}{8} + \frac{6}{4}$$

Material

What you will need for the activity.

- Index cards with fraction problems
- Chairs arranged in a circle
- Stopwatch or timer
- Whiteboard and marker

Instructions

How you will complete the activity.

1. Prepare a stack of index cards with various fraction addition problems. Include problems with common denominators, mixed fractions, and fractions with unlike denominators.
2. Arrange chairs in a circle with one "hot seat" in the center.
3. Explain the rules of the game to the students. One student will sit in the hot seat while the rest sit in the surrounding chairs.
4. The teacher will read an addition problem from the stack. The student in the hot seat has a limited time (e.g., 30 seconds) to solve the problem.
5. If the student in the hot seat answers correctly within the time limit, they stay in the hot seat for the next round. If they answer incorrectly or run out of time, they switch places with another student from the circle.
6. Continue the game until each student has had the opportunity to sit in the hot seat multiple times, or until the designated game time is up.
7. Keep track of the number of correct answers each student provides while in the hot seat. The student with the most correct answers at the end of the game wins.

Index Cards

Use the math problems below

$$\frac{7}{5} + \frac{7}{10}$$

$$\frac{7}{12} + \frac{11}{18}$$

$$\frac{1}{3} + \frac{4}{9}$$

$$\frac{4}{7} + \frac{9}{14}$$

Jan walked $7\frac{1}{3}$ kilometers on
Saturday and $5\frac{2}{5}$ kilometers on
Sunday. What is the total distance
he walked over the weekend?

A farmer harvested $3\frac{2}{8}$ tons of
apples and $4\frac{1}{4}$ tons of oranges. How
many tons of fruit did the farmer
harvest in total?

$$\frac{6}{13} + \frac{5}{13}$$

$$\frac{0}{2} + \frac{5}{10}$$

$$3\frac{7}{8} + 1\frac{5}{8}$$

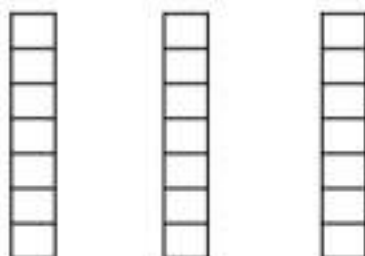
Subtraction Fractions - Common Denominators**Questions**

Subtract the fractions below using the models

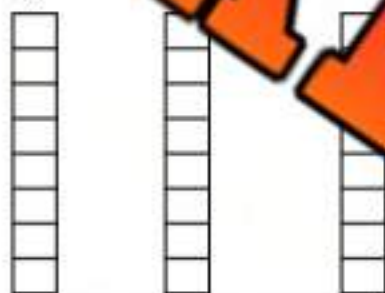
1) $\frac{4}{6} - \frac{2}{6} = \frac{2}{6}$



2) $\frac{6}{7} - \frac{3}{7} = \underline{\quad}$



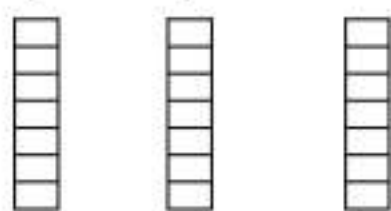
3) $\frac{7}{8} - \frac{2}{8} = \underline{\quad}$



4) $\frac{3}{5} - \frac{1}{5} = \underline{\quad}$



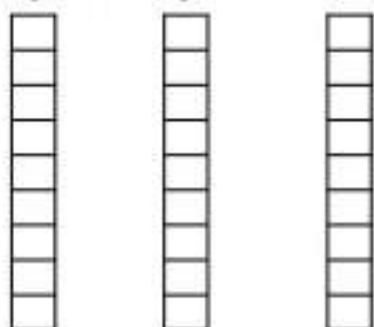
5) $\frac{6}{7} - \frac{3}{7} = \underline{\quad}$



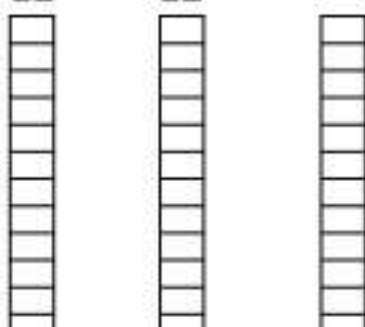
6) $\frac{5}{6} - \frac{2}{6} = \underline{\quad}$



7) $\frac{7}{9} - \frac{4}{9} = \underline{\quad}$



8) $\frac{10}{12} - \frac{7}{12} = \underline{\quad}$



Subtraction Fractions – Word Problems**Questions**

Solve the word problems

1) Drew ran $4\frac{3}{4}$ km yesterday in 20 minutes. Lindsay ran $\frac{18}{4}$ km yesterday in 20 minutes.

- a) Who ran further in the 20 minutes?
b) How much further did they run?



2) Baker found a green snake and a black snake in his backyard. The green snake was $22\frac{1}{3}$ cm long. The black snake was $\frac{45}{3}$ cm long.

- a) Which snake is longer?
b) How much longer is the snake?



3) Ayden picked $3\frac{3}{5}$ baskets of strawberries and Mimi picked $\frac{12}{5}$ baskets of strawberries.

- a) Who picked more strawberries?
b) How much more did they pick?



4) Sharon has practiced playing the piano for $2\frac{2}{7}$ hours this week. She wants to practice for $\frac{25}{7}$ hours.

- a) How much more time does she need to practice?
b) If she wants to practice for 10 hours, how much longer does she need to practice?



Subtracting Fractions – Word Problems**Questions**

Solve the word problems

1) Brianna baked a cake. She used $\frac{4}{6}$ of a cup of white sugar and $\frac{2}{8}$ of a cup of brown sugar. How much more white sugar was used than brown sugar?



2) Mike has to walk 1 kilometre to school. He has walked $\frac{1}{2}$ a kilometre already. How much further does he have to go?



3) Clara has put $\frac{2}{7}$ of a cup of chocolate chips in her cookies. She needs to put in $\frac{3}{4}$ of a cup. How much more does she need to put in?



4) Lawrence ran 5km in $\frac{5}{8}$ of an hour. Skyler ran 5km in $\frac{4}{10}$.

- Who ran the 5km faster?
- How much faster did they run it in?



Subtracting Mixed Fractions

When subtracting a mixed fraction, we have two options we can use to solve.

- 1) We can keep the wholes and subtract them first and then subtract the fractional parts after.
- 2) We can convert the mixed fractions to improper fractions and then subtract.

Part 1

Subtract the mixed fractions using option 1

| | | |
|--|--|-------------------------------------|
| Ex) $3\frac{5}{8} - 2\frac{1}{8} =$ | 1) $8\frac{4}{6} - 5\frac{1}{6} =$ | 2) $3\frac{7}{9} - 1\frac{5}{9} =$ |
| 3) $7\frac{5}{7} - 3\frac{3}{7} =$ | 4) $2\frac{2}{6} - 1\frac{1}{6} =$ | 5) $4\frac{6}{8} - 1\frac{3}{8} =$ |
| 6) $12\frac{9}{11} - 10\frac{8}{11} =$ | 7) $13\frac{12}{15} - 5\frac{6}{15} =$ | 8) $5\frac{9}{9} - 8\frac{4}{10} =$ |

Part 2

Subtract the mixed fractions using option 2

| | |
|--|--|
| Ex) $6\frac{7}{8} - 2\frac{3}{8} = \frac{55}{8} - \frac{19}{8} = \frac{36}{8}$ or $4\frac{4}{8}$ | 1) $8\frac{7}{9} - 4\frac{3}{9} =$ |
| 2) $7\frac{4}{5} - 3\frac{2}{5} =$ | 3) $13\frac{8}{11} - 6\frac{3}{11} =$ |
| 4) $10\frac{11}{13} - 8\frac{6}{13} =$ | 5) $15\frac{12}{14} - 9\frac{9}{14} =$ |

Repeated Addition & Multiplying Fractions

Part 1

Add and multiply the fractions below

| Addition Version | Multiplication Version |
|---|---|
| 1) $\frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} = \frac{20}{7}$ or $2\frac{6}{7}$ | $5 \times \frac{4}{7} = \frac{20}{7}$ or $2\frac{6}{7}$ |
| 2) $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} =$ | |
| 3) $\frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5} =$ | |
| 4) $\frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} + \frac{3}{6} =$ | |
| 5) $\frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} + \frac{4}{9} =$ | |
| 6) $\frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} + \frac{5}{10} =$ | |
| 7) $\frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} + \frac{3}{7} =$ | |

Part 2

Answer the word problems below using an addition and multiplication sentence

- 1) Jerry made 5 pizzas. Each of the pizzas have $\frac{2}{7}$ cups of cheese. How much cheese do all 5 pizzas have in total?

| Addition Sentence | Multiplication Sentence |
|-------------------|-------------------------|
| | |

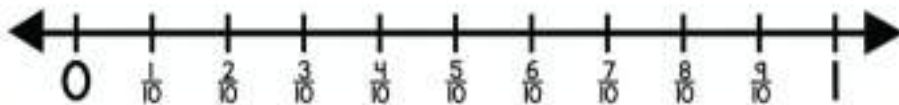
- 2) Helen buys 9 bags of chips. Each bag is $\frac{4}{9}$ of a kg. How many kilograms are all 9 bags combined?

| Addition Sentence | Multiplication Sentence |
|-------------------|-------------------------|
| | |

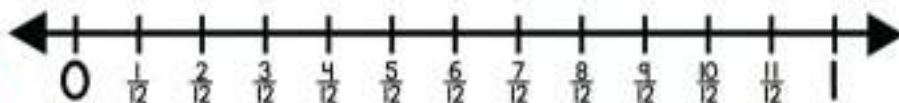
Multiply Whole Numbers by Fractions – Number Line**Questions**

Use the number line by skip counting to find the answer

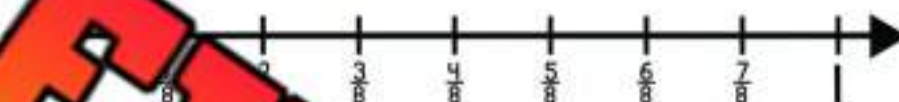
1) $8 \times \frac{1}{10} =$



2) $10 \times \frac{1}{12} =$



3) $7 \times \frac{1}{8} =$



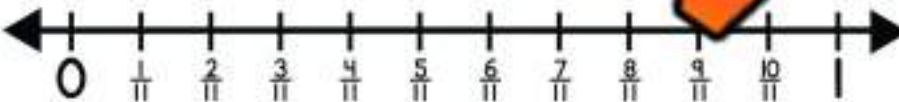
4) $5 \times \frac{1}{6} =$



5) $4 \times \frac{1}{5} =$



6) $7 \times \frac{1}{11} =$



7) $8 \times \frac{1}{9} =$



8) $6 \times \frac{1}{7} =$



Multiply Whole Numbers by Fractions**Questions**

Multiply the whole numbers by the fractions below. Write the answer as an improper fraction

1) $4 \times \frac{3}{4} = \frac{12}{4}$

2) $5 \times \frac{2}{5} = \square$

3) $8 \times \frac{4}{8} = \square$

4) $9 \times \frac{7}{10} = \square$

5) $4 \times \frac{4}{7} = \square$

6) $6 \times \frac{6}{8} = \square$

7) $7 \times \frac{4}{6} = \square$

8) $4 \times \frac{2}{5} = \square$

9) $7 \times \frac{2}{5} = \square$

10) $3 \times \frac{6}{7} = \square$

11) $3 \times \frac{8}{10} = \square$

12) $2 \times \frac{3}{4} = \square$

13) $5 \times \frac{2}{6} = \square$

14) $5 \times \frac{3}{7} = \square$

15) $9 \times \frac{5}{7} = \square$

16) $6 \times \frac{3}{7} = \square$

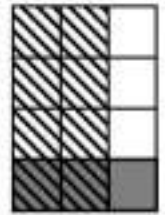
17) $7 \times \frac{6}{8} = \square$

18) $11 \times \frac{2}{9} = \square$

Multiplying Fractions – Area Models

We can represent two fractions using the same area model. Doing so will allow us to determine the product when we multiply two fractions together.

$$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12}$$



Example

Step 1: Divide the area model into thirds horizontally to represent $\frac{2}{3}$

Step 2: Draw diagonal lines that fill in two-thirds of the area model

Step 3: Divide the area model into fourths vertically to represent $\frac{1}{4}$

Step 4: Shade one-fourth of the area model

Step 5: Count how many squares overlap compared to the total number of squares

Questions Find the product using an area model. Steps 1-4 have been done for you

1)



$$\frac{3}{5} \times \frac{2}{4} = \underline{\hspace{2cm}}$$



$$= \underline{\hspace{2cm}}$$

3)



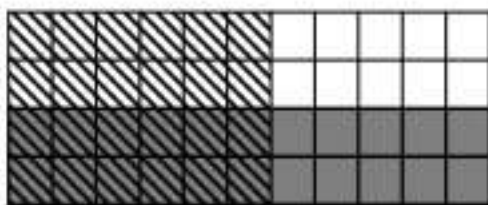
$$\frac{6}{7} \times \frac{3}{4} = \underline{\hspace{2cm}}$$

4)



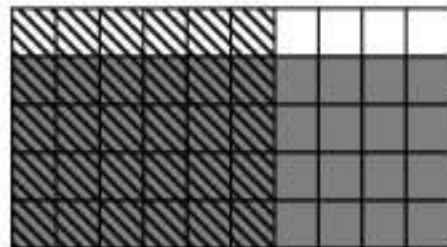
$$\frac{5}{9} \times \frac{3}{5} = \underline{\hspace{2cm}}$$

5)



$$\frac{6}{11} \times \frac{2}{4} = \underline{\hspace{2cm}}$$

6)



$$\frac{6}{10} \times \frac{4}{5} = \underline{\hspace{2cm}}$$

Multiplying Fractions – Area Models

The area models below have been divided to represent the fractions.

Directions:

- 1) Use diagonal lines to represent the first fraction
- 2) Shade in the area model to represent the second fraction
- 3) Write the answer

Questions

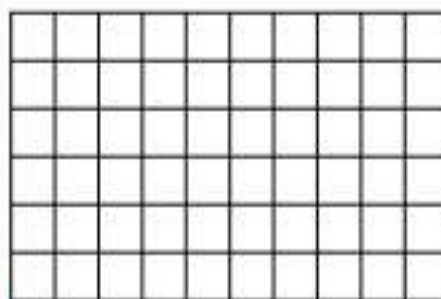
Find the product using the area models below

1)



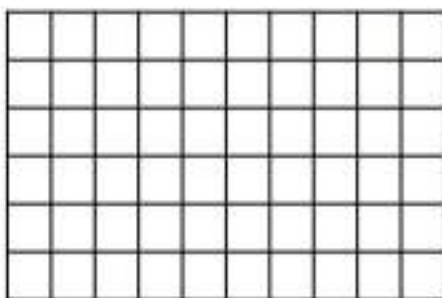
$$\frac{7}{9} \times \frac{5}{6} = \underline{\quad}$$

2)



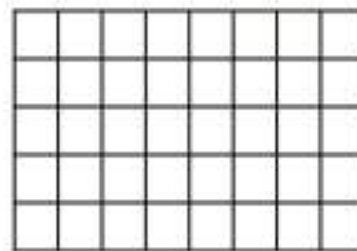
$$\frac{3}{4} \times \frac{4}{6} = \underline{\quad}$$

3)



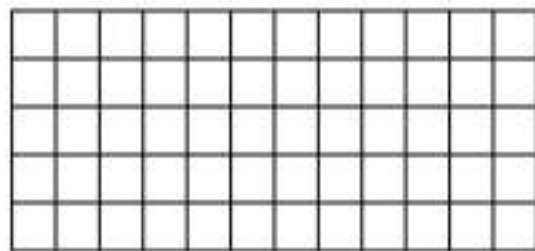
$$\frac{4}{10} \times \frac{4}{6} = \underline{\quad}$$

6)



$$\frac{5}{8} \times \frac{2}{5} = \underline{\quad}$$

5)



$$\frac{8}{12} \times \frac{4}{5} = \underline{\quad}$$

Multiplying Fractions – Word Problems

Questions

Find the products of the fractions below

1) Axel and Jasmine raced for 5 minutes. In the 5 minutes, Axel ran $\frac{4}{5}$ of a kilometre. Jasmine ran $\frac{2}{3}$ times as far as Axel. How far did Jasmine run?



2) Faith and Ember had sandwiches. Faith ate $\frac{3}{4}$ of her sandwich. Ember wasn't that hungry, so she ate $\frac{1}{2}$ as much as Faith ate. How much of her sandwich did Ember eat?



3) Laura completed $\frac{8}{11}$ of a marathon in the same time that Adalyn finished $\frac{2}{3}$ times as much of the race that Laura finished. How much of a marathon did Adalyn finish?



4) Atlas and Evie volunteered one day. Atlas spent $\frac{3}{4}$ of the 8-hour workday volunteering. Evie volunteered $\frac{1}{3}$ the amount of time that Atlas volunteered.

- What fraction of the workday did Evie volunteer?
- How much time did Atlas volunteer?
- How much time did Evie volunteer?



Multiplying Mixed Fractions

How to multiply mixed fractions

- 1) Convert the mixed fractions to improper fractions
- 2) Multiply the improper fractions
- 3) Convert the improper fraction back to a mixed fraction
- 4) Simplify if necessary

$$2\frac{2}{3} \times 2\frac{2}{4} = \frac{8}{3} \times \frac{10}{4} = \frac{80}{12} \text{ or } 6\frac{8}{12} \text{ or } 6\frac{3}{4}$$

Part 1 Find the products of the fractions below. Simplify the fractions.

1) $3\frac{1}{3} \times 2\frac{2}{4} =$

2) $4\frac{2}{5} \times 7\frac{5}{6} =$

3) $5\frac{1}{2} \times 6\frac{3}{7} =$

4) $9\frac{2}{4} \times 4\frac{7}{9} =$

5) $10\frac{5}{7} \times 7\frac{2}{3} =$

6) $1\frac{1}{3} \times 3\frac{1}{2} =$

7) $12\frac{3}{5} \times 5\frac{2}{3} =$

8) $8\frac{1}{9} \times 3\frac{1}{2} =$

Part 2 Answer the word problems below

1) Hadley ran $3\frac{4}{5}$ km. Freya ran $2\frac{2}{3}$ km times further. How far did Freya run?



2) Parker made tomato and chicken noodle soup. He made $2\frac{3}{4}$ kg of tomato soup and $4\frac{4}{5}$ times more chicken noodle soup. How much chicken noodle soup did he make?



Dividing Whole Numbers by Fractions

Questions

Answer the questions below

1) A bakery has 24 kilograms of flour available to make bread. If each loaf of bread requires $\frac{2}{3}$ kilogram of flour, how many loaves of bread can the bakery make with the available flour?

2) A builder has 100 meters of wood to create fence panels. Each panel requires $3\frac{1}{2}$ meters of wood. How many fence panels can he build?



3) A farmer wants to evenly divide 36 kilograms of grain among his $2\frac{1}{4}$ storage bins. How many storage bins can he fill?

4) A family wants to divide their 54-meter long garden into 9-meter sections. How many sections can they create?

5) A hiker has 45 liters of water to split between her $1\frac{2}{3}$ -liter water bottles. How many water bottles can she fill?

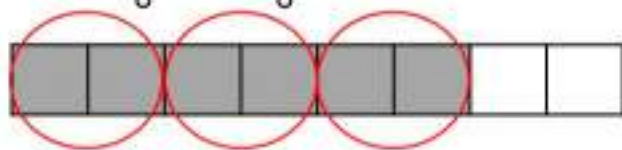


Dividing Fractions Using Models

Dividing Fractions

When we divide a fraction by its unit fraction, we should think, "how many counts of the unit are in the fraction (i.e., how many two-eighths are in six-eighths?)"

$$\frac{6}{8} \div \frac{2}{8} = 3$$



Solution - We can see that there are 3 two eighths in six eighths.

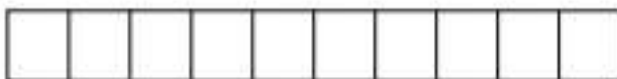
Questions Use a fraction bar. How many times does the divisor fit into the dividend

1)



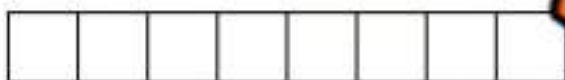
$$\frac{4}{8} \div \frac{2}{8} = \underline{\quad}$$

2)



$$\frac{9}{10} \div \frac{3}{10} = \underline{\quad}$$

3)



$$\frac{4}{8} \div \frac{1}{8} = \underline{\quad}$$

4)



$$\frac{5}{10} \div \frac{2}{10} = \underline{\quad}$$

5)



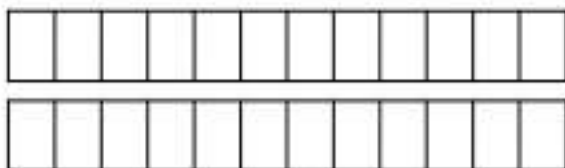
$$\frac{8}{10} \div \frac{2}{10} = \underline{\quad}$$

6)



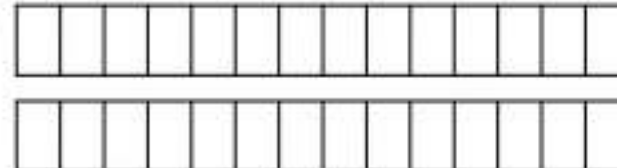
$$\frac{16}{20} \div \frac{4}{20} = \underline{\quad}$$

7)



$$\frac{24}{24} \div \frac{4}{24} = \underline{\quad}$$

8)



$$\frac{21}{28} \div \frac{3}{28} = \underline{\quad}$$

Dividing Fractions Using Models

Dividing Fractions

We can use a bar model to compare fractions to make it easier to divide.

$$\frac{3}{4} \div \frac{1}{8} = 6$$



Solution - We can see that $1/8$ fits into $3/4$ six times.

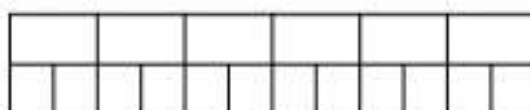
Questions _____ in the fraction bars. How many times does the divisor fit into the dividend

1)



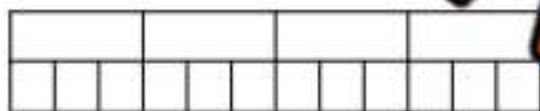
$$\frac{3}{5} \div \frac{1}{10} = \underline{\quad}$$

2)



$$\frac{5}{6} \div \frac{1}{12} = \underline{\quad}$$

3)



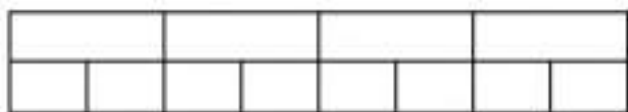
$$\frac{2}{4} \div \frac{1}{12} = \underline{\quad}$$

6)



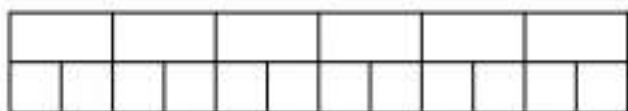
$$\frac{1}{3} \div \frac{1}{9} = \underline{\quad}$$

5)



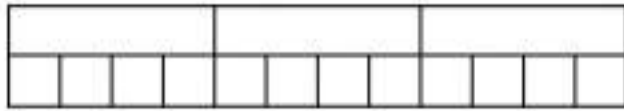
$$\frac{3}{4} \div \frac{1}{8} = \underline{\quad}$$

7)



$$\frac{5}{6} \div \frac{1}{12} = \underline{\quad}$$

8)



$$\frac{1}{3} \div \frac{1}{12} = \underline{\quad}$$

Unit Test - Fractions**Part 1**

Convert the mixed numbers to improper fractions

1) $7\frac{2}{4} =$

2) $4\frac{1}{5} =$

3) $5\frac{3}{5} =$

Part 2

Convert the improper fractions to mixed numbers

1) $\frac{27}{4} =$

2) $\frac{26}{5} =$

3) $\frac{34}{6} =$

Part 3

Add and subtract fractions using the models

1) $\frac{6}{8} + \frac{4}{8} = \underline{\quad}$

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2) $\frac{7}{8} + \frac{3}{8} = \underline{\quad}$

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3) $\frac{8}{9} - \frac{5}{9} = \underline{\quad}$

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4) $\frac{10}{11} - \frac{7}{11} = \underline{\quad}$

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Part 4

Create common denominators and then add/subtract the fractions below

1) $\frac{5}{7} + \frac{3}{8} =$

2) $\frac{5}{14} + \frac{2}{4} =$

3) $\frac{6}{8} + \frac{1}{4} =$

4) $\frac{6}{7} + \frac{2}{4} =$

5) $\frac{11}{15} - \frac{2}{5} =$

6) $\frac{3}{5} - \frac{3}{8} =$

7) $\frac{10}{18} - \frac{5}{9} =$

8) $\frac{1}{3} - \frac{1}{4} =$

Part 5

Add and subtract the mixed fractions

1) $5\frac{5}{8} + 2\frac{4}{8} =$

2) $4\frac{3}{5} + 4\frac{5}{5} =$

3) $11\frac{5}{8} + 10\frac{2}{6} =$

4) $7\frac{6}{8} + 4\frac{6}{10} =$

5) $3\frac{4}{7} - 2\frac{3}{7} =$

6) $13\frac{8}{15} - 8\frac{3}{15} =$

7) $12\frac{3}{8} - 5\frac{4}{7} =$

8) $8\frac{4}{6} - 4\frac{4}{10} =$

Part 6

Solve the word problems

1) Lindsay baked a cake. She used $\frac{5}{6}$ of a cup of white sugar and $\frac{3}{8}$ of a cup of brown sugar. How much more white sugar was used than brown sugar?

2) Dane ran $1\frac{1}{4}$ km yesterday and $2\frac{5}{7}$ km today. How many kilometres did he run in the two days?

Part 7

Multiply the mixed fractions. Give the answers as a mixed fraction

1) $4 \times \frac{4}{7} = \square = \square$

2) $3 \times \frac{2}{5} = \square = \square$

3) $6 \times \frac{5}{8} = \square = \square$

4) $5 \times \frac{3}{12} = \square = \square$

Part 8

Find the products of the fractions below. Simplify the fractions.

1) $\frac{4}{5} \times \frac{5}{6} = \text{---}$

2) $\frac{2}{8} \times \frac{6}{8} = \text{---}$

Part 9

Solve the division questions below

1) $\frac{7}{8} \div \frac{3}{12} =$

2) $\frac{9}{11} \div \frac{3}{7} =$

3) $\frac{5}{6} \div \frac{2}{8} =$

4) $\frac{8}{9} \div \frac{4}{6} =$

5) $8 \div \frac{1}{6} = \text{---} = \text{---} \times \text{---} =$

6) $5 \div \frac{7}{8} = \text{---} \times \text{---} =$

7) $7 \div \frac{2}{5} = \text{---} \times \text{---} =$ $\div \frac{4}{8} = \text{---} \times \text{---} =$

Part 10

Answer the word problems below

1) Scotty can run a kilometre in $\frac{4}{8}$ of an hour. How many kilometres can he run in $\frac{3}{4}$ of an hour?

2) Quinn bought 5 cans of tomato soup. Each can holds $\frac{8}{9}$ litres of soup. How many litres of soup do all 5 cans hold?

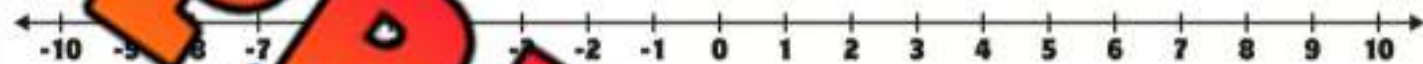
Introduction to Integers

Integers are whole numbers that can be positive, negative or zero. Integers do not include fractions or decimals. We use positive integers a lot, but we sometime need to use negative integers, like when we are measuring the temperature outside in the winter.

Questions

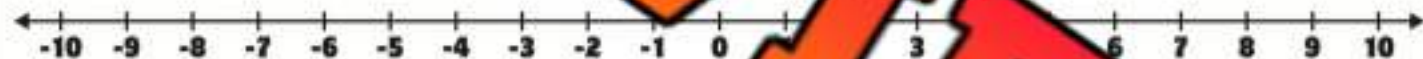
Use the number lines to solve the questions

1) The temperature at 6am was -9°C . At noon, the temperature was 5°C . Circle the temperature on the number line. How much did the temperature rise?



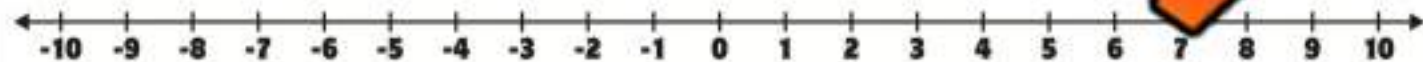
Rise in temperature = _____

2) Steve was in debt to his brother. He had $-\$5$. He was able to make some money by cutting his neighbour's grass. He paid his brother back and has $\$10$ left. How much did he make cutting grass?



Earnings from cutting grass = \$ _____

3) A running back in football earned -8 yards in the first half of his game with 10 yards. How many yards did he get in the second half?



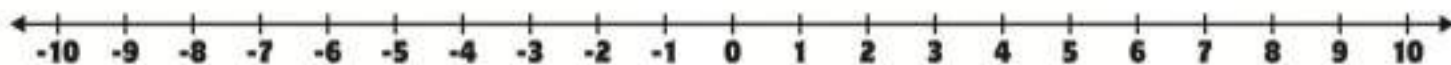
Yards in the second half = _____

4) Tiger Woods scored a -8 in his third round of a golf tournament. He scored $+8$ in the fourth round. How many more shots did he take in the fourth round?



Extra shots in the fourth round = _____

Comparing Integers

**Part 1**Use the $<$, $>$, $=$ to compare the integers below

- 1) 9 -3 2) -7 3 3) -10 0
- 4) -2 5 5) 1 -1 6) -10 10
- 7) -3 3 8) 5 6 9) 8 -6
- 10) -6 -7 11) -7 -1 12) 0

Part 2

Arrange the integers from least to greatest

- | | |
|-------------------------|-----------------------|
| 1) $7, 2, -6, -7, 4$ | 2) $0, -4, -8, 8$ |
| 3) $0, 3, -4, 5, -6$ | 4) $-2, 0, -6, 2, -5$ |
| 5) $10, -10, -9, 8, -8$ | 6) $-8, -7, 7, 0, 8$ |

Adding Integers – Zero Pairs



| | | | | | |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|
| + | + | + | - | - | - |
| + | + | + | - | - | - |
| + | | + | | | |
| <u>8</u> + <u>(-6)</u> = <u>2</u> | | | | | |



Question Cross out the zero pairs. What is left?

| | | |
|--|---|---|
| 1) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \end{matrix}$ _____ + _____ = _____ | 2) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \end{matrix}$ _____ + _____ = _____ | 3) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) \end{matrix}$ _____ + _____ = _____ |
|--|---|---|

| | | |
|---|--|--|
| 4) $\begin{matrix} (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \\ (-) \end{matrix}$ _____ + _____ = _____ | 5) $\begin{matrix} (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) \\ (-) & (-) \\ (-) & (-) \end{matrix}$ _____ + _____ = _____ | 6) $\begin{matrix} (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \end{matrix}$ _____ + _____ = _____ |
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| 7) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \\ (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \end{matrix}$ _____ + _____ = _____ | 8) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \\ (+) & (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) \end{matrix}$ _____ + _____ = _____ | 9) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \\ (-) & (-) \end{matrix}$ _____ + _____ = _____ |
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| 10) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \\ (-) & (-) & (-) \end{matrix}$ _____ + _____ = _____ | 11) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \\ (-) & (-) \end{matrix}$ _____ + _____ = _____ | 12) $\begin{matrix} (+) & (+) & (+) \\ (+) & (+) \end{matrix}$ $\begin{matrix} (-) & (-) & (-) \\ (-) & (-) & (-) \\ (-) \end{matrix}$ _____ + _____ = _____ |
|---|--|---|

Golf - Adding Integers – Zero Pairs

Word Problems

Solve the word problems below using counter chips



1) Bailey played 3 rounds of golf. She filled out her scorecard, but she forgot what she shot in round 2. Fill it in for her.

Equation: _____ + _____ = _____



| Round | Score |
|-------------|-------|
| 1 | -6 |
| 2 | |
| 3 | +9 |
| Total Score | +10 |

2) Ryker played 3 rounds of golf. His final scores for all three rounds are on the scorecard. What is his total score?

Equation: _____ + _____ + _____ = _____



| Round | Score |
|-------------|-------|
| 1 | -13 |
| 2 | -8 |
| 3 | +11 |
| Total Score | |

3) Sara played 4 rounds of golf. Her final scores are on the scorecard, but she can't remember what she scored on her first round. Help her complete her score card.



| R1 | R2 | R3 | R4 | Total Score |
|----|----|----|----|-------------|
| | 3 | -6 | -5 | -17 |

Equation: _____ + _____ + _____ + _____ = _____



4) Jason played 4 rounds of golf. His final scores are written on the scorecard. What is his total score?



| R1 | R2 | R3 | R4 | Total Score |
|-----|----|----|----|-------------|
| -11 | -6 | 8 | -7 | |

Equation: _____ + _____ + _____ + _____ = _____

Adding Integers – Using Number Lines

Adding Integers Rules

$(+) + (+) = (+)$ Adding 2 positive integers will always give a positive answer

$(-) + (-) = (-)$ Adding 2 negative integers will always give a negative answer

$(+) + (-) = (-)$ Adding integers with different signs → use the larger number

$(-) + (+) = (-)$ Adding integers with different signs → use the larger number

*** If the integers have the same sign, add them and keep the sign

*** If the integers have different signs, subtract them and use the sign of the larger number

Part 1 Use the rules above to solve the 1-step questions below

1) $68 + (-32)$

5) $121 + (-121)$

2) $57 + (-76)$

6) $(-1) + (-121)$

3) $-115 + (-122)$

7) $1 + (-2)$

4) $(+133) + (+77)$

8) $-353 + (-2)$

Part 2 Simplify the multi-step questions and use the rules above

1) $31 + (-26) + (-23)$

4) $52 + 35 + (-53) + (-37)$

2) $54 + (-58) + 33$

5) $78 + (-75) + (-33) + 45$

3) $-82 + (-42) + (-35)$

6) $-128 + 96 + (-90) + 132$

Subtracting Integers – Keep, Flip, Change

Subtraction Integers Rules

To subtract integers, it is easiest to change the operation to addition and then follow the addition rules. We can do this by using the rule – Keep, Flip, Change. We keep the first number the same, flip the operation from subtraction to addition, and then change the third number's sign.

Example: $5 - (-6) = ?$ becomes $5 + 6 = 11$

Keep the
first
integer

Flip the
operation

Change the
sign of the next
integer

Part 1

Use the rule above to solve the problems

1) $11 - (-6) =$

7) $(+45) - (+43) =$

2) $24 - (-11) =$

8) $(+7) - (-33) =$

3) $(-11) - 8 =$

9) $(-7) - (-8) =$

4) $(-23) - 13 =$

10) $(-118) - (-4) =$

5) $(-31) - (-12) =$

11) $159 - (-77) =$

Part 2

Answer the word problem below. Write the equation

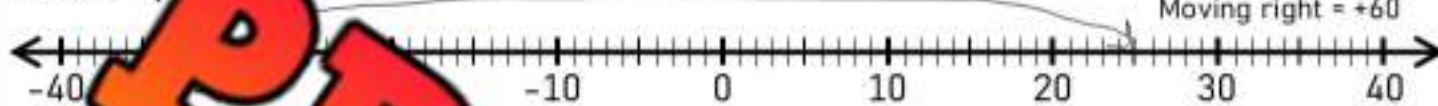
Jake has +\$130 in his bank account. Todd owes \$80 to his brother and has no other money. How much more money does Jake have than Todd?

Subtracting Integers – Number Line

Follow these steps to use a number line for solving subtraction questions involving integers.

- 1) Determine how far the numbers are on a number line (25 and -35 has a distance of 60 in total – magnitude of 60)
- 2) The direction you move **from** the **second** number to the **first** number will tell you which sign to use. When we move left, we are moving in a negative direction (-) and when we move right, we are moving in a positive direction (+)

Ex. $25 - (-35)$



Questions

Use number lines to solve the questions

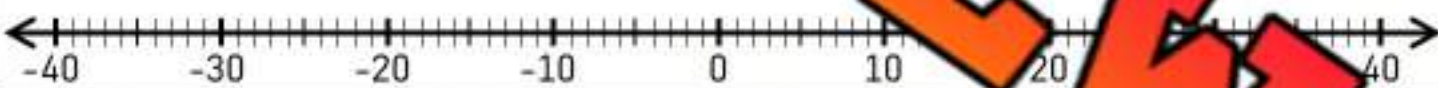
1) $(-30) - (-16) =$



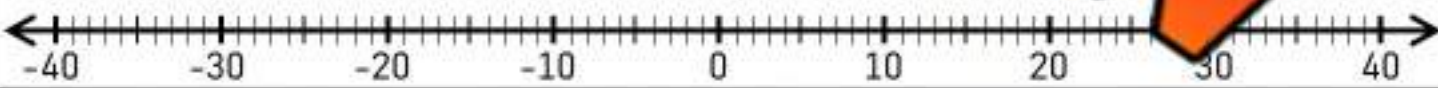
2) $25 - (-25) =$



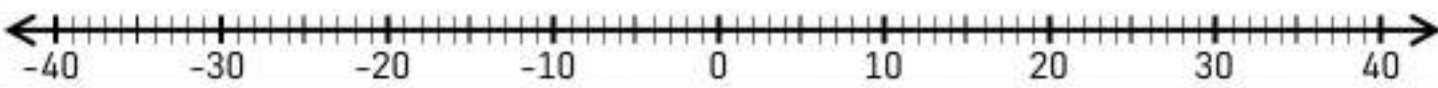
3) $(-20) - 10 =$



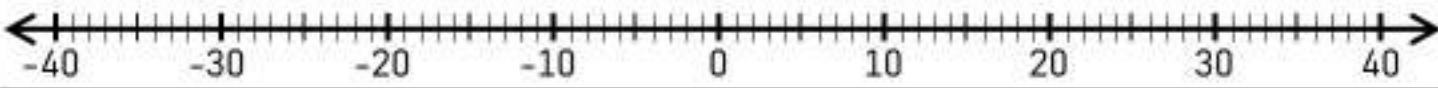
4) $(-35) - 19 =$



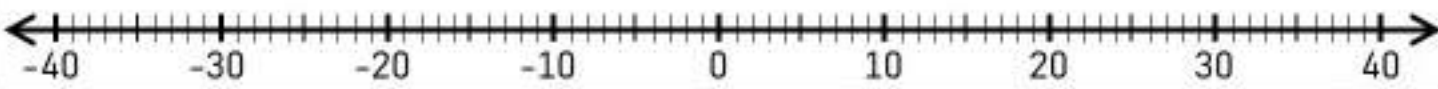
5) $31 - (-37) =$



6) $(-38) - (-22) =$



7) $40 - (-36) =$



Subtracting Integers – Number Line**Part 1**

Solve the questions below

1) $27 - () =$

6) $(-35) - 22 =$

2) $() - (-26) =$

7) $27 - (-16) =$

3) $(-23) - 31 =$

8) $(-38) - (-15) =$

4) $36 - (-17) =$

9) $() - (+13) =$

5) $(-39) - 18 =$

10) $() - (-12) =$

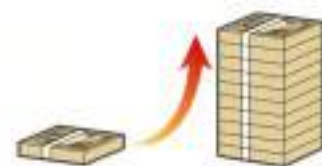
Part 2

Answer the word problem below. Write the equation for

- 1) The winner of a golf tournament scored a -21 after four rounds. The place golfer scored a $+47$. What is the difference between these two scores?



- 2) Dan and Brianna both invested some of their money in the stock market. Dan lost $-\$386$ and Brianna earned $+\$521$. What is the difference between their earnings and losses?



Multiplying Integers – Number Line

Follow these steps to use a number line for solving multiplication questions involving integers.

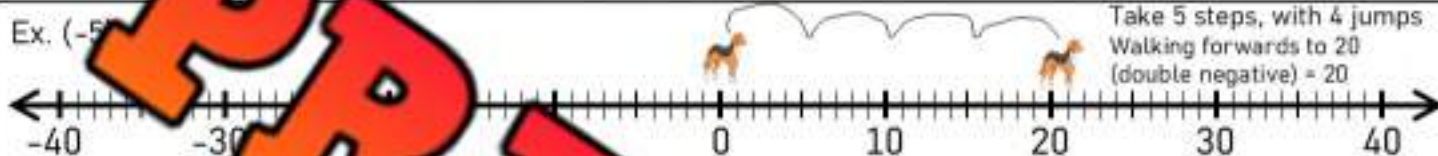
- 1) The dog always starts at 0
- 2) The multiplier tells us how many steps the dog will take.
- 3) The multiplicand tells us to walk forwards or backwards. For a positive number, walk forwards. For a negative number, walk backwards.
- 4) The multiplicand also tells us how many jumps to take.
- 5) If both numbers are negative, the answer will be positive (the dog will jump in the opposite direction)

Multiplier

$$-5 \times -4 = 20$$

Multiplicand

Product

Ex. $(-5) \times (-4) =$ 

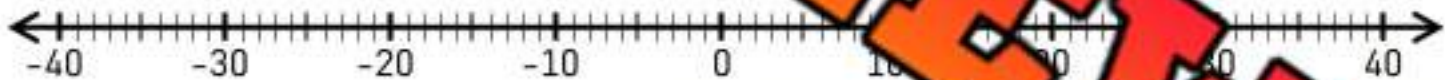
Questions

Use the number line to solve the questions

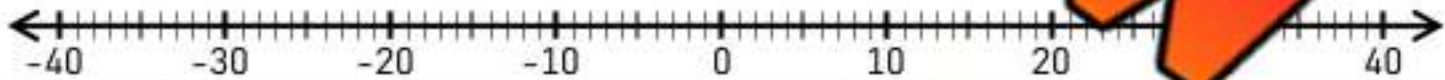
1) $(-5) \times (-7) =$



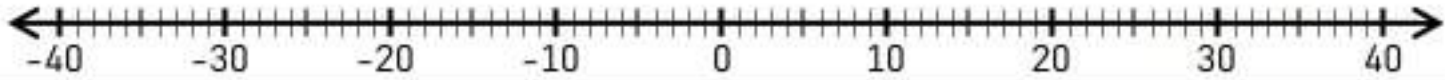
2) $8 \times (-4) =$



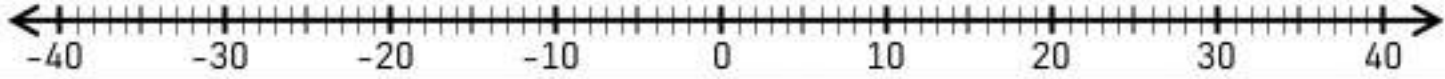
3) $(-7) \times 3 =$



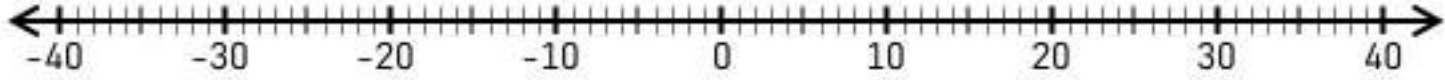
4) $(-9) \times (-4) =$



5) $5 \times (-8) =$



6) $(-20) \times (-2) =$



Multiplying Integers

Multiplying Integers Rules

- $(+) \times (+) = (+)$ Multiplying 2 positive integers will give a positive answer
 $(-) \times (-) = (+)$ Multiplying 2 negative integers will give a positive answer
 $(+) \times (-) = (-)$ Multiplying integers with different signs will give a negative answer
 $(-) \times (+) = (-)$ Multiplying integers with different signs will give a negative answer

Part 1 Use the rules above to answer the 1-step equations below

| | | |
|---------------------------------|-----------------------------------|-----------------------------------|
| 1) $5 \times (-2) = \square$ | 6) $(-3) \times (-5) = \square$ | 11) $(-8) \times (-12) = \square$ |
| 2) $(-7) \times 7 = \square$ | 7) $(-4) \times (-6) = \square$ | 12) $13 \times (-9) = \square$ |
| 3) $(-8) \times (-3) = \square$ | 8) $(-12) \times (-9) = \square$ | 13) $(-16) \times 8 = \square$ |
| 4) $12 \times 8 = \square$ | 9) $(-13) \times (-11) = \square$ | 14) $(-9) \times (-13) = \square$ |
| 5) $(-11) \times 12 = \square$ | 10) $20 \times 7 = \square$ | 15) $25 \times (-6) = \square$ |

Part 2 Simplify the multi-step expressions and use the rules above

| | |
|---|--|
| Ex) $2 \times (-3) \times (-8)$ $= (-6) \times (-8)$ $= 48$ | 3) $5 \times 10 \times (-10) \times (-10)$ |
| 1) $(7) \times (-3) \times 2$ | 4) $6 \times (-2) \times (-4) \times 2$ |
| 2) $(-4) \times (-6) \times (-3)$ | 5) $(-9) \times 3 \times (-2) \times 10$ |

Multiplication Squares

Part 1

Fill in the squares by multiplying the integers

1)

| | | |
|----|---|----|
| x | 5 | -8 |
| -3 | | |
| -7 | | |

2)

| | | |
|----|---|----|
| x | 2 | -9 |
| -8 | | |
| -6 | | |

3)

| | | |
|----|---|----|
| x | 7 | -1 |
| -9 | | |
| -3 | | |

4)

| | | | |
|----|----|----|-----|
| x | -3 | -7 | -10 |
| -8 | | | |
| 6 | | | |

6)

| | | |
|----|----|----|
| x | 12 | -6 |
| -4 | | |
| 9 | | |

7)

| | | |
|----|-----|-----|
| x | -15 | -13 |
| -3 | | |
| -5 | | |

8)

| | | | | |
|----|----|---|----|-----|
| x | -6 | 1 | 23 | -56 |
| -4 | | | | |
| 7 | | | | |

Part 2

Fill in the squares by multiplying the integers

1)

| | | | |
|----|---|----|---|
| x | 6 | -5 | 2 |
| -4 | | | |
| -7 | | | |
| 3 | | | |

2)

| | | | |
|----|----|-----|----|
| x | 10 | -11 | 12 |
| -3 | | | |
| -7 | | | |
| -9 | | | |

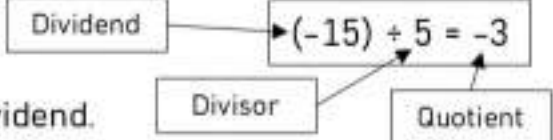
3)

| | | | |
|----|----|----|-----|
| x | -5 | 15 | -25 |
| -2 | | | |
| -4 | | | |
| 6 | | | |

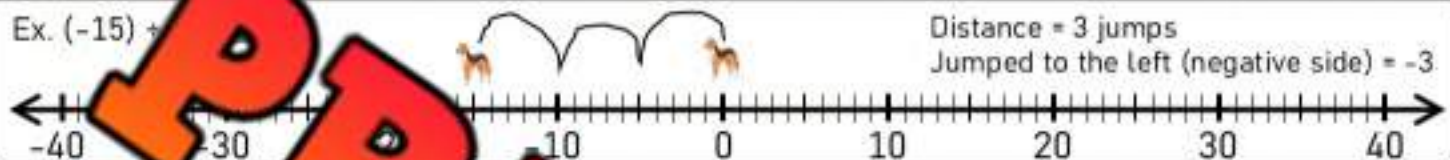
Dividing Integers – Number Line

Follow these steps to use a number line for solving division questions involving integers.

- 1) The dog always starts at 0
- 2) The dog jumps by the divisor until it reaches the dividend.
- 3) Your answer is how many jumps it takes
- 4) The answer is negative if the dog faces the negative side and positive if it faces the positive side.



Ex. $(-15) \div 5 =$



Questions

Use the number lines to solve the questions

1) $(-25) \div (-5) =$



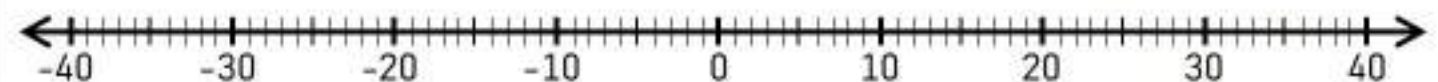
2) $12 \div (-4) =$



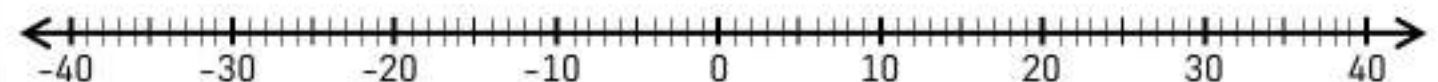
3) $(-32) \div 4 =$



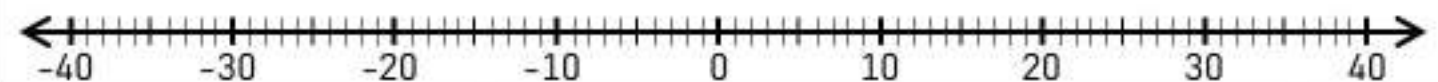
4) $(-18) \div (-6) =$



5) $24 \div (-8) =$



6) $(-36) \div (-3) =$



Dividing Integers

Dividing Integers Rules - Same as Multiplication!

- $(+) \div (+) = (+)$ Dividing 2 positive integers will give a positive answer
 $(-) \div (-) = (+)$ Dividing 2 negative integers will give a positive answer
 $(+) \div (-) = (-)$ Dividing integers with different signs will give a negative answer
 $(-) \div (+) = (-)$ Dividing integers with different signs will give a negative answer

Part 1 Use the rules above to answer the 1-step equations below

| | |
|--------------------------------|---------------------------------|
| 1) $15 \div (-3) = \square$ | 8) $(-60) \div (-12) = \square$ |
| 2) $(-49) \div 7 = \square$ | 9) $(-8) = \square$ |
| 3) $(-66) \div (-6) = \square$ | 10) $(-9) = \square$ |
| 4) $32 \div 4 = \square$ | 11) $(-12) \div (-3) = \square$ |
| 5) $(-81) \div 9 = \square$ | 12) $320 \div (-8) = \square$ |

Part 2 Simplify the multi-step expressions and use the rules above

| | |
|---|---|
| Ex) $28 \div (-7) \div (-2)$ $= (-4) \div (-2)$ $= 2$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> | 3) $50 \div 5 \div (-2)$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> |
| 1) $(36) \div (-3) \div 6$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> | 4) $48 \div (-4) \div (-3) \div 2$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> |
| 2) $(-72) \div (-8) \div (-3)$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> | 5) $(-112) \div 2 \div (-2) \div 4$ <div style="text-align: right; margin-top: 10px;"><input style="width: 50px; height: 20px;" type="text"/></div> |

Division Squares

Part 1

Fill in the squares by dividing the integers

1)

| | | |
|-----|---|----|
| ÷ | 5 | -3 |
| -15 | | |
| -30 | | |

2)

| | | |
|-----|----|---|
| ÷ | -6 | 3 |
| 18 | | |
| -12 | | |

3)

| | | |
|-----|---|----|
| ÷ | 7 | -2 |
| 28 | | |
| -56 | | |

4)

| | | | |
|-----|----|--|--|
| ÷ | 12 | | |
| -48 | | | |
| 36 | | | |

5)

| | | | |
|-----|--|----|----|
| ÷ | | -4 | -8 |
| 56 | | | |
| -32 | | | |

6)

| | | |
|-----|----|-----|
| ÷ | -2 | -12 |
| -60 | | |
| 96 | | |

7)

| | | |
|------|---|----|
| ÷ | 5 | 15 |
| -75 | | |
| -105 | | |

8)

| | | |
|-----|-----|----|
| ÷ | -22 | 11 |
| -88 | | |
| 66 | | |

| | | | |
|---|--|---|----|
| ÷ | | 3 | -9 |
| | | | |
| | | | |

Part 2

Fill in the squares by dividing the integers

1)

| | | | |
|------|---|----|-----|
| ÷ | 2 | -6 | -10 |
| -60 | | | |
| 90 | | | |
| -180 | | | |

2)

| | | | |
|-----|----|----|---|
| ÷ | -3 | -6 | 9 |
| 18 | | | |
| -54 | | | |
| 90 | | | |

3)

| | | | |
|------|----|----|-----|
| ÷ | -5 | 15 | -25 |
| -75 | | | |
| -150 | | | |
| 225 | | | |

Math Jeopardy – Integer Operations

Objective

What are we learning about?

Students will practice adding, subtracting, multiplying, and dividing numbers, while solving word problems using all four operations in a fun and engaging way.

Materials

What you will need for the activity.

- Jeopardy board and questions
- Buzzer or bell



Instructions

How you will complete the activity.

1. Print the Jeopardy board on the next page.
2. Divide the class into two teams.
3. Ask one team to go first by selecting a point value.
4. Read the question aloud from the point value.
5. The first team to ring the bell or buzzer gets to answer.
6. If they answer correctly, award them the points. If not, another team can answer.
7. Continue the game until all questions have been answered.
8. Tally the points to determine the winning team.
9. Conclude by discussing what they learned about the topic in the questions.

Jeopardy Questions

Ask students the questions below:

| \$100 | \$200 | \$300 | \$400 | \$500 |
|--|---|--|---|---|
| $12 + (-5) + 3$ | $20 + (-7) + 9$ | $(-15) + 25 + (-10)$ | $(-45) + 30 + (-20)$ | $78 + (-45) + 62$ |
| $24 - (-8)$ | $(-15) - 9$ | $43 - (-17) - 12$ | $(-75) - (-20) - 33$ | $108 - 45 - (-18)$ |
| $4 \times (-3)$ | $(-5) \times (-8)$ | $(-9) \times 12 \times (-2)$ | $25 \times (-6) \times 4$ | $(-11) \times (-12) \times (-5)$ |
| $20 + (-5)$ | $(-72) + 9$ | $180 + (-6) + 5$ | $(-1440) + (-12) + 6$ | $(-360) + 8 + (-3)$ |
| You start with 20 points. You lose 20 points, then gain 8 points. How many points do you have now? | A hiker descends 20 meters, then ascends 15 meters. How far below sea level has he descended in total? | A submarine is 120 meters below sea level. It rises 50 meters and descends 50 meters. How far below sea level is it? | A snowstorm causes the temperature to drop by -3°C every hour. After 10 hours, what's the total temperature change? | A glacier retreats by -2.5 meters every month. How far will it retreat in 2 years? |
| A diver is 12 meters below sea level. She descends another 8 meters. How far below sea level is she now? | The stock market drops 12 points one day, 6 the next day, and then another 8 points the next day. How much did the stock market drop in total? | A debt of $-\$1,000$ is to be divided equally among 5 people. How much debt does each person take on? | A company's value decreases by $-\$500$ per week. How much will the company's value decrease after 10 weeks? | A scuba diver descends -4 meters per second. How far will the diver descend after 2 minutes? |
| The temperature was -5°C in the morning. By noon, it rose by 7°C . What's the temperature now? | You start with -40 points in a quiz competition. You earn 55 points in the first round and lose 10 points in the second round. What's your final score? | A mountain climber descends -200 meters per hour. How far has the climber descended after 7 hours? | A company's value decreases by $-\$350$ per day. How much will the company's value decrease in 20 days? | A company experiences a daily loss of $-\$5,000$ for 14 days. What's the total loss over the 14 days? |

Input/Output Tables - Integers**Directions**

Fill in the input/output tables by following the rules

1)

| Input | Output |
|-------------------------------|--------|
| -11 | |
| -7 | |
| 3 | |
| 12 | |
| Multiply by _____ Divide by 2 | |

2)

| Input | Output |
|-------------------------------|--------|
| -48 | |
| -26 | |
| -12 | |
| 22 | |
| 56 | |
| Multiply by _____ Divide by 2 | |

3)

| Input | Output |
|----------------|--------|
| -12 | |
| -9 | |
| -6 | |
| 0 | |
| 11 | |
| Multiply by -8 | |

4)

| Input | Output |
|--------------|--------|
| -84 | |
| -66 | |
| 36 | |
| 96 | |
| 114 | |
| Divide by -6 | |

5)

| Input | Output |
|----------------|--------|
| -12 | |
| -9 | |
| 13 | |
| 15 | |
| Multiply by -4 | |

6)

| Input | Output |
|----------------|--------|
| -90 | |
| -75 | |
| 60 | |
| 15 | |
| Multiply by -5 | |

7)

| Input | Output |
|-----------------|--------|
| -13 | |
| -11 | |
| 8 | |
| 12 | |
| 14 | |
| Multiply by -12 | |

8)

| Input | Output |
|---------------|--------|
| -250 | |
| -140 | |
| 90 | |
| 170 | |
| 330 | |
| Divide by -10 | |

9)

| Input | Output |
|------------------|--------|
| -7000 | |
| -6200 | |
| -800 | |
| 4200 | |
| 10000 | |
| Multiply by -100 | |

Order of Operations - Integers**Questions**

Calculate the answers to the equations using BEDMAS

1) $7 + (-3) \times (-9)$

2) $11 \times (-4 + -6)$

3) $(-5)(-9) + (4 - 2)$

4) $(-4 \times 8) \div (-2) - (-2 \times 1)$

6) $(-66 \div 6)(4)$

7) $12 \times (-3) + (-6)$

8) $15 \div (-3) + (-12) \times (3 + 5)$

10) $18 \div 3 + (-16 - 7)$

11) $(-4)(-7) \div 4 + 8$

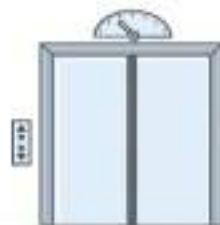
12) $18 + (-11) - 2 \times (-5)$

PREVIEW

Order of Operations - Word Problems**Questions**

Write an equation that represents the situation and solve

1) An elevator starts at the ground floor. It travels up 8 floors before going down halfway to the ground. Next, it travels back up 12 more floors before going down 13 floors. What floor is the elevator on now?



2) A deep-sea diver is returning from his world record diving adventure. He travelled 320m down. He came up at a rate of 10 metres a minute for 32 minutes. How many metres did he go for the sea at the end of the 10 minutes?



3) Chase is the running back for his football team. In the first quarter, he rushed 5 times for an average of +8 yards per rush. He had 12 yards in the second quarter and -15 yards in the third. In the last quarter, he had +20 yards. How many yards did he rush for?



4) Vincent golfed 10 times last month. He had 6 rounds of -3 golf and 3 rounds of +2. His last round he scored a -8. What was his total score for the month?



Integers Quiz**Part 1**

Solve the questions below

1) $9 + (-5) =$

2) $11 + (-9) =$

3) $(-15) + 6 =$

4) $(-13) +$

5) $(-31) + 19 =$

6) $(-43) + 15 =$

Part 2

Solve the questions below

1) $11 + (-4) + 4$

2) $10 + 3 + (-17)$

3) $25 + (-18) + 13$

4) $(-1) +$

Part 3

Answer the word problems below. Write the answer in the box.

- 1) You start at point A and take 17 steps forward to point B. Then, you take 15 steps backward to point C, followed by 25 steps backward to point D. Finally, you take 19 steps forward to point E. How many steps are you away from the starting point, point A?



- 2) A submarine starts at sea level and dives 17m down before coming up 11m. It makes another plunge down 43m and then rises 27m. How many meters is it below sea level?



Part 4

Solve the subtraction equations below

1) $15 - (-6) =$

2) $(+18) - (+13) =$

3) $27 - (-13) =$

4) $(+45) - (-31) =$

5) $(-51) - 18 =$

6) $(-84) - (-55) =$

Part 5

Answer the word problems below. Write the equation for each question

- 1) The winner of a golf tournament scored a -28 after four rounds. The last place golfer scored a $+12$. What is the difference between these two scores?



- 2) The average temperature at the South Pole is -49 degrees Celsius. The average temperature in the North Pole is -20 degrees Celsius. What is the difference in temperatures between the two Poles?



Part 6

Solve the multiplication equations below

1) $6 \times (-3) =$

2) $(-13) \times (-5) =$

3) $(-7) \times (-12) =$

4) $(-7) \times 9 =$

5) $8 \times (-6) =$

6) $4 \times (-9) =$

7) $(8) \times (-5) \times 2$

8) $7 \times (-4) \times (-2) \times 1$

Part 7 Fill in the tables below

1)

| | | |
|-----|---|----|
| x | 5 | -4 |
| -20 | | |
| -40 | | |

2)

| | | |
|-----|----|---|
| x | -6 | 3 |
| 30 | | |
| -12 | | |

3)

| | | |
|-----|---|----|
| ÷ | 7 | -2 |
| 42 | | |
| -56 | | |

Part 8 Fill in the input/output tables by following the rules

1)

| Input | Output |
|----------------|--------|
| -12 | |
| -8 | |
| 4 | |
| 7 | |
| 11 | |
| Multiply by -3 | |

2)

| Input | Output |
|-----------|--------|
| -52 | |
| 8 | |
| 1 | |
| 2 | |
| | |
| Divide by | |

3)

| Input | Output |
|----------------|--------|
| -11 | |
| -7 | |
| -4 | |
| 2 | |
| 12 | |
| Multiply by -8 | |

Part 9 Calculate the answers to the equations using the order of operations (PEMDAS)

1) $9 + (-5) \times (-3)$

2) $7 \times (-5 + -8)$

3) $(-12 \div 3) + 5$

4) $(-5 \times 9) \div (5 \times 1)$

5) $(\frac{-36}{6}) - (-3 \times 1)$

6) $(-48 \div 6)(4)$



Google Slides Lessons Preview





Alberta Math Curriculum Shape and Space – Grade 8

3-Part Lesson Format

Part 1 – Minds On!

- Learning Goals
- Discussion Questions
- Quotes
- And More!

Learning Goal

We are learning to describe and use the Pythagorean relationship with different geometric models so we can solve problems to find missing side lengths in right triangles.



Pythagorean Theorem – Missing Side

a b c

Find the value of the hypotenuse. Round the answer to the nearest tenth. Drag the numbers and labels to answer.

Calculator icon and number keypad: 1 2 3 4 5 6 7 8 9 0

| | | | |
|----|----|----|----|
| 1) | 2) | 3) | 4) |
|----|----|----|----|

Part 2 – Action!

- Writing
- Matching
- Drag and Drop
- Drawing
- And More!

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Pythagorean Theorem

- Amelia is flying a kite. The string of the kite is 15 m long. If the kite is directly above a point that is 9 m away from where Amelia is standing, how high is the kite above the ground?
- Draw and label the right triangle with the string, the ground, and the kite's height.
- Use the Pythagorean theorem to calculate the kite's height.





Alberta Math Curriculum Shape and Space – Grade 8

Consolidation – Multiple-Choice Questions

Drag the checkmark to answer the following multiple-choice questions about the topic.

| | | |
|--|--|--|
| 1) In a right triangle, the side opposite the right angle is called: | 2) Which geometric model BEST demonstrates the Pythagorean relationship? | 3) Which of the following sets of side lengths forms a right triangle? |
| a) The adjacent side | a) Three circles whose areas add up | a) 7 cm, 24 cm, 25 cm |
| b) The base | b) Three squares built on the sides of a right triangle | b) 6 cm, 8 cm, 15 cm |
| c) The altitude | c) A rectangle divided into two triangles | c) 5 cm, 12 cm, 20 cm |
| d) The hypotenuse | d) A hexagon inside a circle | d) 8 cm, 9 cm, 16 cm |



1 2 3 4 5 6 7 8 9 0

| | | |
|---------------------|---------------------|---------------------|
| <p>Area = _____</p> | <p>Area = _____</p> | <p>Area = _____</p> |
| <p>Area = _____</p> | <p>Area = _____</p> | <p>Area = _____</p> |

Find the surface area of the 3D objects below.

1) Rectangular Pyramid



Surface area = _____

2) Triangular Pyramid



Surface area = _____

3) Square Pyramid



Surface area = _____

4) Rectangular Pyramid



Surface area = _____

5) Square Pyramid



Surface area = _____

6) Triangular Pyramid



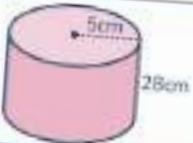
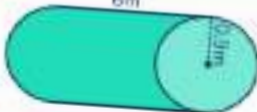


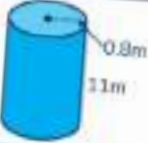

Surface area = _____









Alberta Math Curriculum Shape and Space - Grade 8


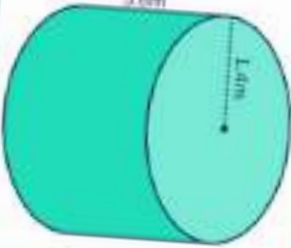

Surface Area - Cylinders

Find the surface area of the 3D objects below. Type in your answers including the units.

| | | |
|--|--|---|
| 1)  Surface area = _____ | 2)  Surface area = _____ | 3)  Surface area = _____ |
| 4)  Surface area = _____ | 5)  Surface area = _____ | 6)  Surface area = _____ |

Fill in the blanks below. **cm mm m km**

| | | |
|---|---|--|
| 1)  Area: _____ Perimeter: _____ | 2)  Area: _____ Perimeter: _____ | 3)  Area: _____ Perimeter: _____ |
| 4)  Area: _____ Perimeter: _____ | 5)  Area: _____ Perimeter: _____ | 6)  Area: _____ Perimeter: _____ |

| | | |
|---|--|--|
|  Area of the Base: _____ Volume: _____ |  Area of the Base: _____ Volume: _____ | 3)  Area of the Base: _____ Volume: _____ |
|---|--|--|



Workbook Preview



Grade 8
SHAPE AND SPACE
Measurement

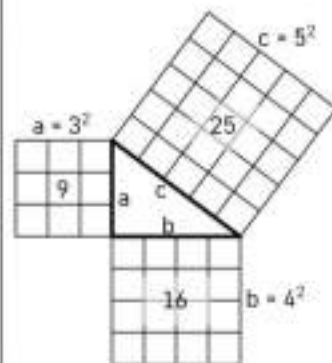
| | Curriculum Expectations | Pages That Cover the Expectations |
|--|---|-----------------------------------|
| SS.1 | Develop and apply the Pythagorean theorem to solve problems. | 5 – 30 |
| Preview of 120 pages from this product that contains 312 pages total. | | |
| SS.3 | <ul style="list-style-type: none">• right rectangular prisms• right triangular prisms• right cylinders to solve problems. | 52 – 86 |
| SS.4 | Develop and apply formulas for determining the volume of right rectangular prisms, right triangular prisms and right cylinders | 87 – 113 |

Intro – Pythagorean Theorem

The properties of a right triangle can be used to find an unknown side length. The longest side of a right triangle is always opposite the 90° angle and is called the **hypotenuse**.

The formula for calculating the length of the hypotenuse is: $a^2 + b^2 = c^2$

- If side a is 3 units long, then a square on this side has an area of 3^2 or 9.
- If side b is 4 units long, then a square on this side has an area of 4^2 or 16.
- If the length of side c is equal to the combined areas of the squares on sides a and b, then the square on side c must have an area of 25 square units ($9 + 16$). This means the length of side c must be $\sqrt{25}$.



Part 1

Label the sides of the right triangles: a, b, and c

1) 2) 3)

Part 2

Evaluate

| | Question | Answer |
|----|-------------|--------|
| 1) | 3^2 | |
| 2) | 8^2 | |
| 3) | 10^2 | |
| 4) | $\sqrt{36}$ | |

| | Question | Answer |
|----|--------------|--------|
| 5) | $\sqrt{144}$ | |
| 6) | $\sqrt{16}$ | |
| 7) | 7^2 | |
| 8) | $\sqrt{81}$ | |

Part 3

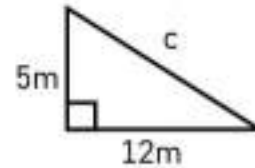
Label the triangles: a, b, c and fill in the blanks to find their values

1) $a^2 + b^2 = c^2$
 $9 + 16 = 25$
 Hypotenuse = 5

2) $a^2 + b^2 = c^2$
 $16 + 9 = 25$
 Hypotenuse = 5

Pythagorean Theorem – Missing Side

The most common use of the Pythagorean Theorem is to find the value of a side on a right-triangle. We do this by applying our understanding of simplifying algebraic equations. To find the value of the hypotenuse, simply plug the values into the equation.



Solution

$$a^2 + b^2 = c^2$$

$$5^2 + 12^2 = c^2$$

$$25 + 144 = c^2$$

$$\sqrt{169} = \sqrt{c^2}$$

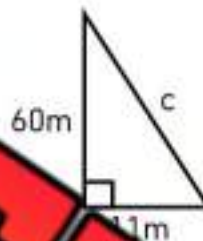
$$13 = c$$

Instruction Find the value of the hypotenuse

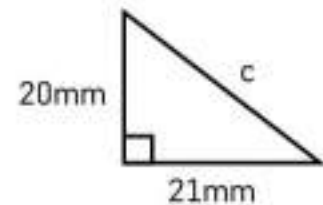
1)



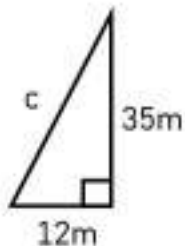
2)



3)



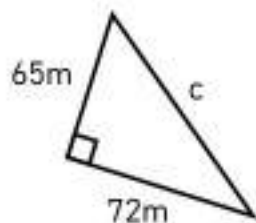
4)



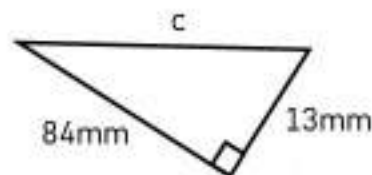
5)



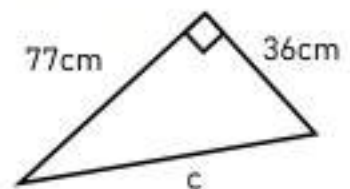
7)



8)



9)



Pythagorean Theorem – Word Problems

Instructions

Answer the questions below



1)

In a right-angled triangle, the lengths of the two shorter sides are 3 cm and 4 cm. What is the length of the hypotenuse?

2)

A right-angled triangle has one leg that measures 8 meters and another leg that measures 6 meters. What is the length of the hypotenuse?

3)

A building is 30 meters tall, and a ladder is leaning against the top of the building. If the base of the ladder is 25 metres away from the building, how long is the ladder?

4)

A rectangular billboard is 15 meters tall and 20 meters wide. A pole runs from the bottom corner to the top corner. How long is the pole?

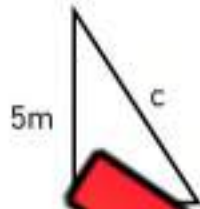
5)

A rectangular garden is 12 meters long and 8 meters wide. If a diagonal path is drawn across the garden, what is the length of the path?

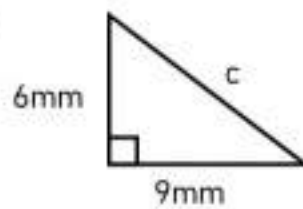
Pythagorean Theorem – Missing Side**Instructions**

Find the value of the hypotenuse. Round the answer to the nearest tenth

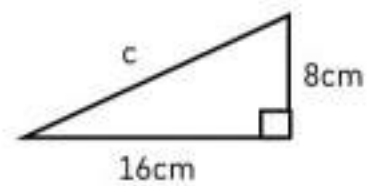
1)



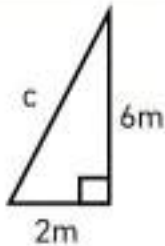
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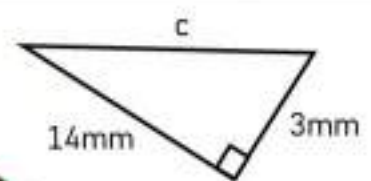
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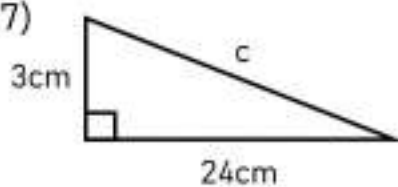
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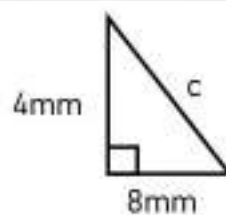
6)



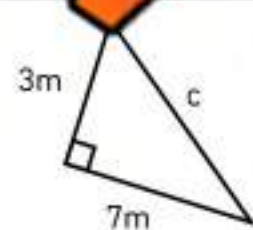
7)



8)



9)



Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Find the value of the missing side.

a

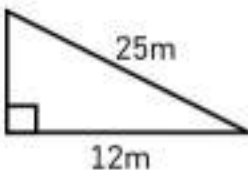


2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

1) Find the value of the missing side.

a

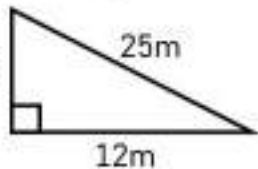


2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

1) Find the value of the missing side.

a

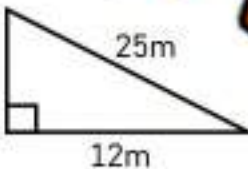


2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Name: _____

1) Find the value of the missing side.

a



2) A rectangular park measures 45m by 60m. A diagonal path cuts across the park. Find the length of the path to the nearest tenth.

Pythagorean Theorem – Word Problems

Instructions

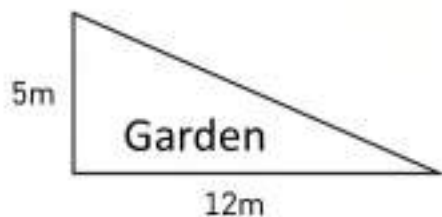
Answer the word problems below

- 1) Find the hypotenuse of a right triangle with a base of 10cm and a height of 6cm.

- 2) Lily walked 4 km south and 3 km east. Calculate how far Lily is away from her starting point.

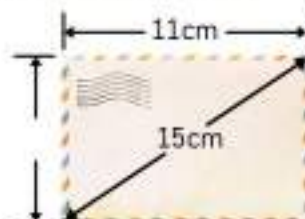


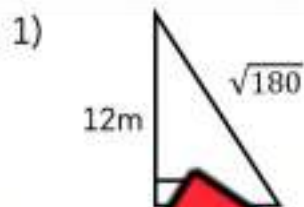
- 3) Julian built a triangular garden with the dimensions below. If he wanted to put a fence around his garden, how long would the fence need to be?



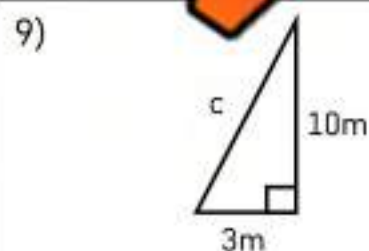
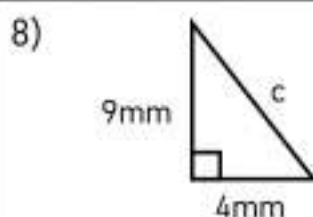
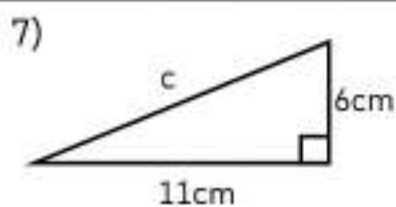
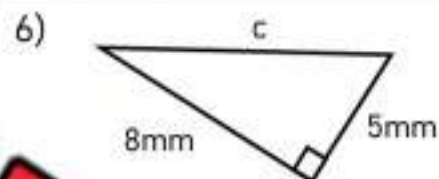
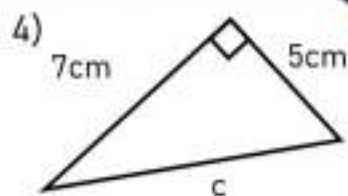
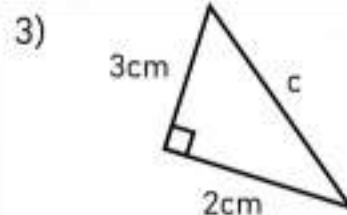
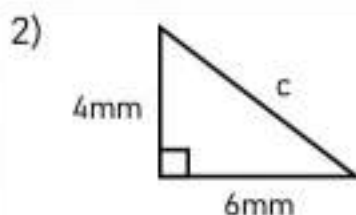
- 4) Ivy's house is a rectangular shape that is 15m wide by 9m high. How long is the diagonal of her house (from corner to corner)?

- 5) An envelope has the dimensions below. What is the height of the envelope?



Pythagorean Theorem – Missing Side**Instructions**Find the value of the missing side. Record your answer as a square root

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 12^2 + 14^2 &= c^2 \\ 144 + 196 &= c^2 \\ 340 &= c^2 \\ \sqrt{340} &= \sqrt{c^2} \\ c &= \sqrt{340} \end{aligned}$$

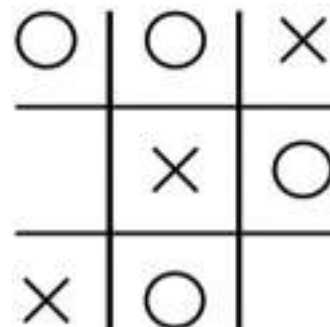


Math Tic-Tac-Toe: Pythagorean Challenge

Objective

What are we learning about?

Students will practice using the Pythagorean Theorem to find the missing side of right triangles in a fun, competitive game of tic-tac-toe. This activity will reinforce their problem-solving skills and teamwork.



Materials

What you will need for the activity.

- Whiteboard or paper
- Markers or colored markers
- Pre-written Pythagorean Theorem problems for each cell of the tic-tac-toe grid

Instructions

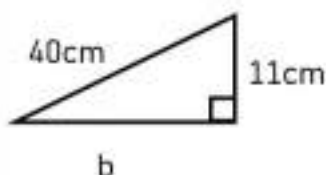
How you will complete the activity.

- 1) **Preparation:** Hand out Tic-Tac-Toe worksheets to each pair of students. Each worksheet should have a large tic-tac-toe grid with a different Pythagorean Theorem problem in each cell. One side of the right triangle is missing in each problem.
- 2) **Instructions:**
 - Students will play individually against each other, with one playing "X" and the other "O."
 - The student playing "X" will go first. They will choose a cell, solve the Pythagorean Theorem problem in that cell, and check their answer with their partner. If the solution is correct, they place an X in that cell.
 - If the answer is incorrect, they do not place their mark, and it becomes the "O" player's turn. The "O" player will then choose a cell, solve the problem, and check their answer. If correct, they place an O in that cell.
 - The game continues with alternating turns.
- 3) **Winning the Game:** The first player to get three marks in a row (horizontally, vertically, or diagonally) wins the game.
- 4) **Discussion:** After the game, students should discuss with their partner the different strategies they used to solve the problems and any challenges they faced during the activity.

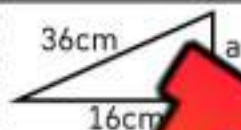
Tic-Tac-Toe

Use the following tic-tac-toe grids for the game.

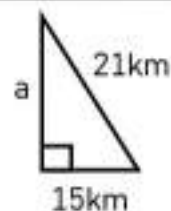
Lily walked 5 km south and 12 km east. How far is she from her starting point?



Jacob's rectangular garden measures 18 m by 24 m. Find the diagonal length.



Lucas paddled his kayak 4 km north and 3 km east. How far is he from his starting point?

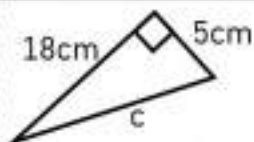


David climbs 12m up a tree and moves 5m to the right on a branch. What is his diagonal distance from the tree base?

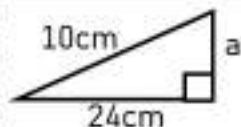
The base of a TV screen measures 48cm, and the height is 36cm. Find the diagonal size of the screen.

A rectangular rug is 9 m wide and 12 m long. What is the diagonal length?

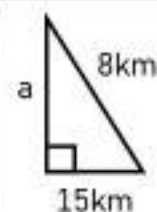
Ella's garden is a rectangle measuring 20m by 15m. Find the diagonal length.



Daniel cycled 9km west and 12 km north. How far is he from his starting point?



Find the hypotenuse: right triangle with legs of 12cm and 16cm.



Tic-Tac-Toe

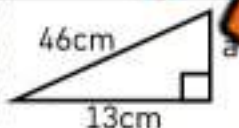
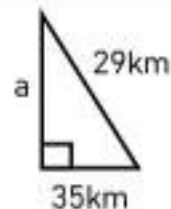
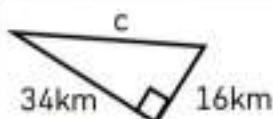
Use the following tic-tac-toe grids for the game.

Chris's living room measures 5 m by 12 m. Find the diagonal length.

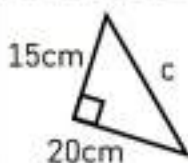
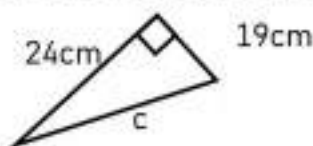
Lisa climbs 3 m up a ladder and moves 4 m sideways on a scaffold. What is her diagonal distance from the ground?

A triangle has legs of 5 cm and 12 cm. What is the hypotenuse?

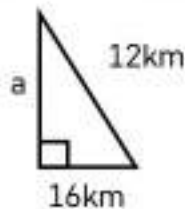
A rectangular field is 12m wide and 35 long. What is the diagonal length?



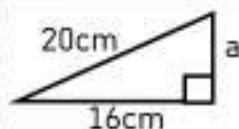
Ava jogged 7 km west and 24 km south. How far is she from her starting point?



Nathan walked 3km north and 4km east. Calculate the distance from his starting point.



Hannah hiked 15km east and 20 km south. How far is she from the starting point?



Mia flew her drone 8m upward and 15 m to the right. Calculate the diagonal distance.

Jamie's rectangular swimming pool measures 20m by 25m. Find the diagonal length.

Pythagorean Theorem – Word Problems

Instruction

Answer the word problems below

1) Robert has a 4m ladder that he is using to get as high as possible to hang his Christmas lights. He puts the ladder 2 metres away from the wall.

- Label the dimensions on the diagram
- How high is the top of the ladder off the ground?



2) Howard has a huge ladder to reach a very tall bookshelf. He needs to climb 9m to find the book he wants. How far away from the top of the ladder to be at the height of the book he wants? Show how you put the ladder away from the bookshelf?



3) A pirate is on a treasure hunting mission. His GPS tells him he is 32km away from the treasure. He decides to travel 21km due east. The GPS now tells him that the treasure is due south from where his boat is. How far south does he need to travel to find the treasure?



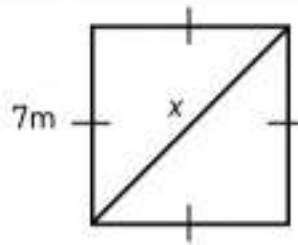
Pythagorean Theorem – Missing Side**Instruction**Find the value of x .

Round the answer to the nearest tenth or leave as a square root

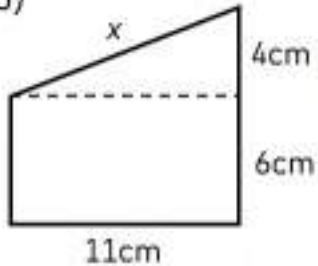
1) 11cm



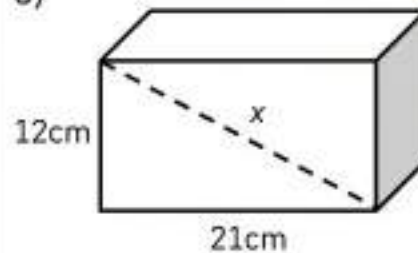
2)



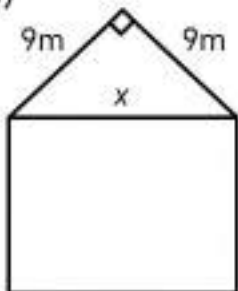
3)



6)



5)



Pythagorean Theorem – Word Problems

Instruction

Answer the word problems below

- 1) TVs are measured diagonally from corner to corner. Jeffrey wants a 150cm TV. He likes the look of one that has a base of 140cm and a height of 54cm. Is the TV 150cm diagonally?



- 2) To get from point A to point B, you need to walk around the pond. To avoid the pond, you walk 30m and 40m. To the nearest metre, how many metres would you have saved if you could walk through the pond?



- 3) A baseball diamond is a square with sides of 30m. What is the distance between first base and third base?

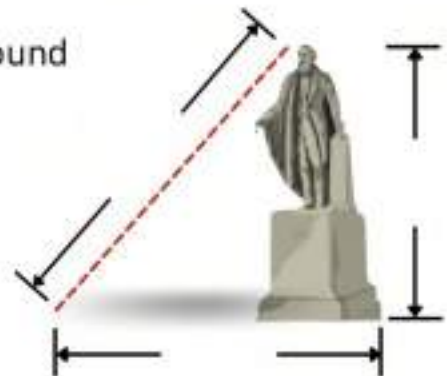
- 4) The local fire department has been called to a burning building. They need their ladder to reach the 4th floor, which is 22m high. They know that the ladder will need to be at least 12m away from the building. If they brought a 25m ladder, will they reach the fourth floor?

Pythagorean Theorem – Word Problems

Instruction

Answer the word problems below

- 1) Steven brings his hang glider 30m to the top of a mountain. He travels southeast 60m before landing on the ground. How far does he need to walk back to the base of the mountain?
- 2) A flagpole casts a shadow of 6m on the ground away from the base of the pole. What is the length from the top of the flagpole to the end of the shadow?
- 3) A building casts a shadow on the ground 12m from the building. The length from the top of the building to the end of a shadow is 13m. How tall is the building?
- 4) A statue is 8m tall and it casts a shadow on the ground that is 6m long. What is the length from the top of the statue to the end of the shadow?



Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Real-life Pythagorean theorem problems, Find the value of the missing side.

1) A tree is 20 m tall and casts a shadow 15 m long on the ground. What is the distance from the top of the tree to the end of the shadow?

2) A ramp is used to load equipment onto a truck. The ramp is 2 m high and 4 m long along the ground. What is the length of the ramp itself?

Name: _____

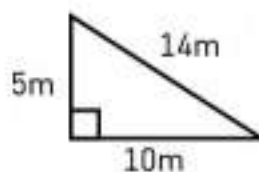
Real-life Pythagorean theorem problems, Find the value of the missing side.

1) A tree is 20 m tall and casts a shadow 15 m long on the ground. What is the distance from the top of the tree to the end of the shadow?

2) A ramp is used to load equipment onto a truck. The ramp is 2 m high and 4 m long along the ground. What is the length of the ramp itself?

Identify Right Triangles – Pythagorean Theorem

We can use the Pythagorean Theorem to find out if a triangle is a right triangle or not. If we have all the measurements of the triangle, we can plug them into the equation. If the equation is true, the triangle is a right triangle and if it is false, it is not.

**Solution**

$$a^2 + b^2 = c^2$$

$$5^2 + 10^2 = 14^2$$

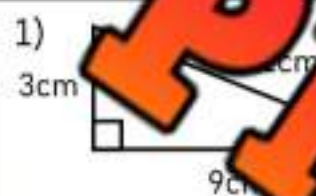
$$25 + 100 = 196$$

$$125 \neq 196$$

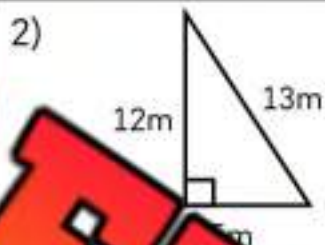
This equation is false, therefore this is not a right triangle

Questions

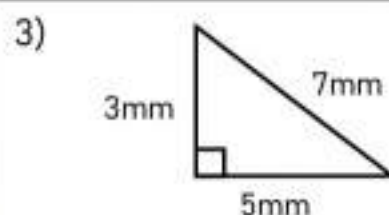
Is the triangle a right triangle?



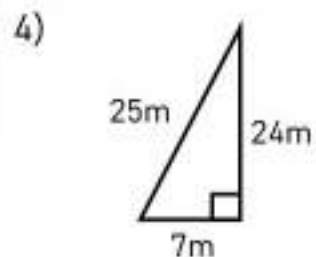
Yes No



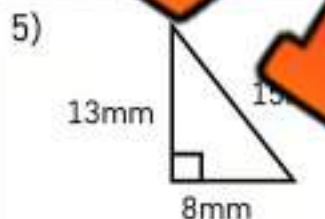
No



Yes No



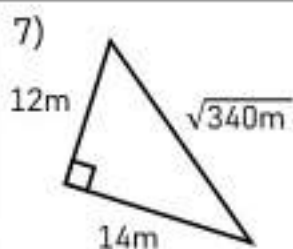
Yes No



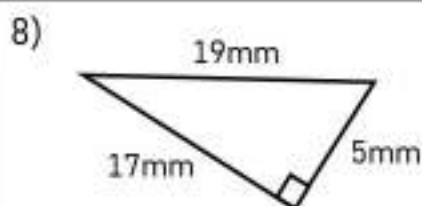
Yes No



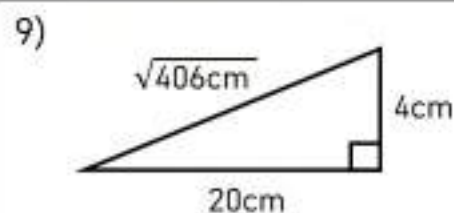
Yes No



Yes No



Yes No



Yes No

Pythagorean Theorem – Word Problems

Instructions

Answer the questions below

1)

A triangular garden has sides measuring 35 meters, 45 meters, and 55 meters. Is the triangle a right triangle?

2)

A triangle has sides that measure 12 meters, 16 meters, and 20 meters. Is the triangle a right triangle?

3)

Three friends are standing at three different points in a triangular field. The distances between them are 9 meters, 12 meters, and 15 meters. Is the triangle a right triangle?

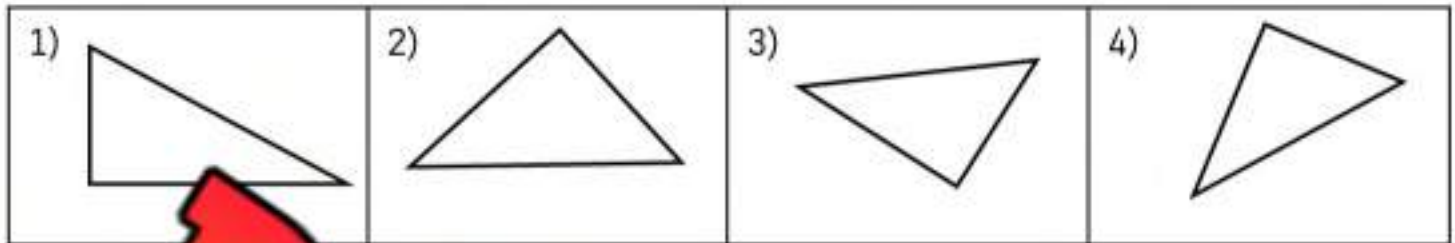
4)

A kite has a width of 18 meters and a height of 24 meters. The diagonal between the two non-adjacent corners measures 30 meters. Is the triangle a right triangle?

Pythagorean Theorem – Quiz

Part 1

Label the sides of the right triangles: a, b, and c



Part 2

| | Question | Answer |
|----|-------------|--------|
| 1) | 7^2 | |
| 2) | 9^2 | |
| 3) | $\sqrt{16}$ | |

| | Question | Answer |
|----|--------------|--------|
| 4) | $\sqrt{121}$ | |
| 5) | $\sqrt{64}$ | |
| | 6^2 | |

Part 3

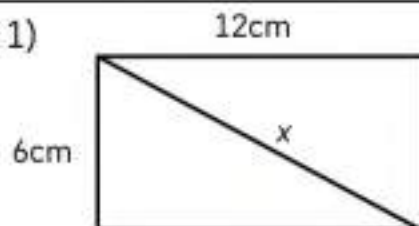
Find the value of the missing side length

Part 4

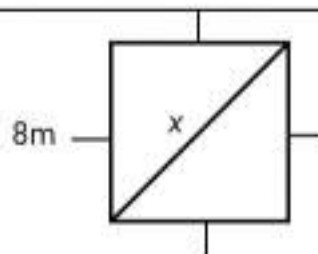
Find the value of x .

Round the answer to the nearest tenth or leave as a square root

1)



2)



Part 5

Is the triangle a right triangle?

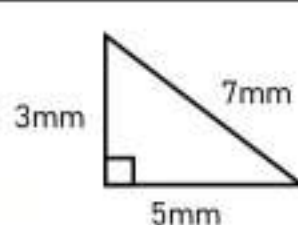
1)



Yes

No

3)



Yes

No

No

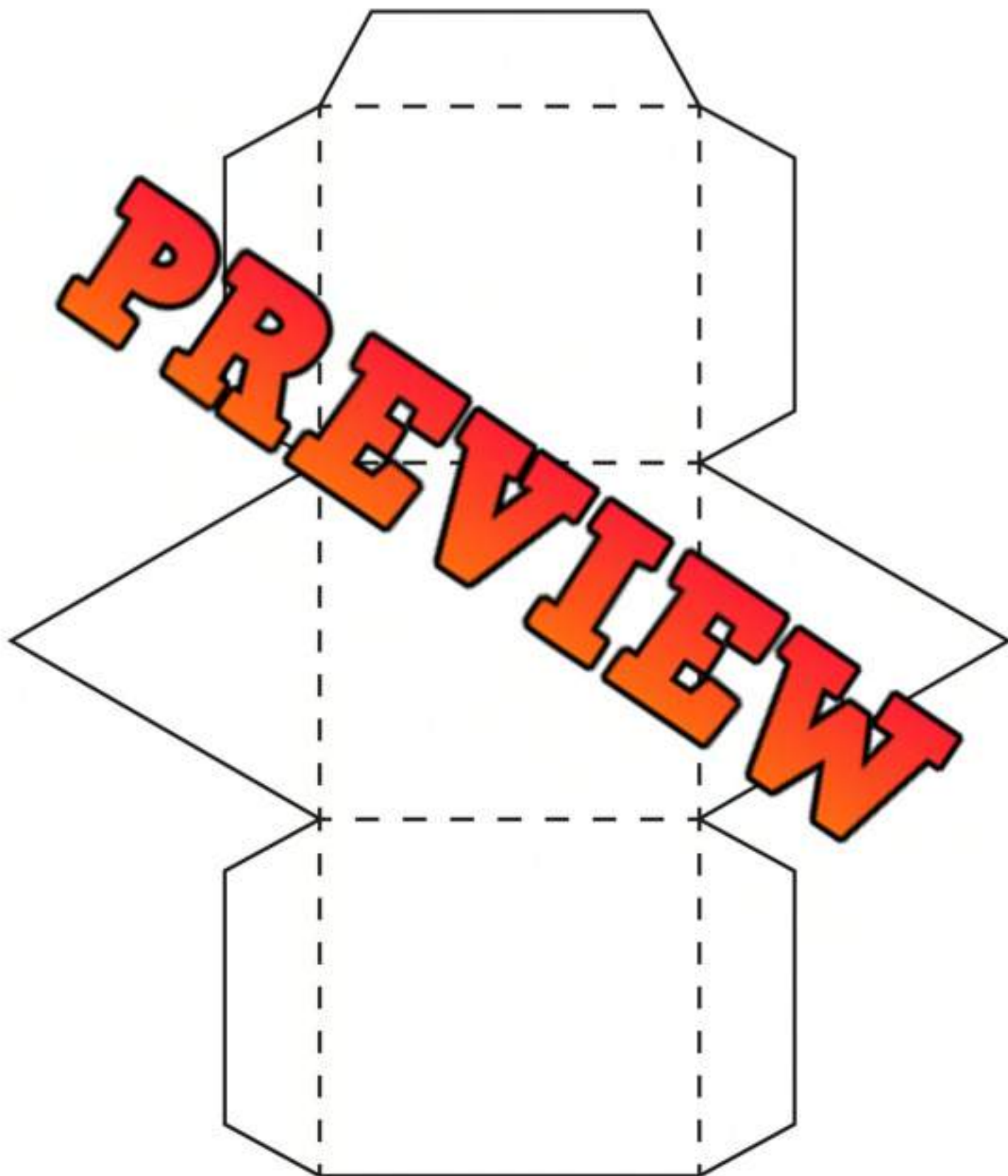
Part 6

Is the triangle a right triangle?

- 1) A 14m ladder is leaning against a house. The bottom of the ladder is 10m from the house. How high does the ladder reach to the nearest tenth?
- 2) A building casts a shadow of 10m on the ground. The length from the top of the building to the end of the shadow is 26m. How tall is the building?

Name: _____

3D Model – Triangle Based Prism Net



Name: _____

32

Curriculum Connection
SS.2

3D Model – Rectangle Based Prism Net

PREVIEW



Name: _____

36

Curriculum Connection
SS.2

3D Model – Cone Net



Name: _____

3D Model – Square Based Pyramid Net



Name: _____

3D Model – Icosahedron Pyramid Net



Name: _____

43

Curriculum Connection
SS.2

3D Model – Octahedron Pyramid Net



Name: _____

3D Models – Investigating Nets

| Name of 3D Shape | Prism or Pyramid | Shape of Base | Faces |
|------------------|------------------|---------------|-------|
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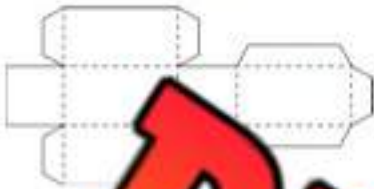
PREVIEW

Nets Representing 3D Objects

Instruction

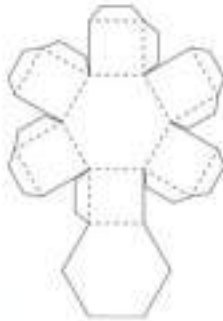
Identify and circle the 3D object formed by each net

1)



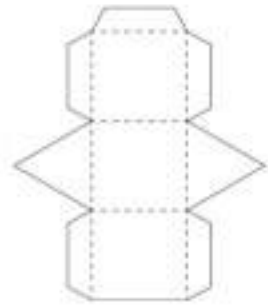
- Rectangular Prism
- Cylinder
- Cube

2)



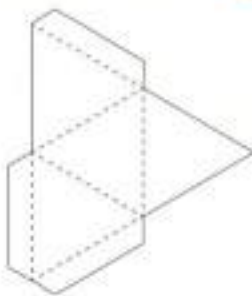
- Rectangular Prism
- Pentagonal Prism
- Triangular Prism

3)



- Rectangular Prism
- Pentagonal Prism
- Triangular Prism

4)



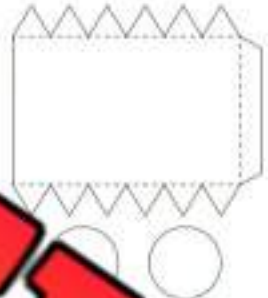
- Rectangular Pyramid
- Pentagonal Pyramid
- Triangular Pyramid

5)



- Rectangular Pyramid
- Square Pyramid
- Triangular Pyramid

6)



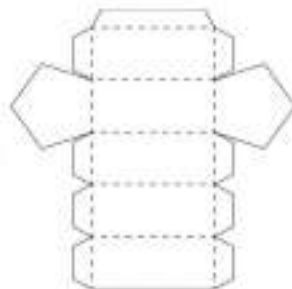
- Rectangular Prism
- Cylinder
- Cone

7)



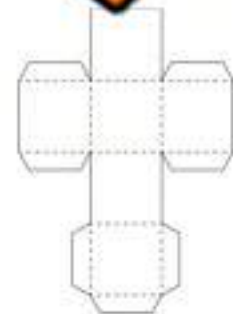
- Rectangular Prism
- Cylinder
- Cone

8)



- Rectangular Prism
- Pentagonal Prism
- Cube

9)



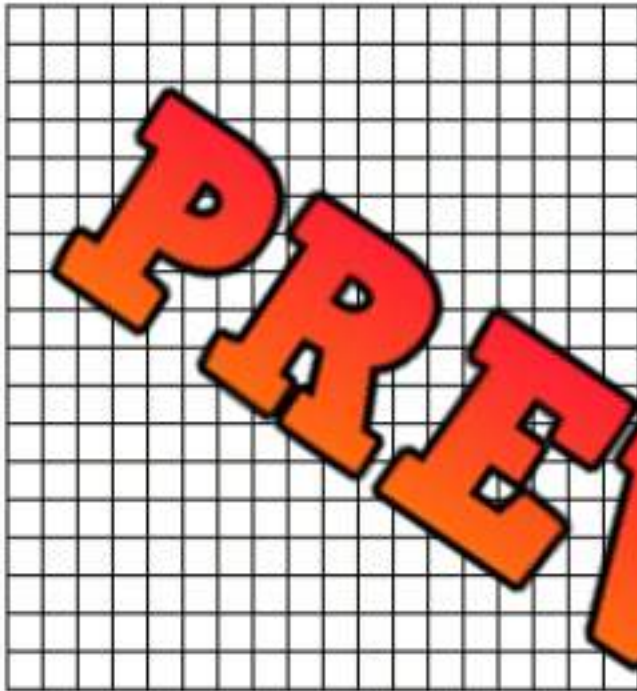
- Rectangular Prism
- Pentagonal Prism
- Cube

Drawing Nets – 3D Objects

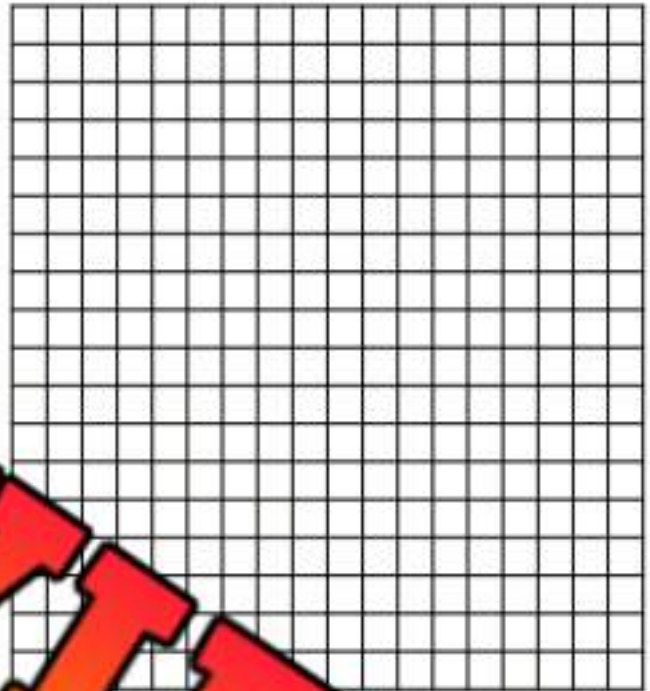
Instructions

Draw the 3D objects using the grids below

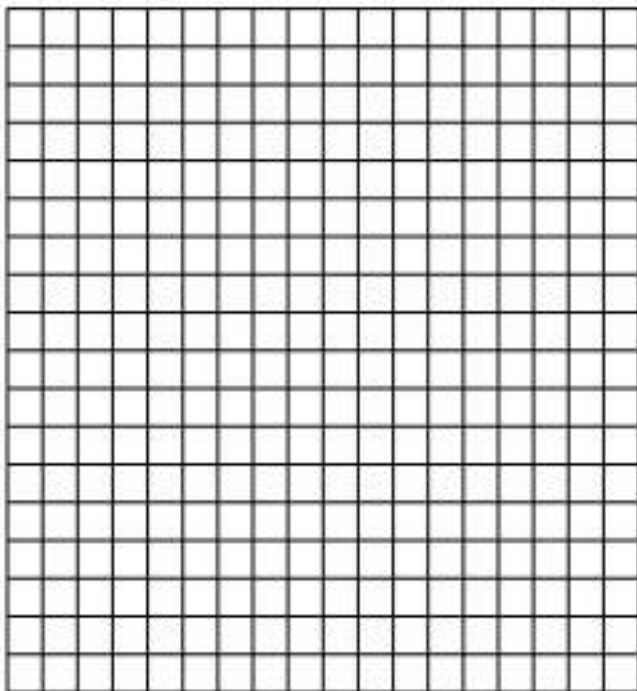
1) Rectangular Prism



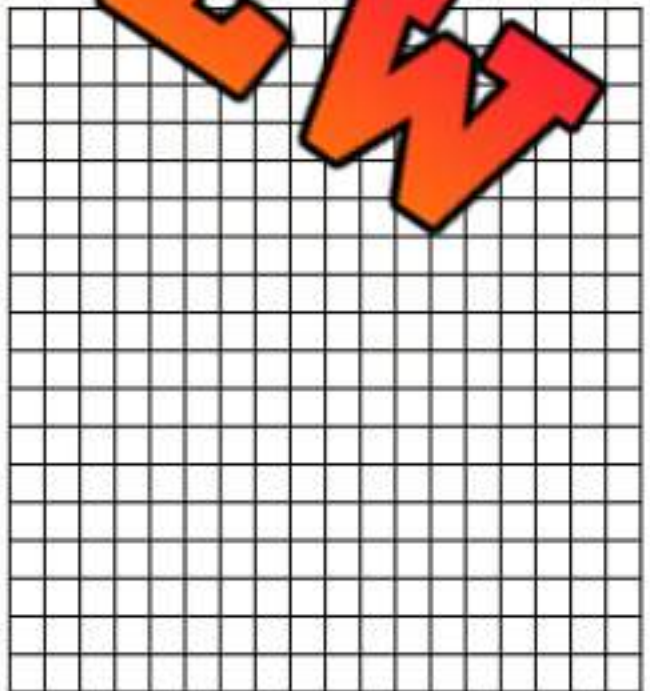
2) Rectangular Prism



3) Triangular Prism



4) Rectangular Prism



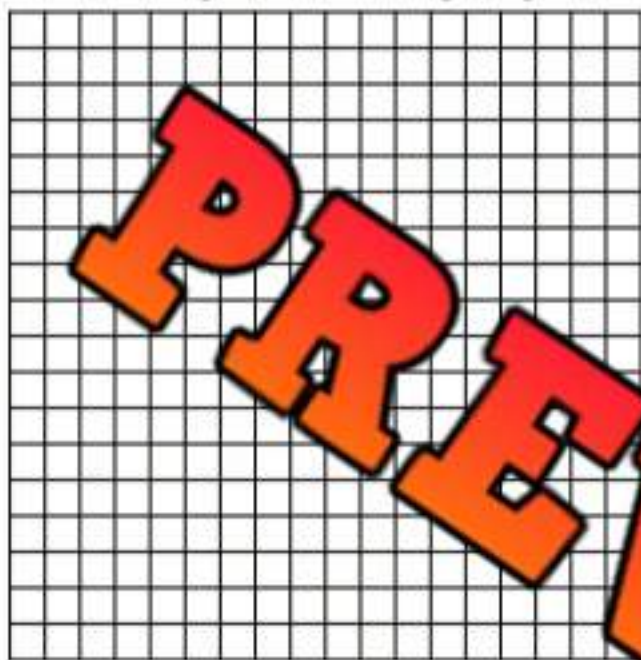
PREVIEW

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

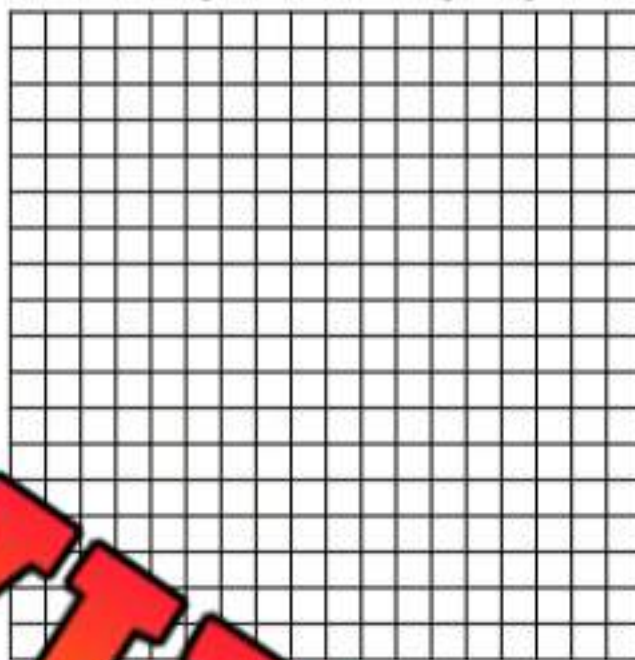
Name: _____

Draw the **Octagonal Prism** using the grid.



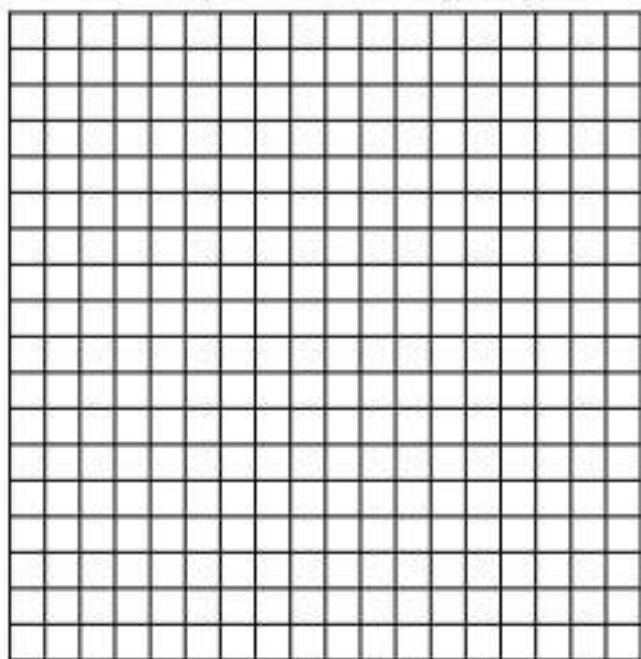
Name: _____

Draw the **Octagonal Prism** using the grid.



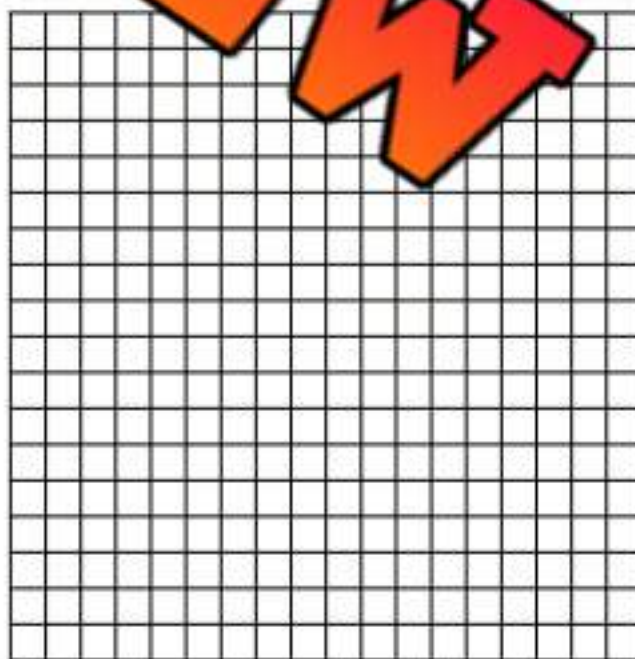
Name: _____

Draw the **Octagonal Prism** using the grid.



Name: _____

Draw the **Octagonal Prism** using the grid.



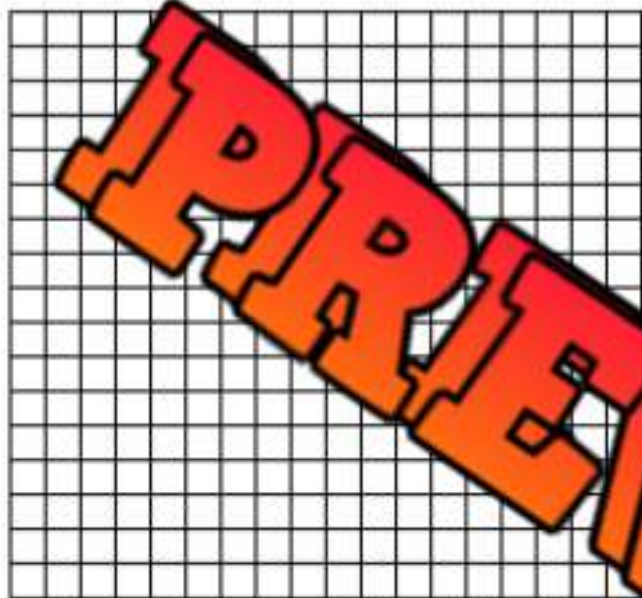
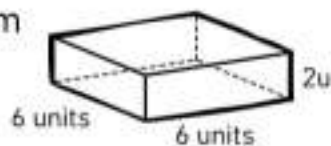
PREVIEW

Drawing Nets – 3D Objects

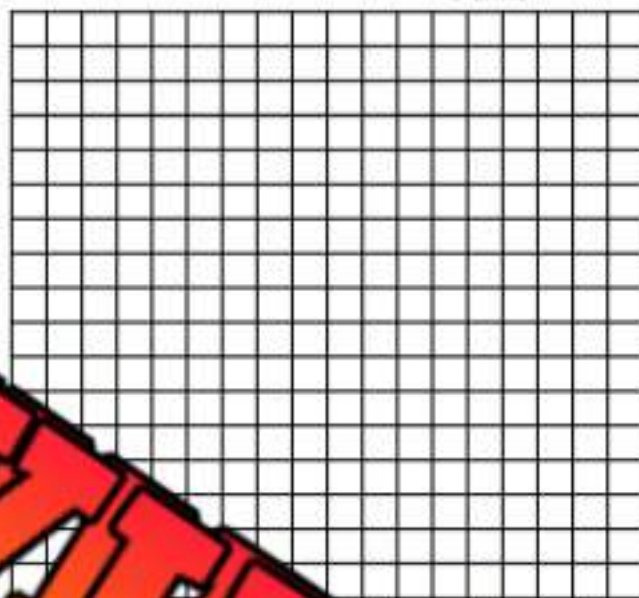
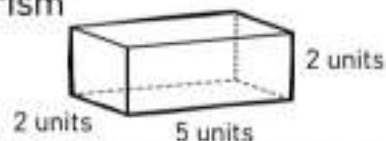
Instructions

Draw the nets based on the dimensions provided

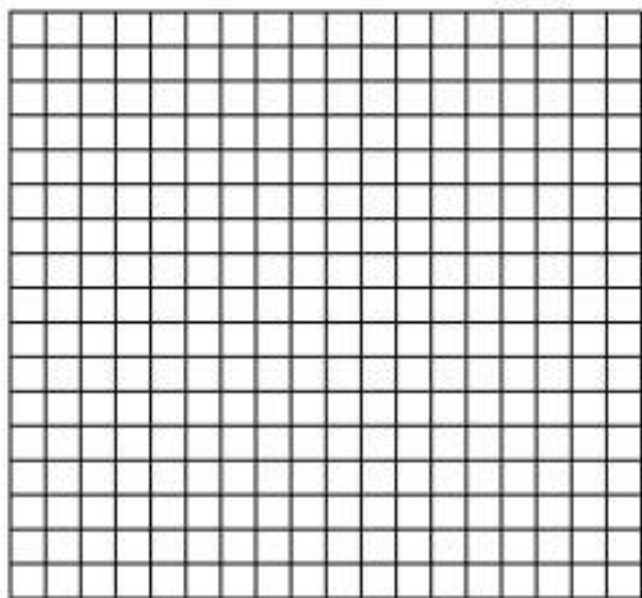
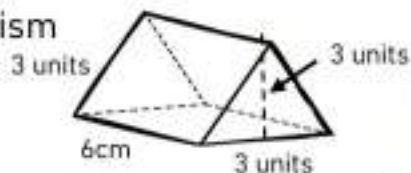
1) Rectangular Prism



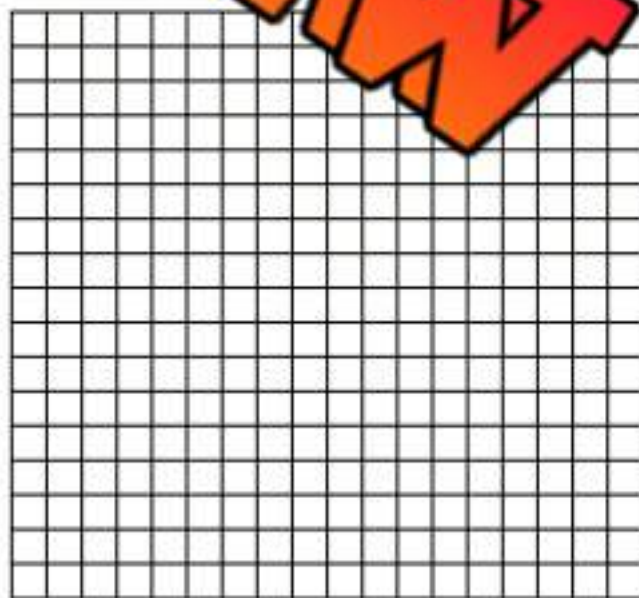
2) Rectangular Prism



3) Triangular Prism



4)

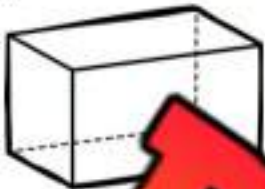


Drawing Nets – 3D Objects

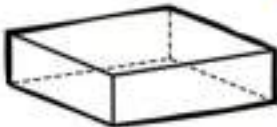
Instructions

Draw two different nets of the 3D objects

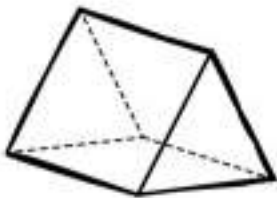
1)



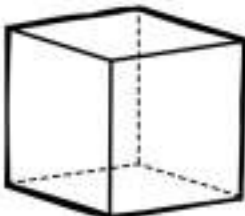
2)



3)



4)



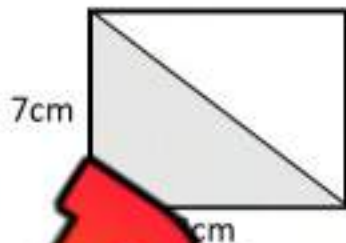
PREVIEW

Introduction – Area of a Triangle

Instruction

 Find the area of the triangles below ($A = b \times h \div 2$)

1)



7cm

7cm

Area of a rectangle = _____

Area of a triangle = _____

2)



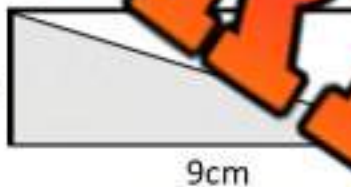
4cm

7cm

Area of a rectangle = _____

Area of a triangle = _____

3)



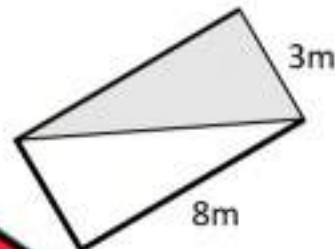
6cm

9cm

Area of a rectangle = _____

Area of a triangle = _____

4)



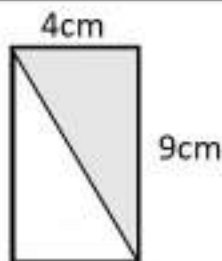
3m

8m

Area of a rectangle = _____

Area of a triangle = _____

5)



4cm

9cm

Area of a rectangle = _____

Area of a triangle = _____

6)

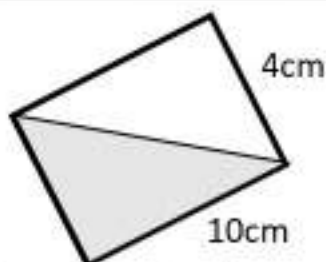


8cm

Area of a square = _____

Area of a triangle = _____

7)



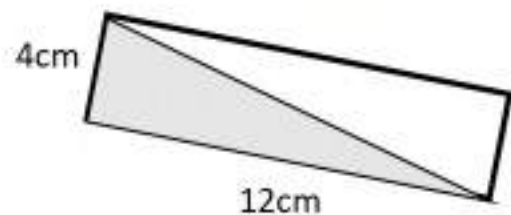
4cm

10cm

Area of a rectangle = _____

Area of a triangle = _____

8)



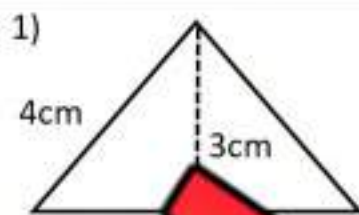
4cm

12cm

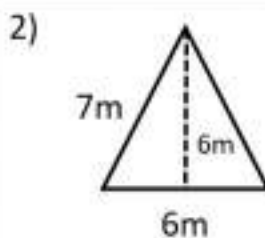
Area of a rectangle = _____

Area of a triangle = _____

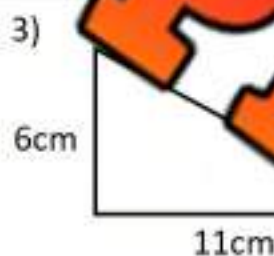
Area of a Triangle

InstructionFind the area of the triangles below ($A = b \times h \div 2$)

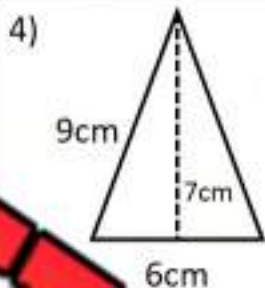
Area = _____



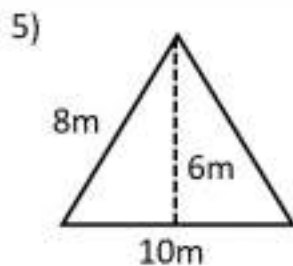
Area = _____



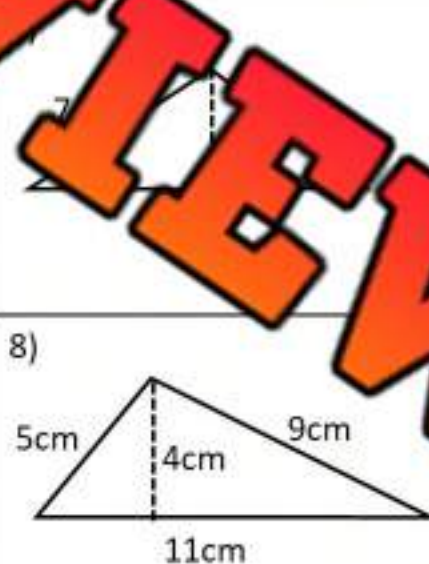
Area = _____



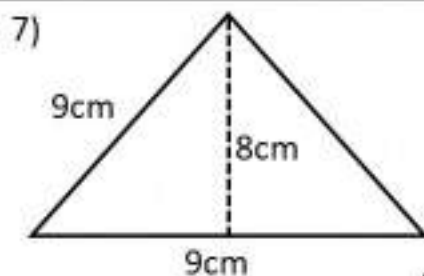
Area = _____



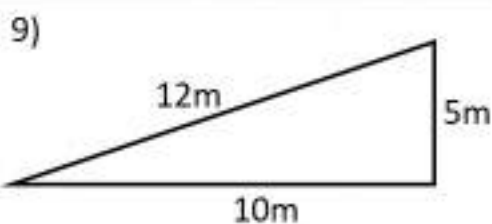
Area = _____



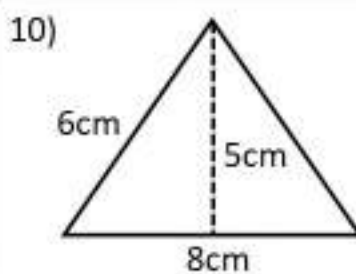
Area = _____



Area = _____



Area = _____

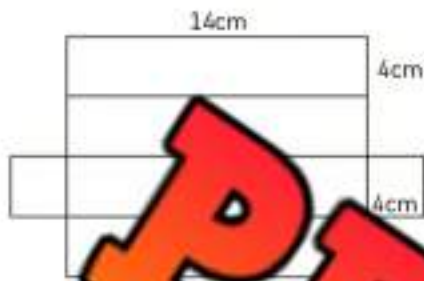


Area = _____

Surface Area Using Nets – Rectangular Prisms**Instruction**

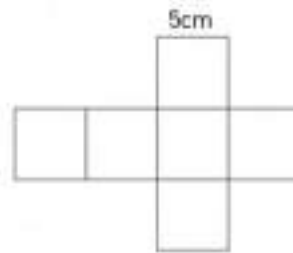
Find the surface area of the 3D objects using the nets below

1)



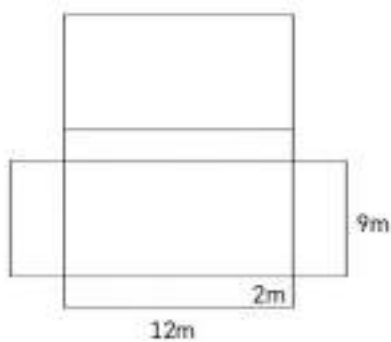
Surface Area: _____

2)



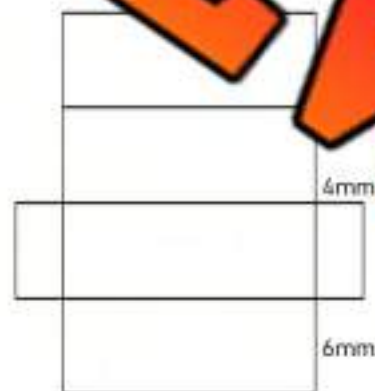
Surface Area: _____

3)



Surface Area: _____

4)

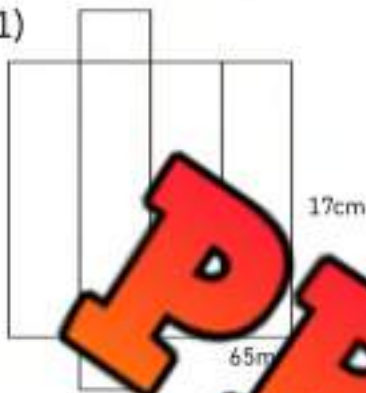


Surface Area: _____

Surface Area Using Nets – Rectangular Prisms**Instruction**

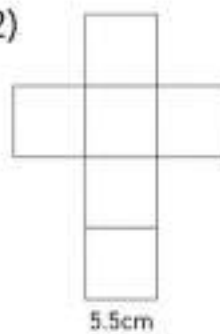
Find the surface area of the 3D objects using the nets below

1)



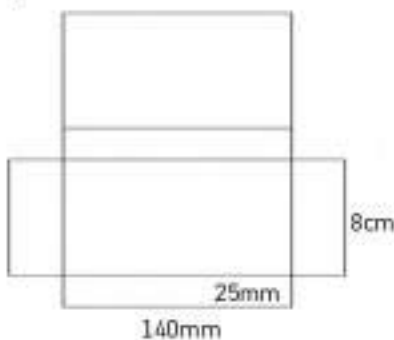
Surface Area: _____

2)



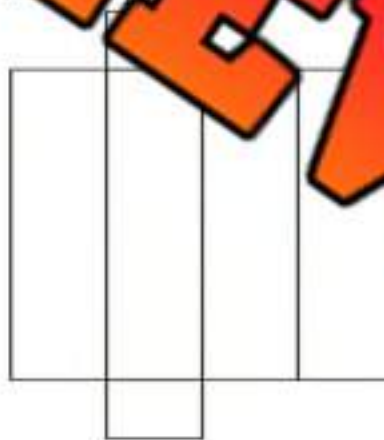
Surface Area: _____

3)



Surface Area: _____

4)

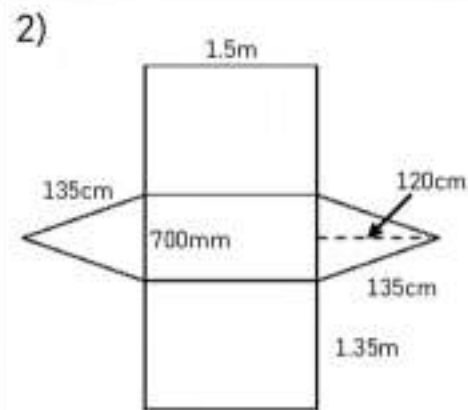


Surface Area: _____

Surface Area Using Nets – Triangular Prisms

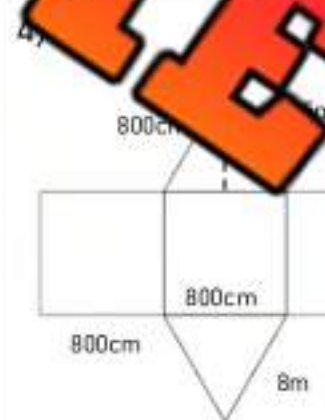
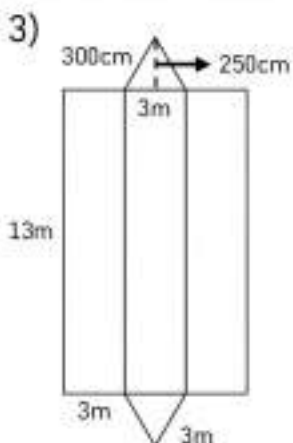
Instruction

Find the surface area of the 3D objects using the nets below



Surface Area: _____

Surface Area: _____



Surface Area: _____

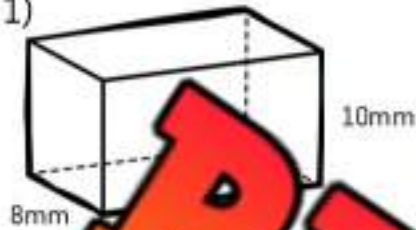
Surface Area: _____

Surface Area Using Nets – Rectangular Prisms**Instruction**

Find the surface area of the 3D objects below

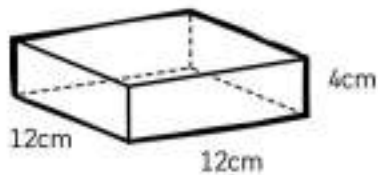
Workspace**Draw the Net**

1)



Surface Area: _____

2)



Surface Area: _____


PREVIEW

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

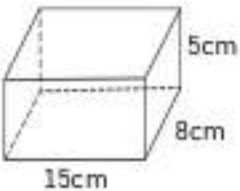
Name: _____

Find the surface area of the 3D objects & draw the net of the rectangular prism.

| Workspace | Draw the Net |
|--|--------------|
|  Surface Area: _____ | |

Name: _____

Find the surface area of the 3D objects & draw the net of the rectangular prism.

| Workspace | Draw the Net |
|--|--------------|
|  Surface Area: _____ | |

PREVIEW

Surface Area Using Nets – Rectangular Prisms**Instruction**

Find the surface area of the 3D objects below

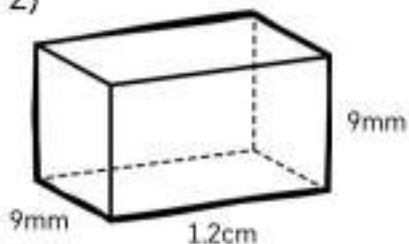
Workspace**Draw the Net**

1)



Surface Area: _____

2)

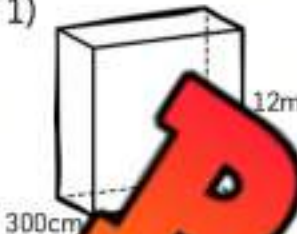
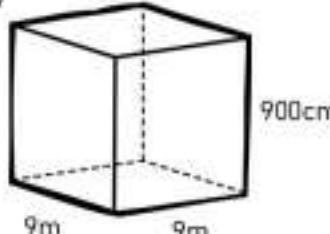


Surface Area: _____

PREVIEW

Surface Area Using Nets – Rectangular Prisms**Instruction**

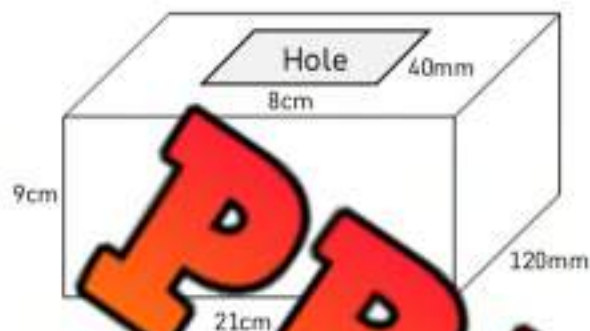
Find the surface area of the 3D objects below

| Workspace | Draw the Net |
|--|--------------|
| <p>1)</p>  <p>Surface Area: _____</p> | |
| <p>2)</p>  <p>Surface Area: _____</p> | |

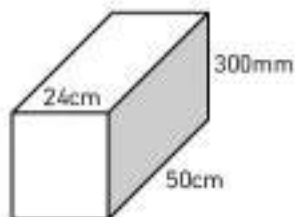
Surface Area – Prism – Word Problems**Instruction**

Solve the word problems below

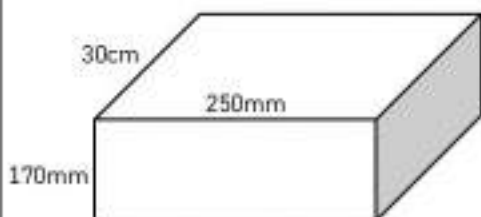
- 1) Find the surface area of the tissue box below.



- 2) Edward is painting a mailbox. He needs to find the surface area so he can buy the amount of paint he needs. The mailbox has no door on the front. Find the surface area of the mailbox using the diagram below.



- 3) Kaitlyn needs to wrap her mom's birthday present. She has enough wrapping paper to cover a surface area of 3500cm^2 . Does she have enough paper?



Surface Area – Prism – Word Problems**Instruction**

Solve the questions below

Lisa is planning to lay bricks on her outdoor fireplace. Her fireplace is a rectangular prism, and she wants to brick all sides, except the bottom.

- a) What is the surface area of the fireplace, excluding the bottom?



- b) What is the surface area of the fireplace (excluding the bottom) in cm?

- c) If the surface area of each brick is 500cm^2 , how many bricks will it take to cover her fireplace (excluding the bottom)?



- d) If each brick costs \$0.79, how much will it cost to cover the fireplace?

Calculating Radius and Diameter

Calculating Radius Formula

$$r = \frac{d}{2} \quad \text{or} \quad r = d \div 2$$

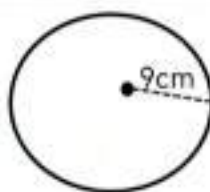
Calculating Diameter Formula

$$d = 2r \quad \text{or} \quad d = r \times 2$$

Instruction

Find the radius and diameter of each circle below

1)



Radius = _____

Diameter = _____

2)



Radius = _____

Diameter = _____

4)



Radius = _____

Diameter = _____

6)



Radius = _____

Diameter = _____

7)



Radius = _____

Diameter = _____

8)



Radius = _____

Diameter = _____

Radius = _____

Diameter = _____

10)



Radius = _____

Diameter = _____

11)



Radius = _____

Diameter = _____

12)



Radius = _____

Diameter = _____

Calculating Circumference

The circumference of a circle is slightly more than 3 times the length of the diameter, or a little more than 6 times the length of the radius. When we need to calculate the circumference of a circle more precisely, we use pi (π). Pi is equal to approximately 3.14, but it is an irrational number, meaning it never ends!



Calculating Circumference (Diameter)

$$c = \pi d \quad \text{or} \quad c = \pi \times d$$

Calculating Circumference (Radius)

$$c = 2\pi r \quad \text{or} \quad c = 2 \times \pi \times r$$

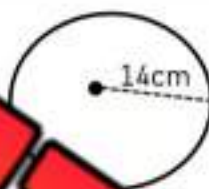
Practice Calculate the circumference of the circles below

1)



Radius = _____
Diameter = _____
Circumference = _____

2)



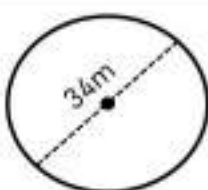
Radius = _____
Diameter = _____
Circumference = _____

3)



Radius = _____
Diameter = _____
Circumference = _____

4)



Radius = _____
Diameter = _____
Circumference = _____

5)



Radius = _____
Diameter = _____
Circumference = _____

6)



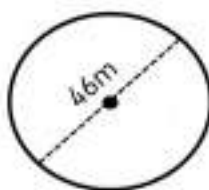
Radius = _____
Diameter = _____
Circumference = _____

7)



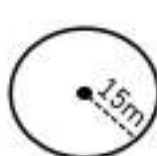
Radius = _____
Diameter = _____
Circumference = _____

8)



Radius = _____
Diameter = _____
Circumference = _____

9)



Radius = _____
Diameter = _____
Circumference = _____

Calculating Circumference

Calculating Circumference (Diameter)

$$c = \pi d \quad \text{or} \quad c = \pi \times d$$

Calculating Circumference (Radius)

$$c = 2\pi r \quad \text{or} \quad c = 2 \times \pi \times r$$




Part 1

Fill in the table with the missing information

| | Radius | Diameter | Circumference |
|-----|--------|----------|---------------|
| 1) | 8cm | | |
| 2) | 1 | | |
| 3) | | 25m | |
| 4) | | 48cm | |
| 5) | 2 | | |
| 6) | | | |
| 7) | 3.8km | | |
| 8) | 8.5m | | |
| 9) | | 1 | |
| 10) | | 54.8m | |

Part 2

Answer the word problems below

| | | |
|----|--|---|
| 1) | <p>Aiden is deciding which pizza to buy. He has two options.</p> <p><u>Option A:</u> Pizza with a radius of 22cm</p> <p><u>Option B:</u> Pizza with a circumference of 136cm</p> <p>Which pizza is larger?</p> |  |
| 2) | <p>You need to wrap a label around a can. If the diameter of the can is 11.5cm, what length does the label need to be?</p> |  |
| 3) | <p>Alexa needs to wrap a cake she made with a ribbon. The cake has a radius of 16.25cm. How long does the ribbon need to be?</p> |  |

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Fill in the table with the missing information. ($c = \pi d$ & $c = 2\pi r$)

| | Radius | Diameter | Circumference |
|----|--------|----------|---------------|
| 1) | 13m | | |
| 2) | | | |
| 3) | | | |
| 4) | | | |

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Name: _____

1) Fill in the table with the missing information. ($c = \pi d$ & $c = 2\pi r$)

| | Radius | Diameter | Circumference |
|----|--------|----------|---------------|
| 1) | 13m | | |
| 2) | | 39m | |
| 3) | 11m | | |
| 4) | | 77m | |

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Name: _____

1) Fill in the table with the missing information. ($c = \pi d$ & $c = 2\pi r$)

| | Radius | Diameter | Circumference |
|----|--------|----------|---------------|
| 1) | 13m | | |
| 2) | | 39m | |
| 3) | 11m | | |
| 4) | | 77m | |

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Name: _____

1) Fill in the table with the missing information. ($c = \pi d$ & $c = 2\pi r$)

| | Radius | Diameter | Circumference |
|----|--------|----------|---------------|
| 1) | 13m | | |
| 2) | | 39m | |
| 3) | 11m | | |
| 4) | | 77m | |

2) A circular garden has a radius of 7.5 m. You want to put a fence around the entire garden. How long does the fence need to be?

Area of a Circle - Radius

The area of a circle is the part inside the circle. We can calculate the area of a circle by using its radius. For most calculations, we can use 3.14 for pi. The formula is $\pi \times \text{radius}^2$. We can write this as $a = \pi r^2$

Calculating Area Using Radius



$$a = \pi r^2$$

$$a = \pi \times 8 \times 8$$

$$a = 200.96\text{m}^2$$

Practice

Calculate the area of the circles using the radius

1)



Radius = _____

Area = _____

2)



3)



Radius = _____

Area = _____

4)



Radius = _____

Area = _____

5)



Radius = _____

Area = _____

Radius = _____

Area = _____

7)



Radius = _____

Area = _____

8)



Radius = _____

Area = _____

9)



Radius = _____

Area = _____

Area of a Circle - Diameter

When we know the diameter of a circle, we can divide it by two to get the radius. Once we have the radius, we can use it to calculate the area of a circle using the formula: $a = \pi r^2$

Calculating Area Using Diameter



$$a = \pi r^2$$

$$\text{diameter} = 18, \text{ radius} = 9$$

$$a = \pi \times 9 \times 9$$

$$a = 254.34\text{m}^2$$

Practice

Calculate the area of the circles using the radius

1)

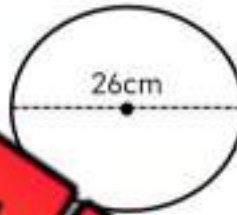


Diameter = _____

Radius = _____

Area = _____

2)

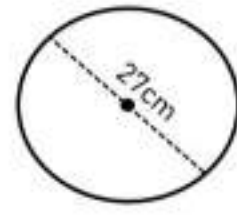


Diameter = _____

Radius = _____

Area = _____

3)

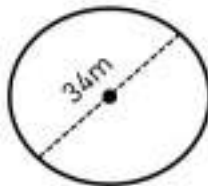


Diameter = _____

Radius = _____

Area = _____

4)



Diameter = _____

Radius = _____

Area = _____

5)



Diameter = _____

Radius = _____

Area = _____

6)



Diameter = _____

Radius = _____

Area = _____

Word Problems

Solve the problems below



| | Questions | Answer |
|----|--|--------|
| 1) | A dinner plate has a diameter of 19cm. What is the area of the plate? | |
| 2) | A circular table is 1.3 metres wide. What is the area of the table in centimetres? | |

Circles – Mixed Review**Practice**

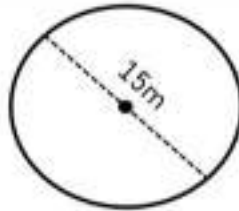
Fill in the blanks below

1)



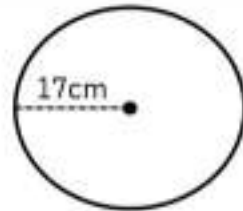
Radius = _____
Diameter = _____
Circumference = _____
Area = _____

2)



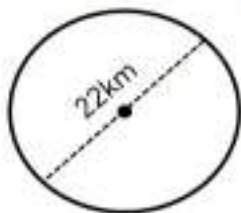
Radius = _____
Diameter = _____
Circumference = _____

3)



Radius = _____
Diameter = _____
Circumference = _____
Area = _____

4)



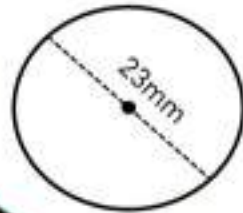
Radius = _____
Diameter = _____
Circumference = _____
Area = _____

5)



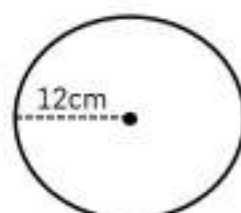
Radius = _____
Diameter = _____
Circumference = _____
Area = _____

6)



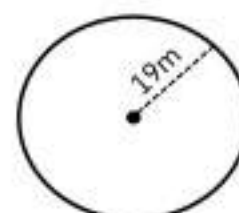
Radius = _____
Diameter = _____
Circumference = _____
Area = _____

7)



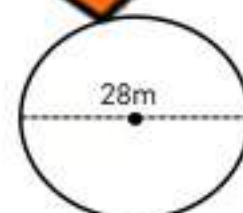
Radius = _____
Diameter = _____
Circumference = _____
Area = _____

8)



Radius = _____
Diameter = _____
Circumference = _____
Area = _____

9)



Radius = _____
Diameter = _____
Circumference = _____
Area = _____

Name: _____

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Math Race: Circumference, Radius, Diameter, and Area

Objective

What are we learning about?

Students will practice calculating the circumference, radius, diameter, and area of circles by quickly answering related questions in a competitive and engaging game format. They will learn how to estimate these values using $\pi = 3$.

Materials

What you will need for the activity.

- Large circle
- Questions about circumference, radius, diameter, and area of circles.
- Optional: Timer or stopwatch
- Chairs arranged in a circle



Instructions

How you will complete the activity

1. Setup: Arrange chairs in a circle, with one student seated in a chair. One student stands behind a seated student to start the game.
2. Explain the Game: Explain to the students that they will be participating in a race around the circle by answering questions about circumference, radius, diameter, and area. The goal is to move around the entire circle and return to their original position. Students should use mental math and estimation ($\pi = 3$).
3. Start the Game: The teacher reads out a question (e.g., "What is the circumference of a circle with a radius of 3 cm?")
4. Answering the Question: The standing student and the seated student in front of them compete to answer the question first. The student who answers correctly first moves to stand behind the next seated student, while the other student remains seated.
5. Continue the Race: The teacher continues reading out questions, and the process repeats. The standing student continues to move around the circle, answering questions at each stop.
6. Winning the Game: The first student to make it around the entire circle and return to their original position wins the race.
7. Review: After the game, review some of the questions and answers with the class to reinforce the concepts and ensure understanding.

Name: _____

Questions

Use the questions below for the game

| | |
|---|------------------------|
| A circular fountain has a diameter of 3 metres. What is the circumference of the fountain in centimetres? | 900 cm |
| A clock face has a radius of 10 cm. Calculate the area of the clock face. | 300 cm ² |
| A circular garden has a circumference of 60 metres. What is the diameter of the garden? | 20 metres |
| A car tire has a radius of 30 cm. Find the circumference of the tire. | 180 cm |
| The area of a circular pool is 300 square metres. What is the diameter of the pool? | 10 metres |
| You have a circular rug with a diameter of 2 metres. What is the area of the rug in square centimetres? | 600 cm ² |
| A circular logo has a radius of 3 cm. How long is needed to outline the logo's edge? | 60 cm |
| The circumference of a bicycle wheel is 180 cm. What is the wheel's radius? | 30 cm |
| A frisbee has a radius of 5 cm. What is the area of the frisbee? | 75 cm ² |
| The area of a circular rug is 48 square metres. What is the diameter of the rug? | 4 metres |
| A circular tablecloth has a circumference of 90 cm. What is the diameter of the tablecloth? | 15 cm |
| The area of a circular park is 12 square metres. What is the diameter of the park? | 4 m |
| A round swimming pool has a circumference of 30 metres. What is the pool's radius? | 5 metres |
| A pizza with a diameter of 40 cm needs to be boxed. What is the circumference of the pizza? | 120 cm |
| A round garden bed has a radius of 1 metre. Calculate the area of the bed in square centimetres. | 30,000 cm ² |
| The area of a circular park is 75 square metres. What is the radius of the park? | 5 metres |

Name: _____

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Questions

Use the questions below for the game

| | |
|--|-----------------------|
| A cylindrical can has a circumference of 30 cm at its base. What is the can's diameter? | 10 cm |
| A round placemat has a radius of 12 cm. What is the circumference of the placemat? | 72 cm |
| The area of a circular fountain is 27 square metres. What is the diameter of the fountain? | 6 metres |
| A round playground has a circumference of 48 metres. What is the radius of the playground? | 8 metres |
| The area of a circular playground is 300 square metres. What is the radius of the playground? | 10 metres |
| The area of a circular clock face is 12 square metres. What is the radius of the clock face? | 2 metres |
| A round wall clock has a diameter of 90 cm. What is the circumference of the clock face? | 90 cm |
| A circular pizza pan has a circumference of 20 cm. What is the radius of the pan? | 10 cm |
| A circular garden plot has a radius of 4 metres. What is the circumference of the plot in centimetres? | 240 cm |
| A round clock's face has a diameter of 16 cm. What is the area of the clock's face? | 192 cm ² |
| The area of a circular trampoline is 75 square metres. What is the trampoline's diameter? | 10 metres |
| A cylindrical water tank has a circumference of 150 cm at its base. What is the radius of the base? | 23 cm |
| A round hot tub has a radius of 3 metres. What is the area of the hot tub in square centimetres? | 2,700 cm ² |
| The diameter of a circular sticker is 9 cm. Calculate the circumference of the sticker. | 27 cm |
| A circular track has a circumference of 60 metres. What is the radius of the track? | 10 metres |
| The area of a round park bench is 300 square centimetres. Find the radius of the bench. | 10 cm |
| A circular plate has a circumference of 30 cm. What is the plate's diameter? | 10 cm |
| A round fountain has a diameter of 12 metres. Calculate the area of the fountain in square metres. | 108 m ² |

Semi-Circles

A semi-circle is half of a circle. If we can find the area of a full-circle, we can divide it by two to find the area of a semi-circle.

Calculating Circumference

$$c = \pi d \text{ or } c = 2\pi r$$



Calculating Area of Semi-Circle

$$a = \pi r^2 \div 2$$

diameter = 10, radius = 5

$$a = 3.14 \times 5 \times 5 \div 2$$

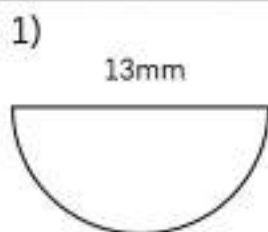
$$a = 78.5\text{cm}^2 \div 2$$

$$\text{area of semi-circle} = 39.25\text{cm}^2$$

Part 1 Complete the table below

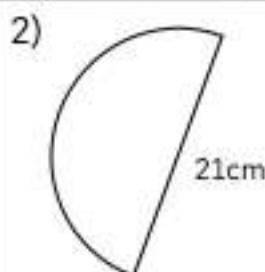
| | Diameter | Area of Full Circle | Area of Semi-Circle | Circumference of Full Circle | Circumference of Semi-Circle |
|----|----------|---------------------|---------------------|------------------------------|------------------------------|
| 1) | 7 cm | | | | |
| 2) | 5 km | | | | |
| 3) | 26 m | | | | |
| 4) | 12 mm | | | | |
| 5) | 18 m | | | | |
| 6) | 33 cm | | | | |

Part 2 Calculate the area and perimeter of the semi-circle



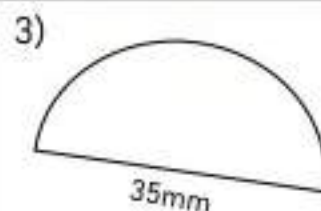
Area = _____

Perimeter = _____



Area = _____

Perimeter = _____



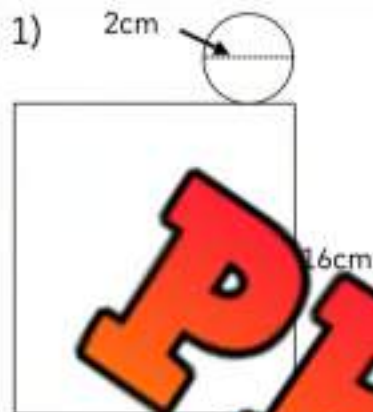
Area = _____

Perimeter = _____

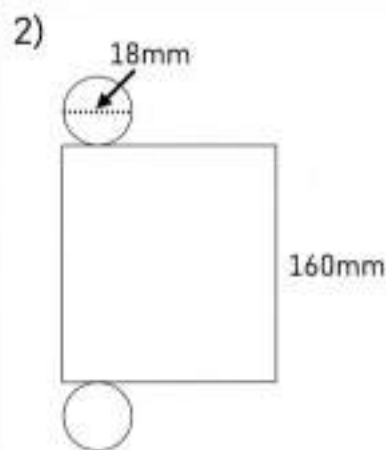
Surface Area Using Nets - Cylinders

Part 1

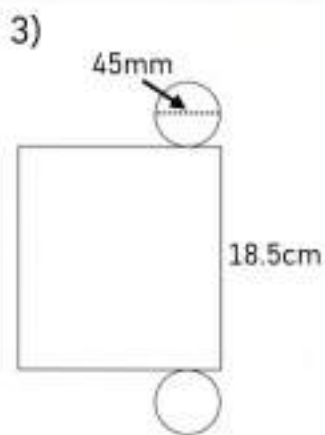
Solve the questions below



Surface Area: _____



Surface Area: _____



Surface Area: _____



Surface Area: _____

Part 2

Solve the question below

A can is 13cm tall. The top of the can has a radius of 3cm. Draw the net of the can and calculate the surface area of the can.



Surface Area - Cylinders

Instruction

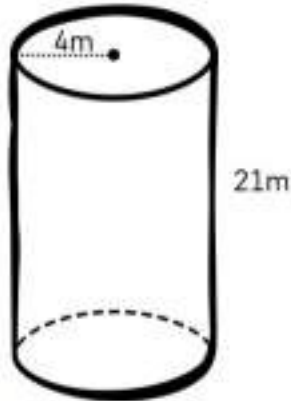
Solve the questions below

1)



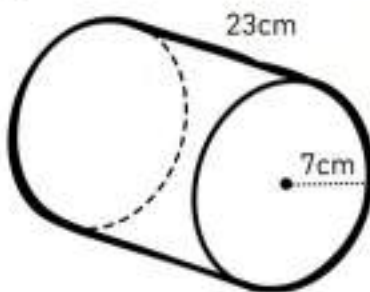
Surface Area: _____

2)



Surface Area: _____

3)



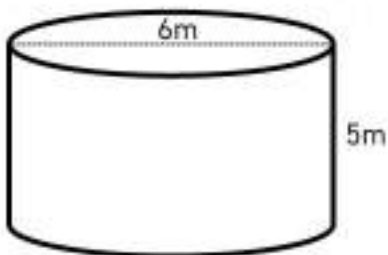
Surface Area: _____

2.5cm



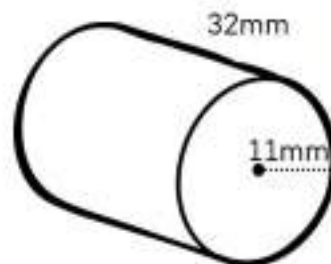
Surface Area: _____

5)



Surface Area: _____

6)



Surface Area: _____

Surface Area - Cylinders

Instruction

Solve the questions below



1) A can of soup has a diameter of 9cm and a height of 19cm. What is the surface area of the can?



2) A can of tuna has a radius of 7.5cm and a height of 42mm. What is the surface area of the can?



3) A battery is composed of two cylinders. The main battery cylinder has a radius of 1.5cm and a height of 8cm. The smaller cylinder on top of the battery has a diameter of 8mm and a height of 1.5cm.

What is the total surface area of the battery?



4) A barrel has a diameter of 74cm and a height of 1.62m. What is the surface area of the barrel?

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

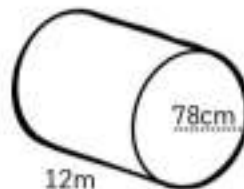
- 1) Find the surface area for the cylinder.
(Surface Area = $2\pi r^2 + 2\pi rh$)



- 2) A water tank is shaped like a cylinder.
It has a radius of 2.5 m and a height of
5.5 m. What is the surface area of the
tank, including the top and bottom?

Name: _____

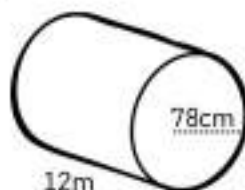
- 1) Find the surface area for the cylinder.
(Surface Area = $2\pi r^2 + 2\pi rh$)



- 2) A water tank is shaped like a cylinder.
It has a radius of 2.5 m and a height of
5.5 m. What is the surface area of the
tank, including the top and bottom?

Name: _____

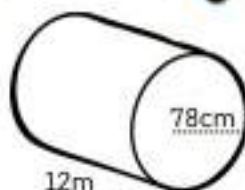
- 1) Find the surface area for the cylinder.
(Surface Area = $2\pi r^2 + 2\pi rh$)



- 2) A water tank is shaped like a cylinder.
It has a radius of 2.5 m and a height of
5.5 m. What is the surface area of the
tank, including the top and bottom?

Name: _____

- 1) Find the surface area for the cylinder.
(Surface Area = $2\pi r^2 + 2\pi rh$)



- 2) A water tank is shaped like a cylinder.
It has a radius of 2.5 m and a height of
5.5 m. What is the surface area of the
tank, including the top and bottom?

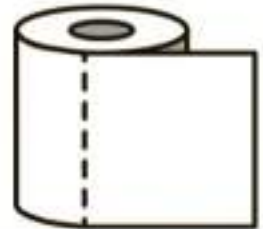
Surfaces Area Using Nets - Cylinders

Instruction

Solve the questions below

1) A toilet paper roll is 16cm tall with a radius of 6cm. The inside cylinder is a hole. It has a diameter of 3cm.

What is the surface area of the toilet paper roll. Remember to account for the hole.



2) A wheel of brie cheese is 16cm tall. The radius is 9cm long. What is the surface area of the full wheel of cheese?



3) A pot has no lid on top. The pot is 14cm tall and has a radius of 10cm. What is the surface area of the pot?



Calculating Volume Using the Base

Instruction

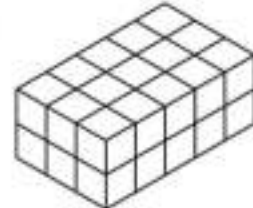
Fill in the blanks to investigate the area of the base and the height

1)



| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | 18 |

2)



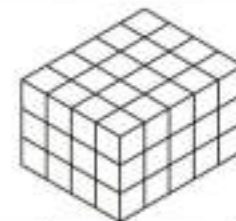
| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

3)



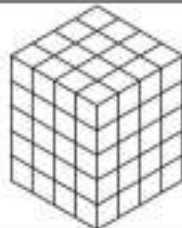
| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

4)



| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

5)



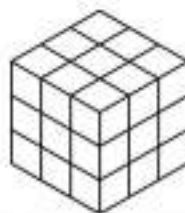
| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

6)



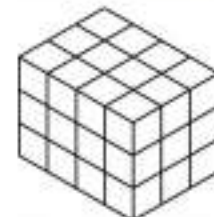
| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

7)



| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

8)



| | | |
|--------------|--------|--------|
| Area of Base | Height | Volume |
| | | |

Calculating Volume Using the Base




Part 1

Fill in the blanks to investigate the area of the base and the height

| | Area of Base | Height | Volume |
|----|-------------------|--------|--------------------|
| 1) | 10 cm^2 | | 80 cm^3 |
| 2) | 13 mm^2 | 6 mm | |
| 3) | | 5 cm | 75 cm^3 |
| 4) | | 8 mm | 96 mm^3 |
| 5) | | 9 m | |
| 6) | 16 | | 144 mm^3 |
| 7) | | | 132 km^3 |
| 8) | 15 m^2 | | 210 m^3 |

Part 2

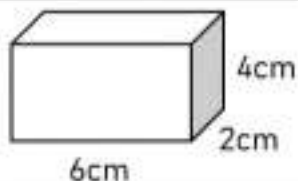
Answer the questions below

| | | |
|----|--|---|
| 1) | A box of cereal has a base with a length of 12cm and a width of 9cm. The height of the box is 22cm. What is the volume of the box? |  |
| 2) | A juice box is 9cm wide and 5cm long. The height of the juice box is 12cm. What is the volume of the juice box? |  |
| 3) | A railway car is 6.5m long and 2.2m wide. The railway car is 3.1m tall. What is the volume of the railway car? |  |

Calculating Volume of Rectangular Prisms

Rectangular Prism - Calculating Volume

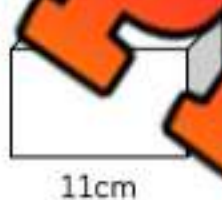
To find the volume of a rectangular prism, multiply the length by the width by the height.



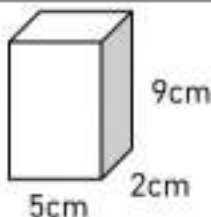
$$v = l \times w \times h$$
$$v = 6\text{cm} \times 2\text{cm} \times 4\text{cm}$$
$$v = 48\text{cm}^3$$

Instruction Calculate the volume of the rectangular prisms

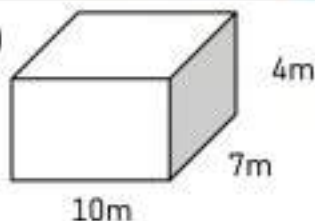
1)



2)



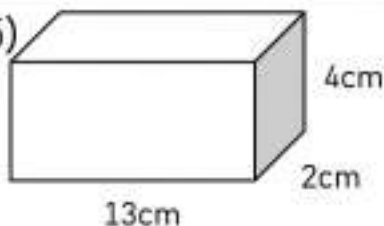
3)



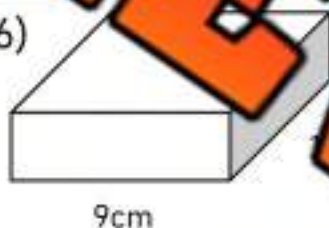
4)



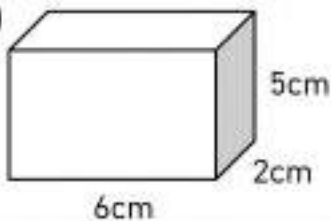
5)



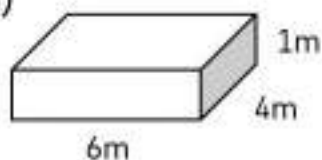
6)



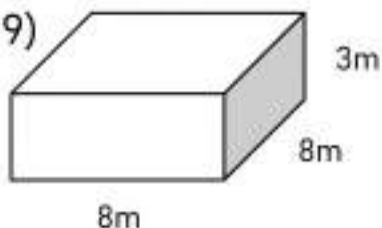
7)



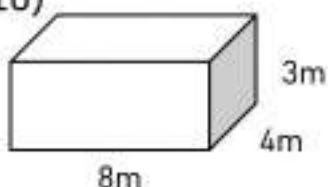
8)



9)



10)



Calculating Volume of Rectangular Prisms

Instruction

Solve the word problems below

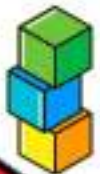
1) A classroom has a width of 12m, height of 2m, and a length of 10m. What is the volume of the classroom?



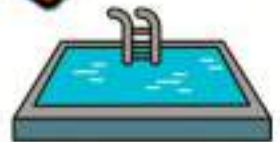
2) An elevator is 2m deep, and 4m long. What is the volume of the elevator?



3) A block has a height of 7cm, width of 30cm, and a length of 10cm. What is the volume of the block?



4) A pool is 9m long, 6m wide, and 300cm deep. What is the volume of the pool?



5) A lunchbox is 120mm wide, 7cm tall, and 10cm deep. What is the volume of the lunchbox?



Scavenger Hunt: Volume of Rectangular Prisms

Objective

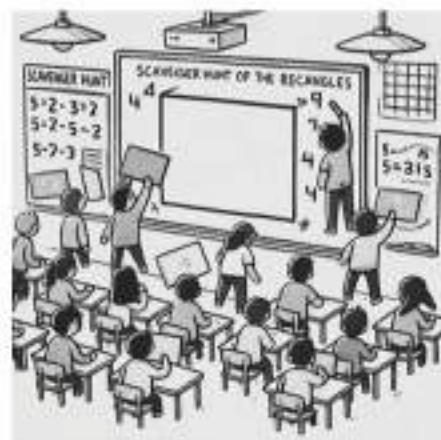
What are we learning about?

Students will practice calculating the volume of rectangular prisms, enhancing their understanding of this geometric concept through a fun and engaging scavenger hunt.

Materials

What you will need for the activity.

- Scavenger hunt volume questions (provided)
- Small bags or envelopes for each team to collect their cards
- Tape to hide cards around the classroom or in a designated safe outdoor area



Instructions

How you will complete the activity.

- 1) **Prepare the Cards:** Write volume questions about rectangular prisms on index cards. Use the questions generated above.
- 2) **Hide the Cards:** Hide the cards around the classroom or in a designated safe outdoor area. Tape them under chairs, desks, or on the floor in non-obvious spots.
- 3) **Divide into Teams:** Divide the class into small teams and give each team a bag or envelope to collect their cards.
- 4) **Explain the Game:** Explain the game to the students. Each team will look for a card, solve the problem on it as quickly as they can, and return to you for verification.
- 5) **Start the Game:** Say "Go!" and each team rushes to find their first card.
- 6) **Verify Answers:** When a team thinks they have the correct answer, they come back to you. If correct, they receive a checkmark and move on to find the next card.
- 7) **Continue Playing:** The game continues until all cards are found or you call time. The team with the most correct answers wins.
- 8) **Discuss:** After the game, discuss the problems and solutions each team encountered, focusing on the methods used to calculate the volume.

Index cards

Cut out the cards below

A rectangular prism has a length of 8 m, a width of 6 m, and a height of 5 m. What is its volume?

A storage container has a length of 4.5 m, a width of 2 m, and a height of 1.8 m. Find its volume.

The dimensions of a shipping crate are 3 m by 2 m by 1 m. Calculate the volume of the crate.

A rectangular tank is 1.2 m wide, 2.5 m long, and 0.8 m tall. What is the volume of the tank?

A wooden block measures 12 cm by 5 cm by 8 cm. Find the volume of the block in cubic centimeters.

The dimensions of a large rectangular pool are 20 m by 15 m. The depth is 3 m. Calculate the volume of the pool.

A storage box has dimensions of 40 cm by 25 cm by 30 cm. What is the volume of the box in cubic centimeters?

A rectangular prism has dimensions of 18 cm by 12 cm by 10 cm. Find the volume in cubic centimeters.

Index cards

Cut out the cards below

A rectangular box has a length of 12 cm, a width of 8 cm, and a height of 5 cm. What is the volume of the box?

The dimensions of a bookcase are 2 m by 1 m by 2.5 m. Calculate the volume of the bookcase.

A storage bin is 5 m long, 3 m wide, and 2.8 m high. Calculate the volume of the storage bin.

A rectangular swimming pool measures 25 m in length, 10 m in width, and 2 m in depth. Find the volume of the pool.

A rectangular prism has a width of 5 cm, a length of 10 cm, and a height of 20 cm. What is its volume?

The dimensions of a rectangular island are 3 m by 4 m by 2 m. Calculate the volume of the island.

A toy box measures 60 cm in length, 45 cm in width, and 35 cm in height. Find the volume of the toy box.

A warehouse has a storage bin that is 8 m long, 4 m wide, and 3 m high. What is the volume of the bin?

Index cards

Cut out the cards below

A refrigerator has a width of 0.7 m, a depth of 0.6 m, and a height of 1.8 m. Calculate the volume of the refrigerator.

A truck container has dimensions of 12 m by 3 m by 4 m. What is the volume of the container?

A brick has dimensions of 12 cm by 6 cm by 4 cm. Calculate the volume of the brick in cubic centimeters.

The volume of a rectangular prism is 96 cubic meters. The length is 8 m and the width is 4 m. What is the height?

A cereal box has a length of 30 cm, a width of 8 cm, and a height of 25 cm. What is the volume of the box?

A room has a length of 4 m, a width of 3 m, and a height of 2 m. Calculate the volume of the room.

A fish tank has a length of 50 cm, a width of 20 cm, and a height of 30 cm. What is the volume of the fish tank?

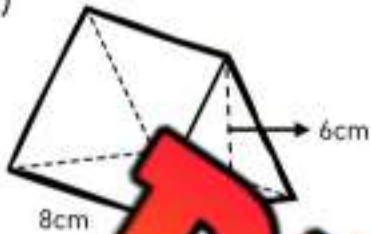
A storage crate has dimensions of 6 m by 2.5 m by 2 m. What is the volume of the crate?

Volume – Triangular Prisms

Instruction

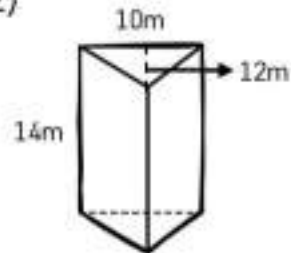
Find the volume of the triangular prisms below

1)



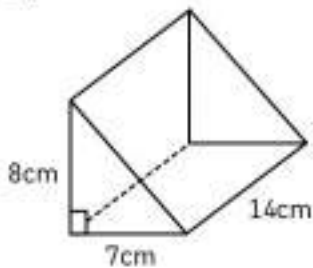
Volume: _____

2)

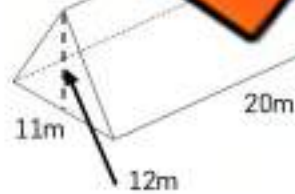


Volume: _____

3)



Volume: _____



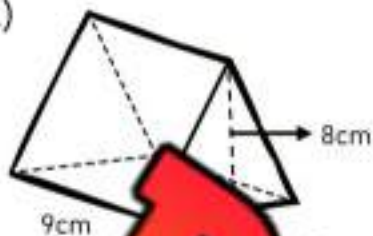
Volume: _____

Volume – Triangular Prisms

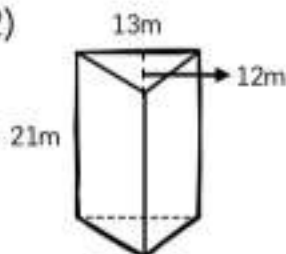
Instruction

Find the volume of the triangular prisms below

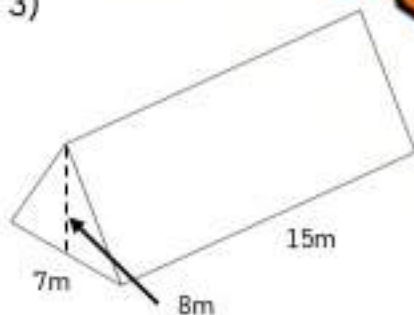
1)



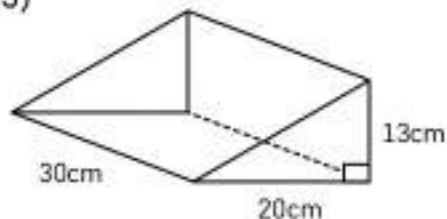
2)



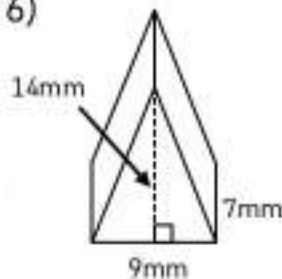
3)



5)



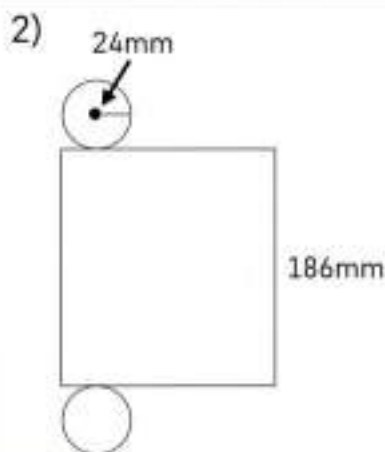
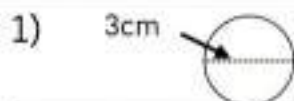
6)



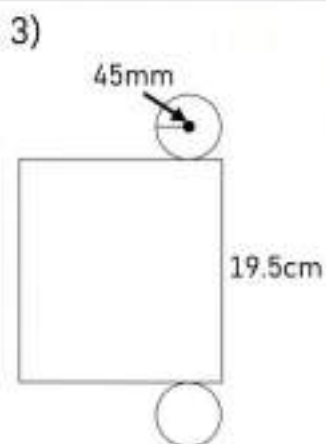
Volume - Cylinders

Part 1

Solve the questions below



Area of the Base: _____ Volume: _____



Area of the Base: _____ Volume: _____

Part 2

Solve the question below

A paint can is 54cm tall and has a diameter of 18cm. What is the volume of the paint can?



Volume - Cylinders




Part 1

Fill in the blanks to investigate the area of the base and the volume

| | Radius | Area of Base | Height | Volume |
|----|--------|--------------|--------|--------|
| 1) | 8 mm | | 12 mm | |
| 2) | 5 mm | | 18 mm | |
| 3) | | | 9 cm | |
| 4) | | | 7 km | |
| 5) | 9 | | 7 cm | |
| 6) | 12 cm | | 8 cm | |
| 7) | 4 m | | 13 m | |
| 8) | 7 m | | 11 m | |

Part 2

Answer the questions below

| | | |
|----|--|---|
| 1) | <p>The radius of a swimming pool is 3.6 metres. The height of the pool is 1.8 metres. What is the volume of the swimming pool?</p> |  |
| 2) | <p>A can's base has an area of 32 cm^2. The volume of the can is 288 cm^3. What is the height of the can?</p> |  |
| 3) | <p>A bucket has a height of 8cm. The bucket's base has an area of 20 cm^2.</p> <p>a) What is the volume of the bucket?</p> <p>b) If 1 cm^3 of volume has the capacity to hold 1mL of water, how many mL can the bucket hold?</p> |  |

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Fill in the blanks to investigate the area of the base, height, and the volume.

| | Radius | Area of Base | Height | Volume |
|----|--------|--------------------|--------|----------------------|
| 1) | 5cm | | 10cm | |
| 2) | 4cm | | 15cm | |
| 3) | 5cm | | 20cm | 392.5cm ³ |
| 4) | 7cm | 154cm ² | | 924cm ³ |

2) A cylindrical water tank has a base area of 200 cm² and a height of 2 meters.

- a) What is the volume of the water tank in cubic centimeters (cm³)?
- b) If 1 liter of water is equal to 1,000 cm³, how many liters of water can the tank hold?

Name: _____

1) Fill in the blanks to investigate the area of the base, height, and the volume.

| | Radius | Area of Base | Height | Volume |
|----|--------|--------------------|--------|----------------------|
| 1) | 6cm | | 10cm | |
| 2) | 4cm | | 15cm | |
| 3) | 2.5cm | | 20cm | 392.5cm ³ |
| 4) | 7cm | 154cm ² | | 924cm ³ |

2) A cylindrical water tank has a base area of 200 cm² and a height of 2 meters.

- a) What is the volume of the water tank in cubic centimeters (cm³)?
- b) If 1 liter of water is equal to 1,000 cm³, how many liters of water can the tank hold?

Volume of Cylinders

Part 1

Fill in the blanks to investigate the area of the base and the volume

| | Area of Base | Height | Volume |
|----|-------------------|-----------------|--------------------|
| 1) | 8 mm^2 | 7 mm | |
| 2) | 15 cm^2 | 11 cm | |
| 3) | | | 114 m^3 |
| 4) | 11 m^2 | | 154 km^3 |
| 5) | | | 119 mm^3 |
| 6) | 18 m^2 | 15 m | |
| 7) | 22 km^2 | | |
| 8) | 25 mm^2 | | 175 mm^3 |

Part 2

Answer the questions below

A hot cocoa jar is 12cm tall. There are only 4 cm left of cocoa in it. The radius of the jar is 7cm.

- What is the volume of cocoa left in the jar?
- How much more cocoa would be needed to fill the jar?



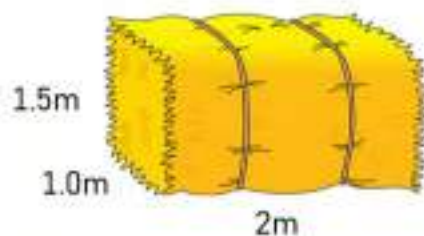
Volume of Cylinders

Instruction

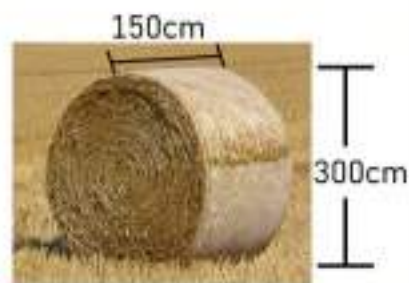
Answer the questions below

1) There are two types of hay bales – one that is in the shape of a cylinder and one that is in the shape of a rectangular prism. The cylinder-shaped hay bale is 300cm tall and 150cm long. The rectangular-shaped hay bale has the following dimensions: 1.5m by 1.0m by 2.0m.

a) Which type of hay bale contains more hay?



b) Joel thinks that you could fit a cylinder-shaped hay bale out of 3 rectangular-shaped hay bales. Is he right? Explain.



2) You are planning to make candles to sell. What would the dimensions of the candles be?

a) Draw a picture of one of the candles and label the dimensions.

b) What is the volume of the candle?

c) For every 10cm^3 , it costs you 30 cents. How much would the candle cost you in total?

Activity: "Cylinder Volume Toss Challenge"**Objective**

What are we learning about?

Students will reinforce their understanding of finding the volume of cylinders through a fun, team-based activity that involves answering volume problems and shooting a paper ball into a bin.

Materials

What you will need for the activity.

- Index cards with volume problems
- Recording sheet for each team
- Paper balls (one per team)
- Bins or baskets (one per team)
- Desks (one per team)

**Instructions**

How you will apply the activity

1. Arrange the classroom so that there is enough space for multiple teams to work simultaneously. Place a desk about 6 feet away from a bin or basket.
2. Place a stack of index cards with area problems on each desk.
3. Provide each team with a recording sheet and a paper ball.
4. Divide the students into teams of about five members.
5. Each team stands in a line behind their respective desk.
6. The first student in line flips over an index card and solves the problem to find the volume of a cylinder on the recording sheet.
7. Once the answer is recorded, the student attempts to shoot the paper ball into the bin.
8. If the student makes the shot, they place a tally mark on the team's tally sheet for a point. If they miss, no tally is given.
9. The student then goes to the end of the line, and the next student steps up to the desk to repeat the process.
10. The activity continues until all index cards have been solved.
11. Once all index cards are completed, the teacher collects the recording sheets and reviews the answers with the class.
12. For each incorrect answer, the team loses one point.
13. The team with the highest number of points after deductions is declared the winner.

Index Cards

Cut out the cards below

A water tank has a radius of 2 m and a height of 4 m. What is the volume of the tank?

A cylindrical candle has a radius of 3 cm and a height of 8 cm. What is the volume of the candle?

A cylindrical container has a radius of 6 cm and a height of 10 cm. Find its volume.

A cylindrical barrel has a diameter of 2 m and a height of 5 m. Find the volume of the barrel.

A can of paint has a diameter of 10 cm and a height of 20 cm. Calculate the volume of the can.

A gas tank has a volume of 5000 cm^3 and a radius of 5 cm. What is the height of the tank?

The volume of a cylinder is 1000 cm^3 and the height is 10 cm. Find the radius of the base.

A cylindrical container has a radius of 7 cm and a height of 15 cm. What is its volume?

Index Cards

Cut out the cards below

A cylinder has a diameter of 8 cm and a height of 15 cm. What is the volume?

A cylinder has a volume of 3140 cm^3 and a height of 10 cm. What is the radius of its base?

A cylindrical container has a base area of 78.5 cm^2 and a height of 10 cm. What is the volume of the container?

A cylindrical jar has a diameter of 14 cm and a height of 20 cm. Find its volume.

A cylindrical swimming pool has a radius of 5 m and a height of 2 m. What is the pool's volume?

The volume of a cylinder is 1500 cm^3 . If the radius is 5 cm, what is the height?

A soda can has a radius of 4 cm and a height of 12 cm. Find the volume of the can.

A cylindrical water bottle has a radius of 4 cm and a height of 18 cm. What is the volume?

Index Cards

Cut out the cards below

A cylindrical pipe has a radius of 4 cm and a height of 10 cm. What is the volume of the pipe?

A cylindrical water tank has a radius of 3 m and a height of 8 m. What is the volume of the tank?

A large silo has a diameter of 10 m and a height of 20 m. Find the volume of the silo.

A container has a base area of 100 cm^2 and a height of 25 cm. Find the volume of the container.

A cylindrical vase has a radius of 6 cm and a height of 15 cm. What is the volume of the vase?

A soda can has a diameter of 7 cm and a height of 12 cm. Find the volume of the can.

The volume of a cylindrical drum is 2000 cm^3 and the radius is 5 cm. Find the height of the drum.

A cylinder has a volume of 1200 cm^3 and a height of 10 cm. What is the radius of its base?

Cylinder Volume Toss Challenge

Answers

Record your answers below

| Question | Answer |
|----------|--------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |

| Question | Answer |
|----------|--------|
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |

PREVIEW

Tally Chart

Record your makes in the tally chart below

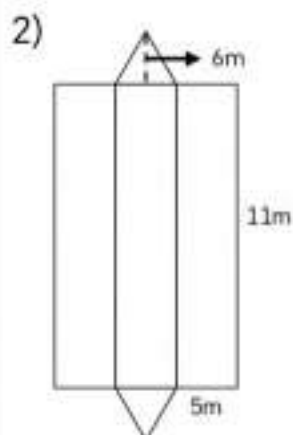
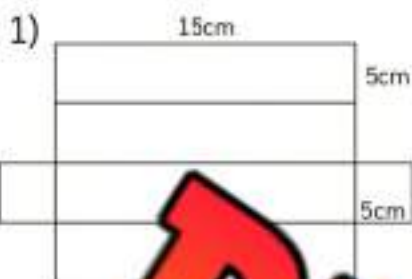
| Tallies - Made Shots | Total |
|----------------------|-------|
| | |

| Wrong Answers | Final Score |
|---------------|-------------|
| | |

Unit Test – Surfaces Area and Volume

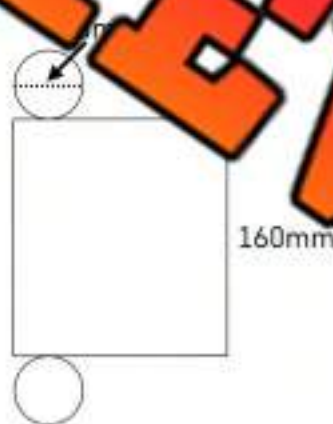
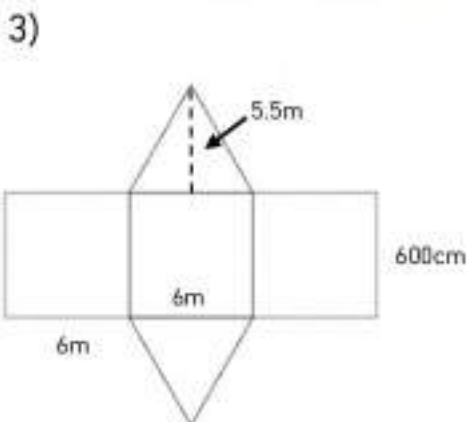
Part 1

Find the surface area of the 3D objects using the nets below



Surface Area: _____

Surface Area: _____



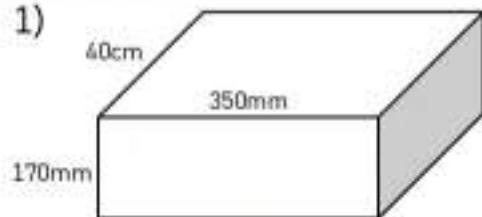
Surface Area: _____

Surface Area: _____

Part 2

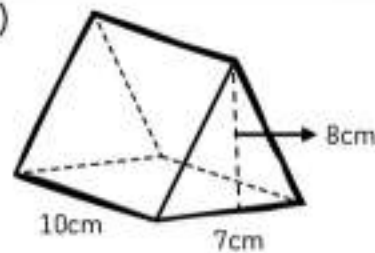
Find the surface area of the objects below

1)



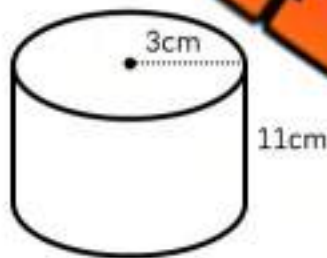
Surface Area: _____

2)



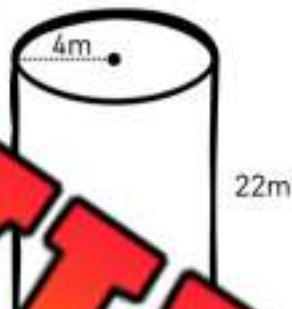
Surface Area: _____

3)



Surface Area: _____

4)



Surface Area: _____

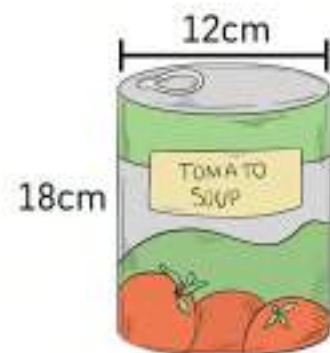
Part 3

Solve the question below

Becky takes the lid off a can of soup. The can's dimensions are labelled on the picture.

a) What is the surface area of the can without the lid?

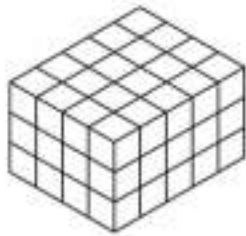
b) What is the surface area of the lid?



Part 4

Fill in the blanks to investigate the area of the base and the volume

1)

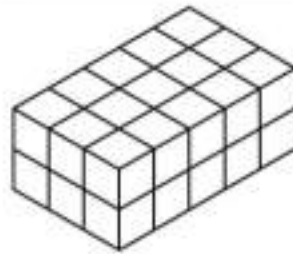


Area of Base

Height

Volume

2)



Area of Base

Height

Volume

Part 5

Fill in the blanks to investigate the area of the base and the volume

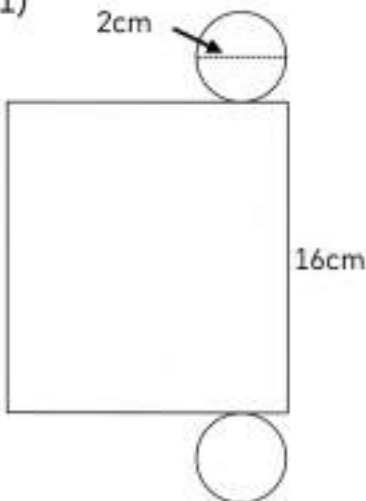
| | Area of Base | Height | Volume |
|----|---------------------|--------|----------------------|
| 1) | 110 mm ² | 10 mm | 1100 mm ³ |
| 2) | 15 mm ² | 8 mm | 120 mm ³ |
| 3) | 12 cm ² | 8 cm | 96 cm ³ |
| 4) | 12 mm ² | 11 mm | 132 mm ³ |

Part 6

Find the area of the base and the volume of the cylinder

1)

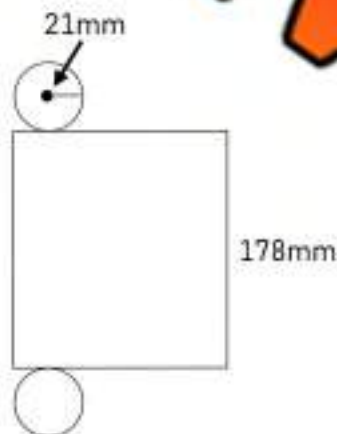
2cm



Area of the Base: _____ Volume: _____

2)

21mm

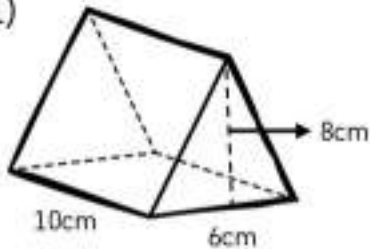


Area of the Base: _____ Volume: _____

Part 7

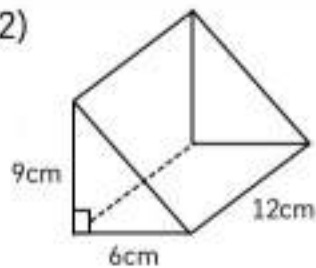
Find the volume of the triangular prisms

1)



Volume: _____

2)



Volume: _____

Part 8

Answer the questions below

1)

The radius of a swimming pool is 2 metres. The height of the pool is 1.6 metres.

- a) What is the volume of the pool?
- b) If 1cm^3 of volume has the capacity to hold 1 mL of water, how many mL can the pool hold?



2)

A can's base has an area of 37 cm^2 . The volume of the can is 333 cm^3 . What is the height of the can?



3)

A bucket has a height of 17cm. The bucket's base has an area of 16cm^2 . What is the volume of the bucket?




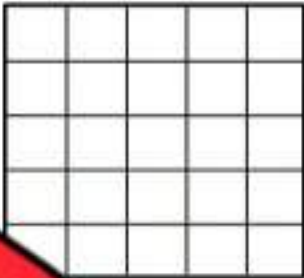
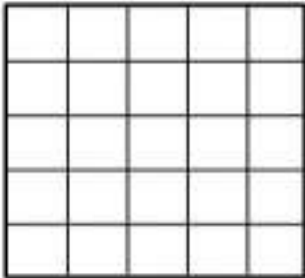
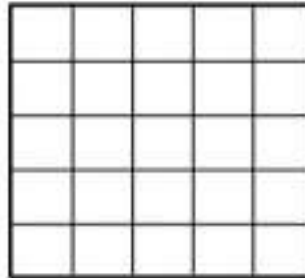
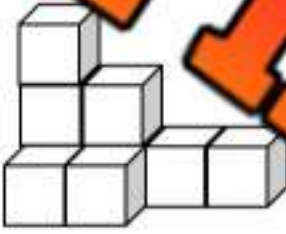

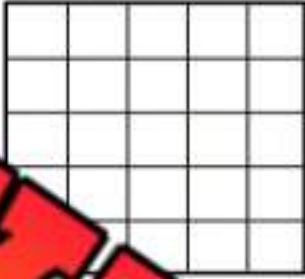
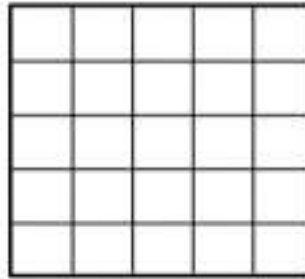
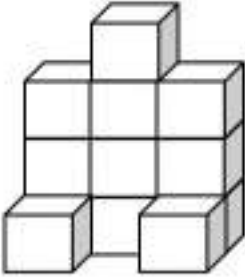
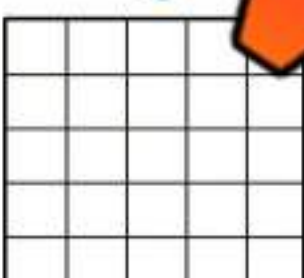

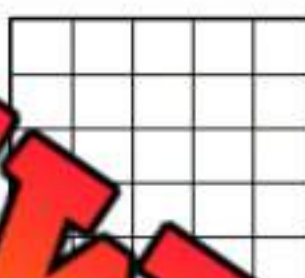
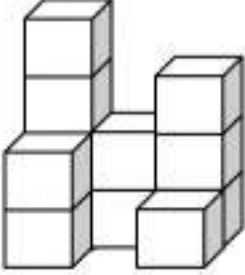
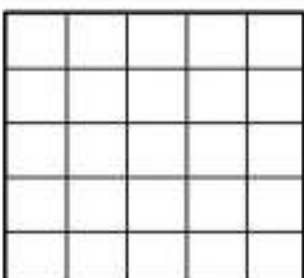
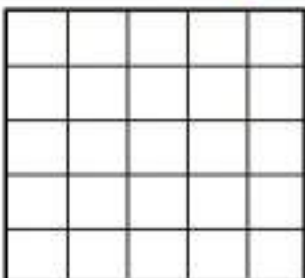
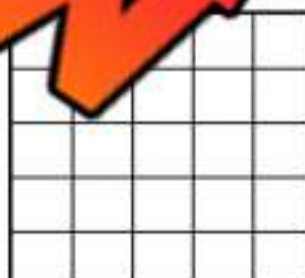
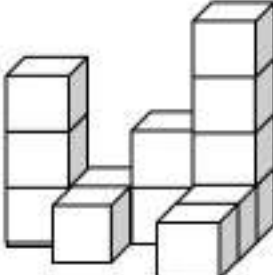
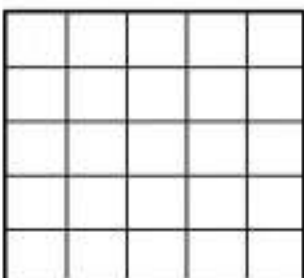
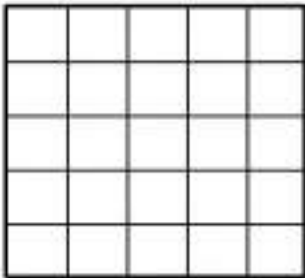
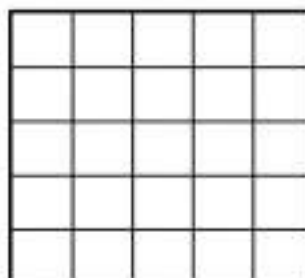
Grade 8
SHAPE AND SPACE
3-D Objects and 2-D Shapes
Transformations

| | Curriculum Expectations | Pages That Cover the Expectations |
|-------------|---|--|
| SS.5 | Draw and interpret top, front and side views of 3-D objects composed of right rectangular prisms. | 115 - 129 |
| SS.6 | Demonstrate an understanding of the congruence of polygons. | 130 - 174 |

Drawing Top, Front, and Side Views of Objects


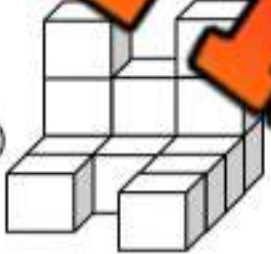
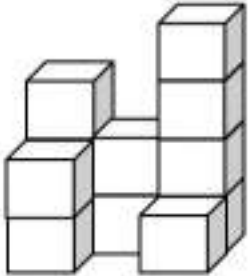
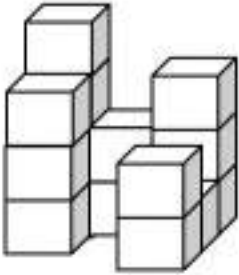
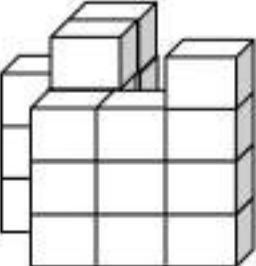
Instructions

Draw the top, front, and side view of the objects below

| Original Shape | Top View | Front View | Side View |
|---|---|--|---|
| 1)  |  |  |  |
| 2)  |  |  |  |
| 3)  |  |  |  |
| 4)  |  |  |  |
| 5)  |  |  |  |

Drawing Top, Front, and Side Views of Objects**Instructions**

Draw the top, front, and side view of the objects below

| Original Shape | Top View | Front View | Side View |
|---|----------|------------|-----------|
| 1)  | | | |
| 2)  | | | |
| 3)  | | | |
| 4)  | | | |
| 5)  | | | |

Drawing Top, Front, and Side Views of Objects

Instruction Look at the front, top, and side views and circle the matching 3D object

| 1) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

| 2) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

| 3) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

| 4) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

| 5) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

| 6) Top View | Front View | Side View |
|-------------|------------|-----------|
| | | |
| | | |

Drawing Top, Front, and Side Views of Objects

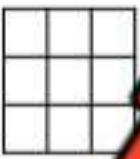

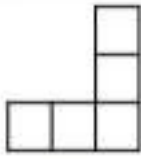
Instruction Look at the front, top, and side views and circle the matching 3D object

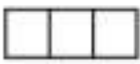
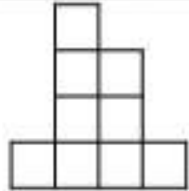

| 1) Top View | Front View | Side View | 2) Top View | Front View | Side View |
|-------------|------------|-----------|-------------|------------|-----------|
| | | | | | |
| | | | | | |
| 3) Top View | Front View | Side View | 4) Top View | Front View | Side View |
| | | | | | |
| | | | | | |
| 5) Top View | Front View | Side View | 6) Top View | Front View | Side View |
| | | | | | |
| | | | | | |

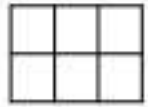
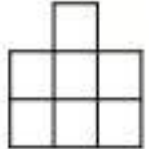
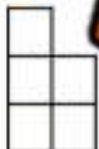
Drawing Top, Front, and Side Views of Objects


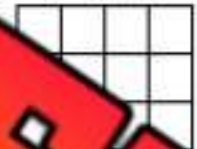
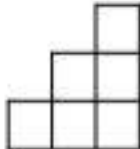
Instruction

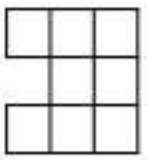
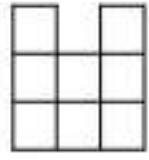
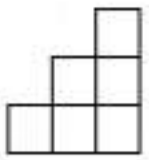
Draw the 3D objects by using the top, front, and side views

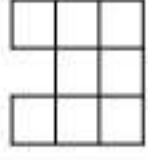
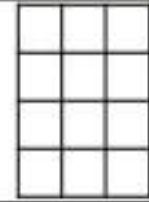
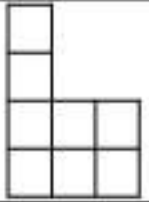
| Top View | Front View | Side View |
|---|---|---|
|  |  |  |
| 1) | | |

| Top View | Front View | Side View |
|--|---|---|
|  |  |  |
| 2) | | |

| Top View | Front View | Side View |
|---|---|---|
|  |  |  |
| 3) | | |

| Top View | Front View | Side View |
|--|---|---|
|  |  |  |
| 4) | | |

| Top View | Front View | Side View |
|---|---|---|
|  |  |  |
| 5) | | |

| Top View | Front View | Side View |
|--|---|---|
|  |  |  |
| 6) | | |

Drawing Top, Front, and Side Views of Objects

Instruction

Draw the 3D objects by using the top, front, and side views

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 1) | | |

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 2) | | |

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 3) | | |



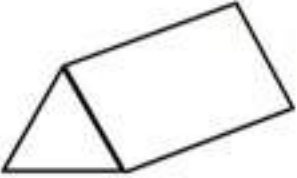

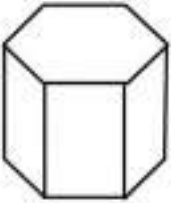

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 4) | | |

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 5) | | |

| Top View | Front View | Side View |
|----------|------------|-----------|
| | | |
| 6) | | |

Drawing Top, Front, and Side Views – 3D Shapes**Instruction**

Draw the top, front, and side views of the 3D shapes

| 3D Shape | Top View | Front View | Side View |
|---|----------|------------|-----------|
|  | | | |
|  | | | |
|  | | | |
|  | | | |
|  | | | |
|  | | | |

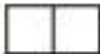
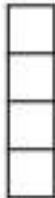

PREVIEW

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

1) Draw the 3D objects by using the top, front, and side views




| 3D Objects | Top View | Front View | Side View |
|------------|---|---|---|
| |  |  |  |

2) Draw the top, front, and side views of the 3D shapes

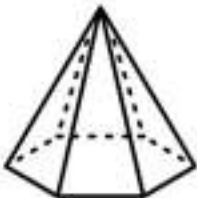
| 3D Objects | Top View | Front View | Side View |
|--|----------|------------|-----------|
|  | | | |

Name: _____

1) Draw the 3D objects by using the top, front, and side views

| 3D Objects | Top View | Front View | Side View |
|------------|---|---|---|
| |  |  |  |

2) Draw the top, front, and side views of the 3D shapes

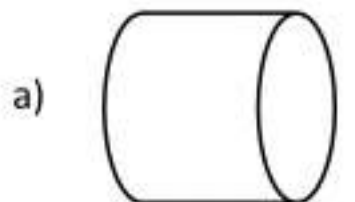
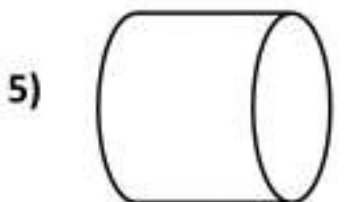
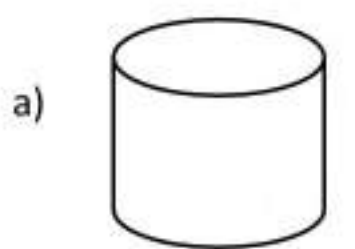
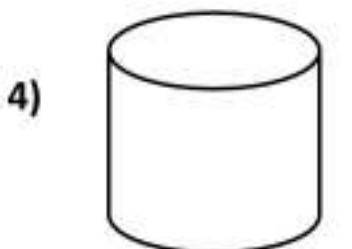
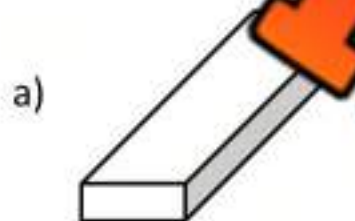
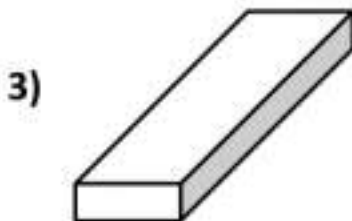
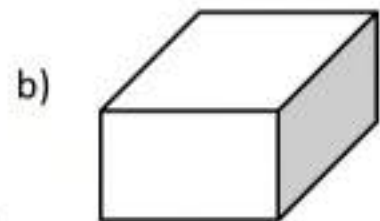
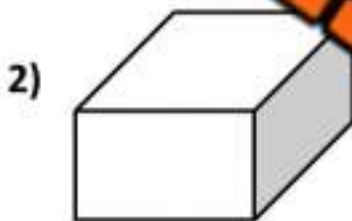
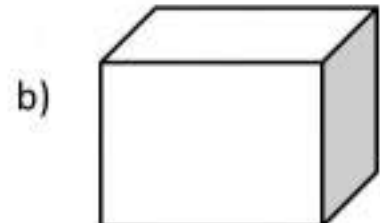
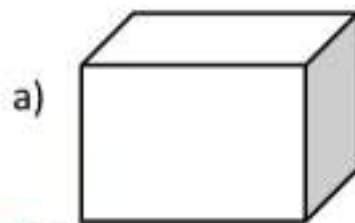
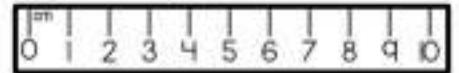
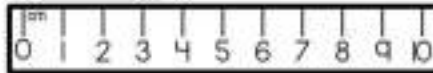
| 3D Objects | Top View | Front View | Side View |
|---|----------|------------|-----------|
|  | | | |

Congruent Shapes

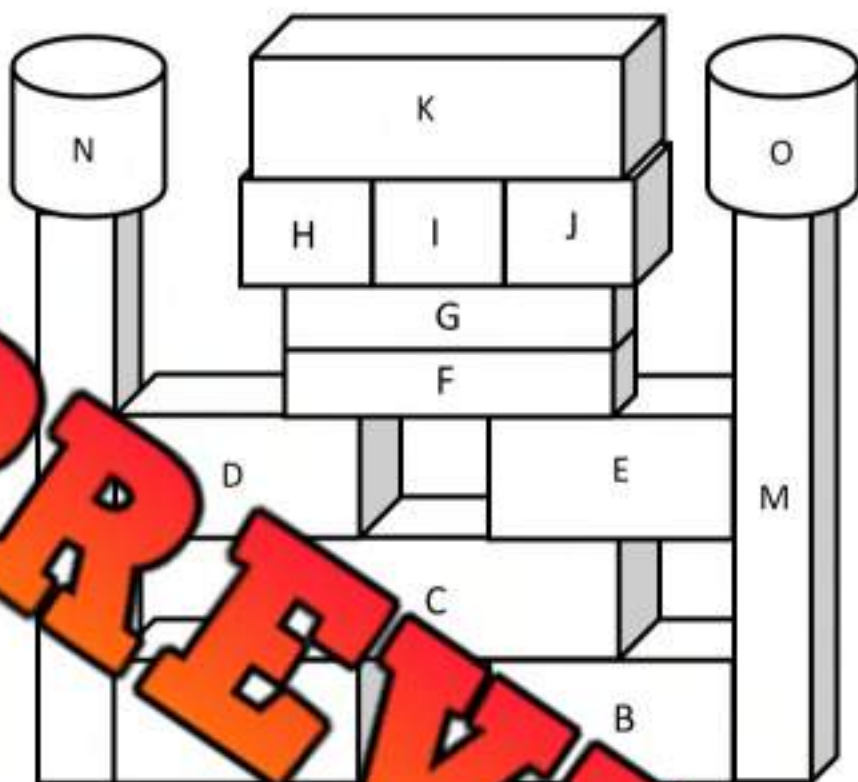
Questions

Measure the side lengths and circle the congruent shape

Measure each of the side lengths to make sure they are the same.



Congruent 3D Shape Statue



Questions

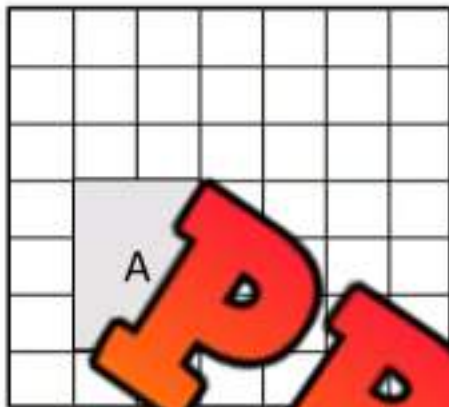
Answer the questions below by naming the shape in the statue above.

- 1) Which shapes are congruent to A?
- 2) Which shape is congruent to shape C?
- 3) Which shapes are congruent to shape D?
- 4) Which shape is congruent to shape G?
- 5) Which shapes are congruent to shape H?
- 6) Which shape is congruent to shape L?
- 7) Which shape is congruent to shape N?

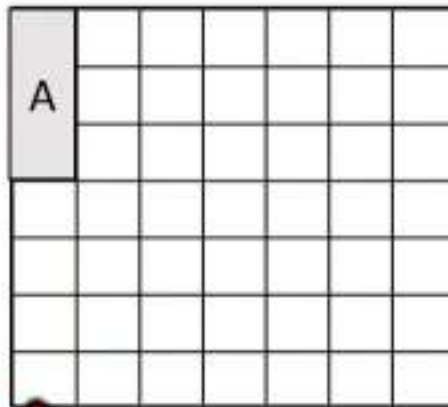
Performing Translations

Instruction

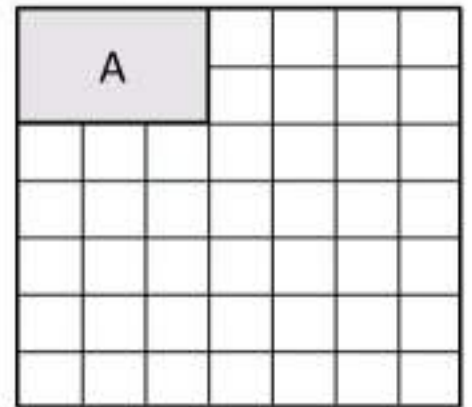
Draw the new shape after translating the 3 steps



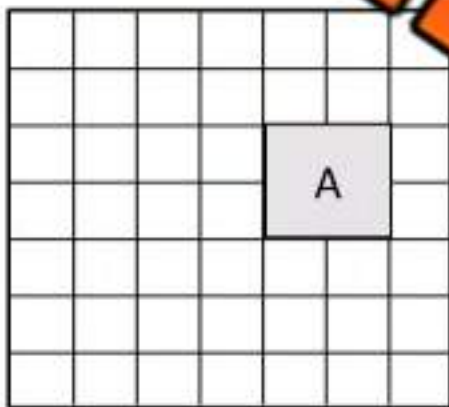
1) 3↑, 4



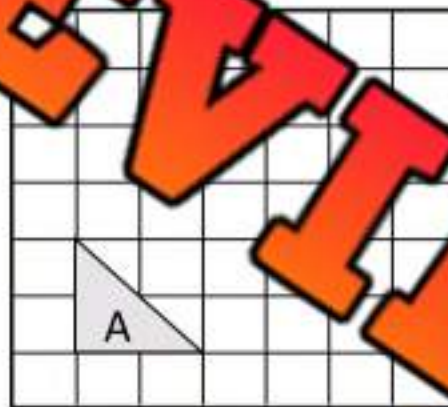
2) 1↓, 5→, 3↑



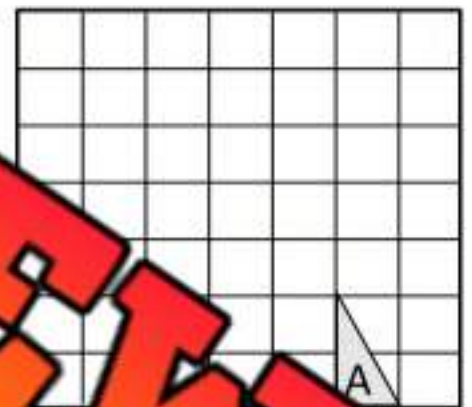
3) 2↓, 4→, 2↓



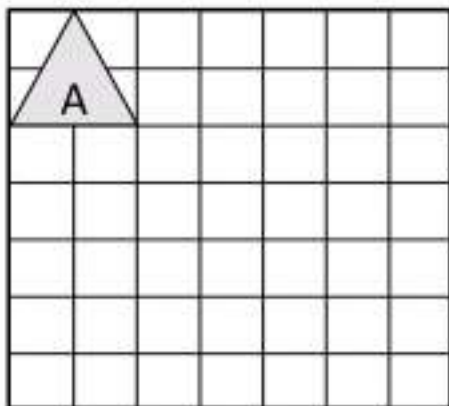
4) 2↓, 4←, 3↑



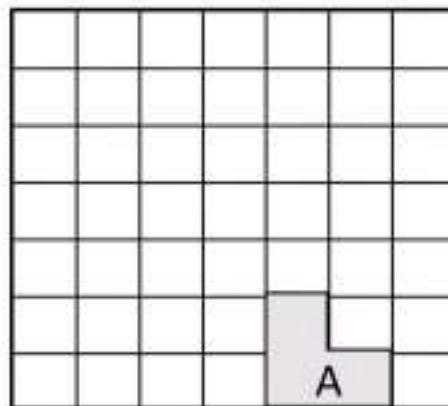
5) 1↓, 4→, 4↑



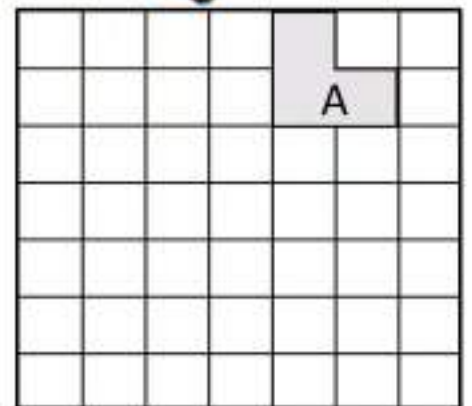
6) 3↓, 5→, 3↓



7) 4↓, 5→, 2←



8) 3↑, 2←, 1↓



9) 4↓, 3←, 2↑

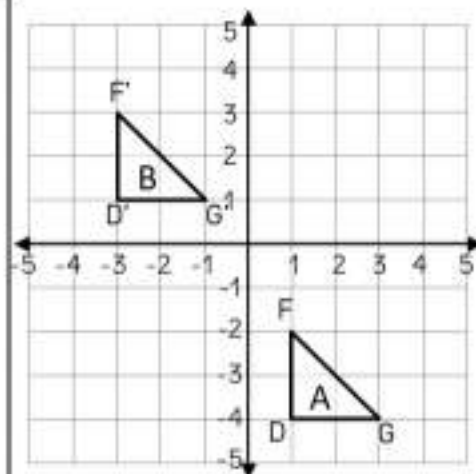
Translations – Mapping Rules

Mapping Rules for Translations

Each point on a shape slides according to the mapping rule.

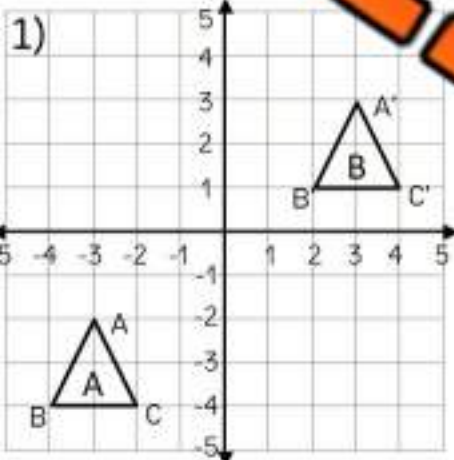
The rule is $(x, y) \rightarrow (x + a, y + b)$

- 1) Choose 1 coordinate from the shape to translate
- 2) We need to move the x coordinate -4 spaces to the left. This means we subtract 4.
- 3) We need to move the y coordinate +5 spaces up. This means we add 5.
- 4) The mapping rule is: $(x, y) \rightarrow (x - 4, y + 5)$
- 5) Remember, if we move to the left or down, we are subtracting a number (subtracting) and if we move to the right or up, we are adding a positive number.

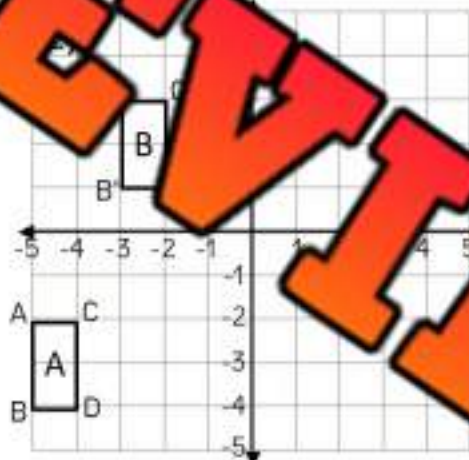


Instruction

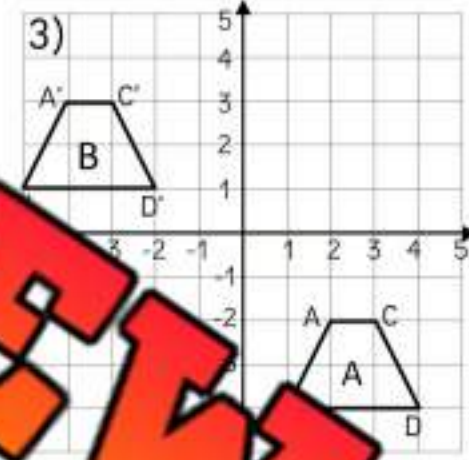
Write the mapping rule that translates figure A to figure B



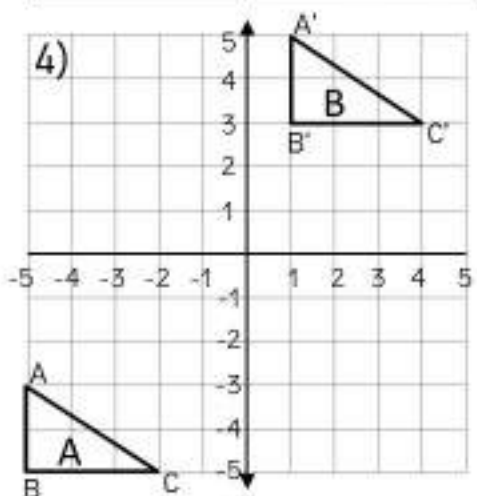
Mapping Rule $(x \square _, y \square _)$



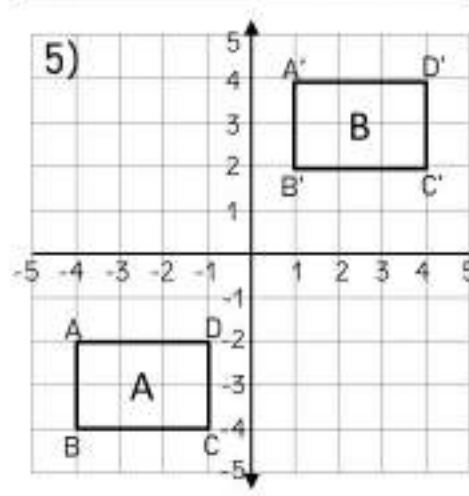
Mapping Rule $(x \square _, y \square _)$



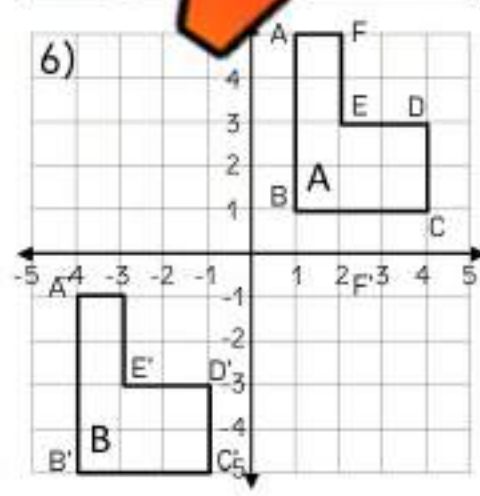
Mapping Rule $(x \square _, y \square _)$



Mapping Rule $(x \square _, y \square _)$



Mapping Rule $(x \square _, y \square _)$

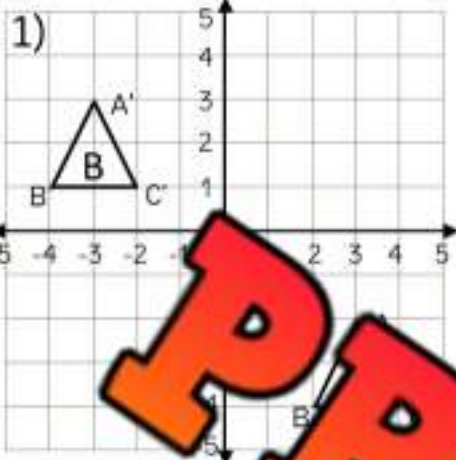


Mapping Rule $(x \square _, y \square _)$

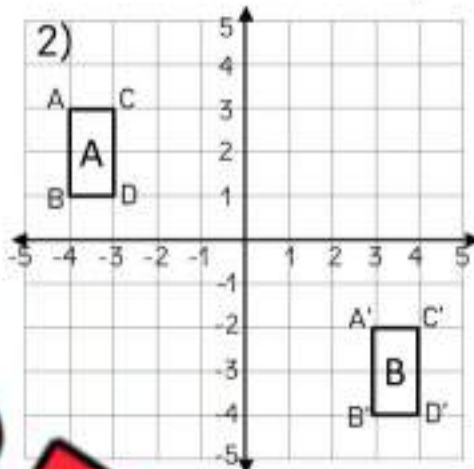
Translations – Mapping Rules

Instruction

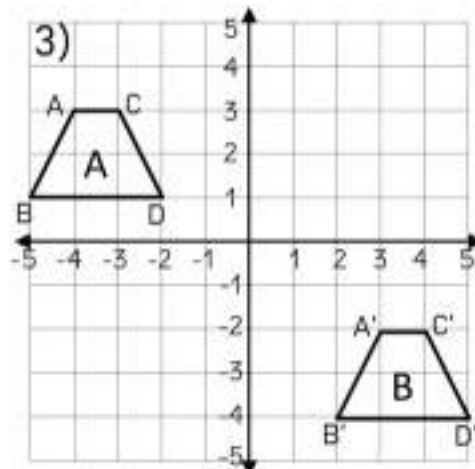
Fill in the mapping rule



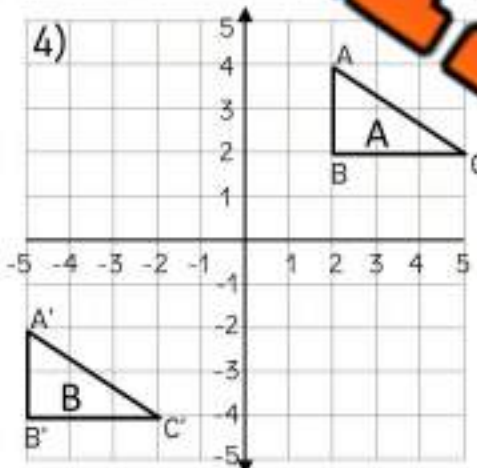
Mapping Rule



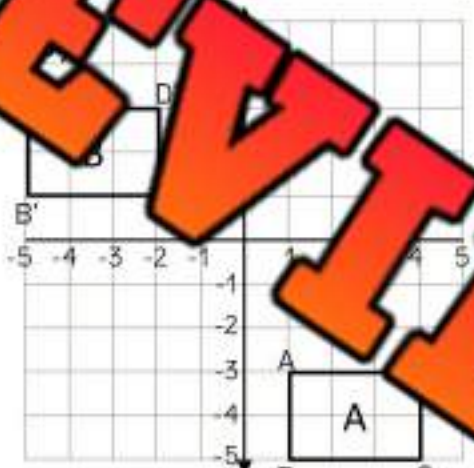
Mapping Rule



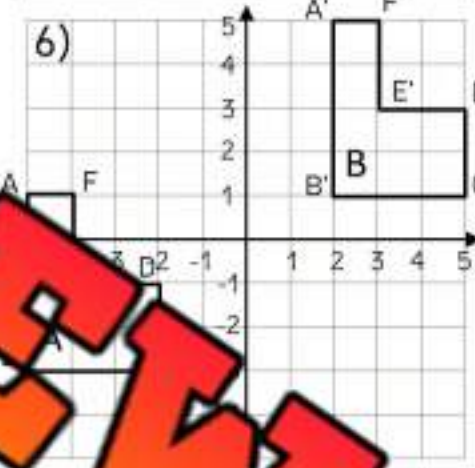
Mapping Rule



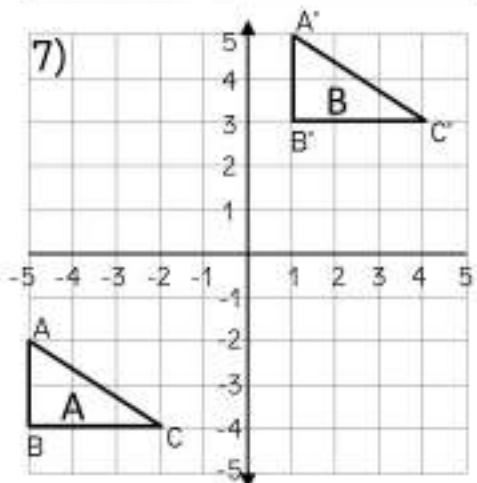
Mapping Rule



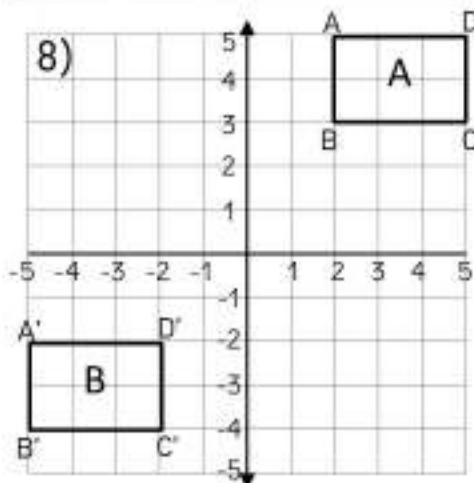
Mapping Rule



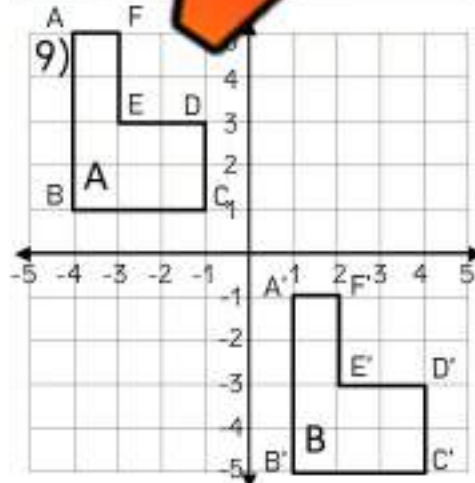
Mapping Rule



Mapping Rule



Mapping Rule



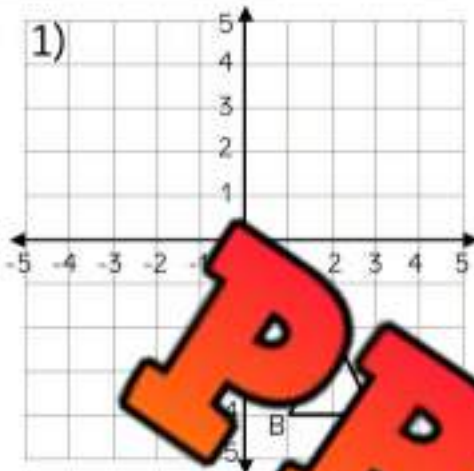
Mapping Rule

Translations – Mapping Rules

Instruction

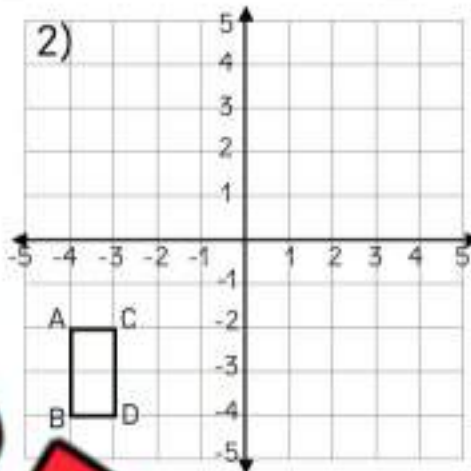
Translate the shape using the mapping rule

1)



Mapping Rule

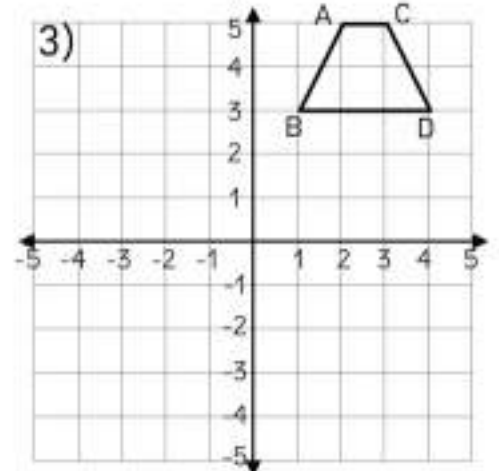
2)



Mapping Rule

 $(x + 5, y + 4)$

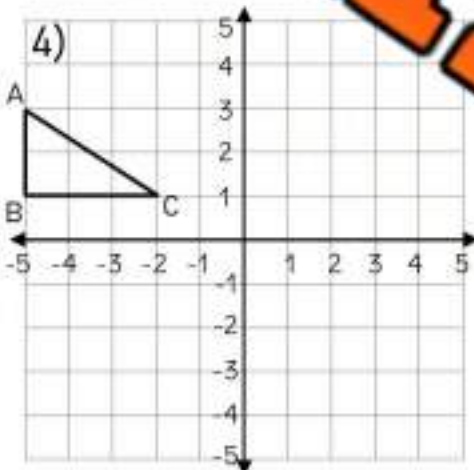
3)



Mapping Rule

 $(x - 5, y - 6)$

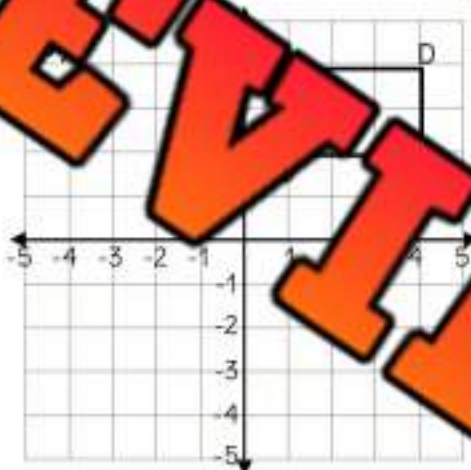
4)



Mapping Rule

 $(x + 6, y - 4)$

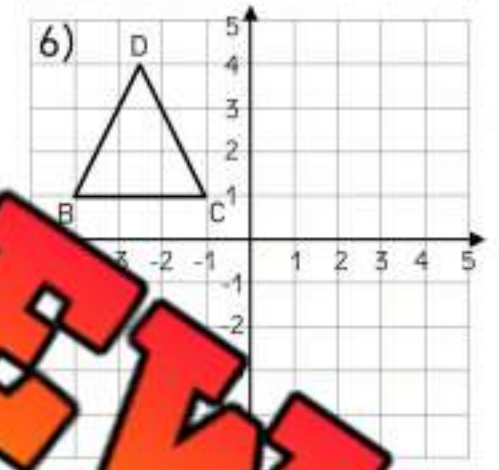
5)



Mapping Rule

 $(x - 5, y - 4)$

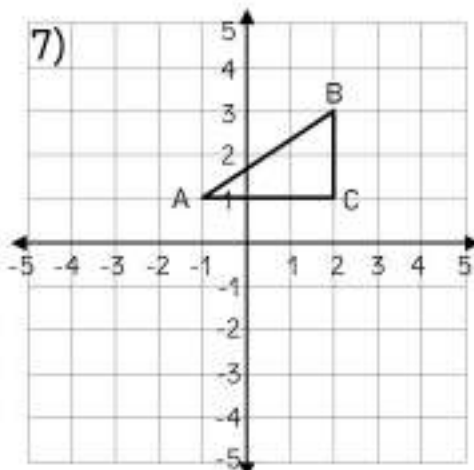
6)



Mapping Rule

 $(x + 6, y - 5)$

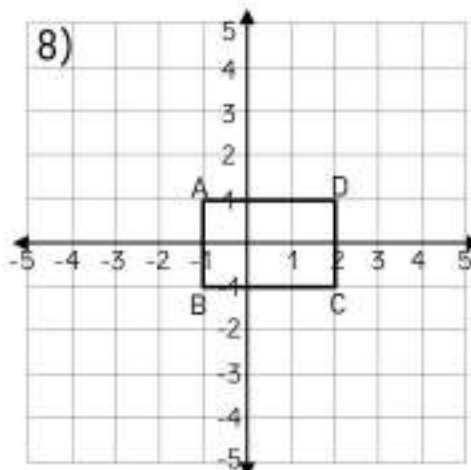
7)



Mapping Rule

 $(x - 4, y - 5)$

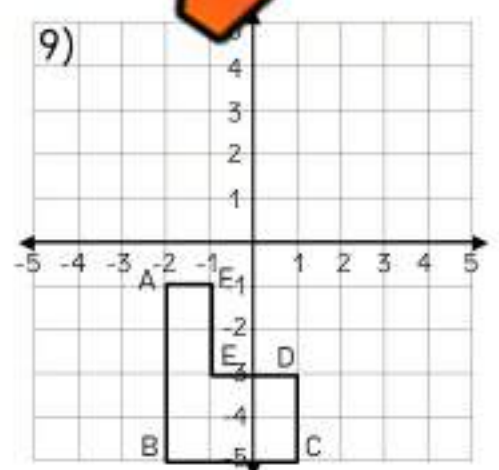
8)



Mapping Rule

 $(x + 3, y - 4)$

9)



Mapping Rule

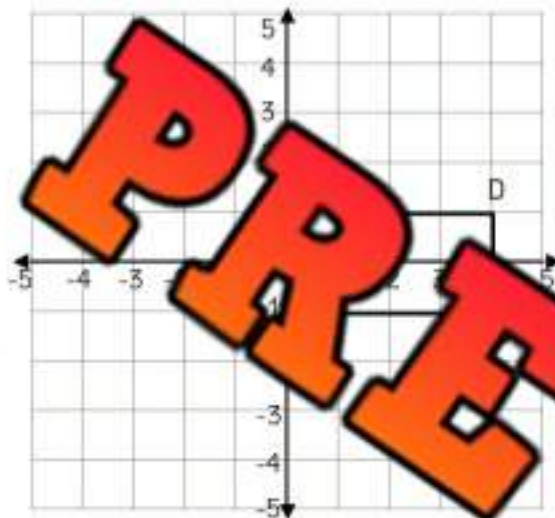
 $(x + 4, y + 6)$

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

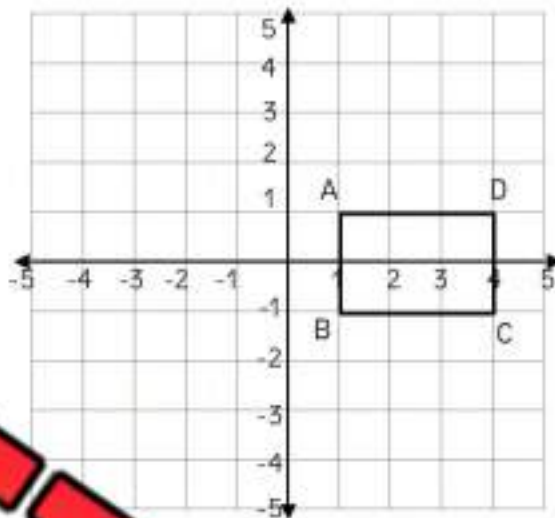
Name: _____

Translate the shape using the mapping rule.

Mapping Rule $(x + 4, y - 3)$

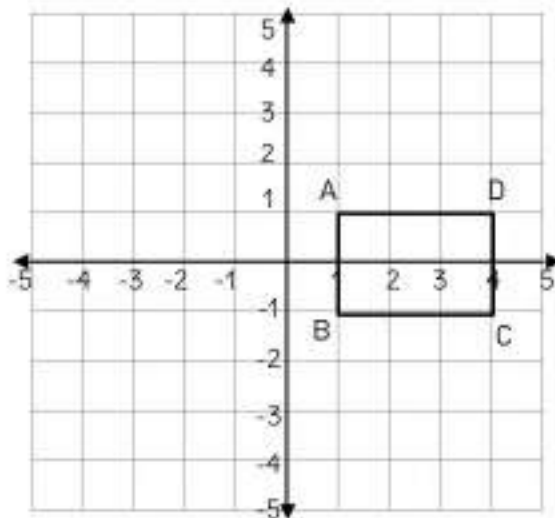
Name: _____

Translate the shape using the mapping rule.

Mapping Rule $(x + 4, y - 3)$

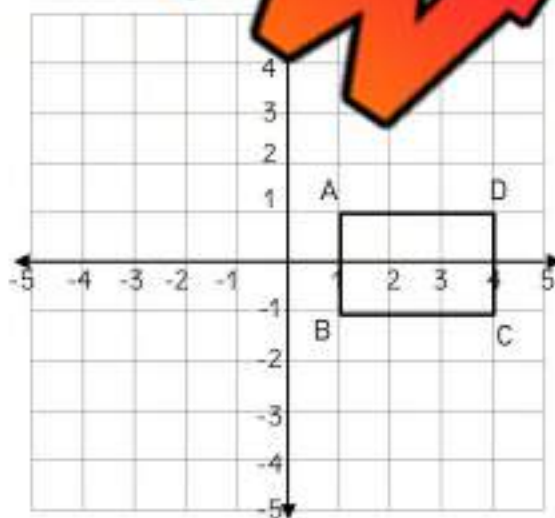
Name: _____

Translate the shape using the mapping rule.

Mapping Rule $(x + 4, y - 3)$

Name: _____

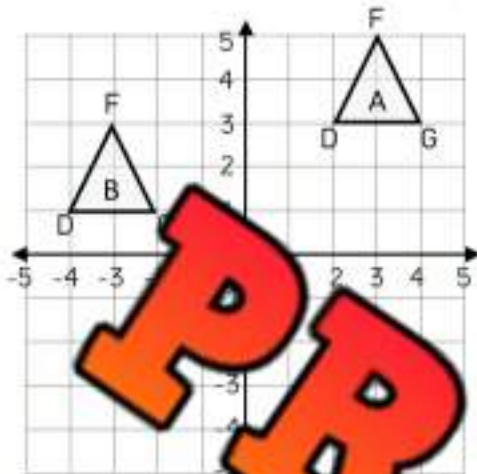
Translate the shape using the mapping rule.

Mapping Rule $(x + 4, y - 3)$

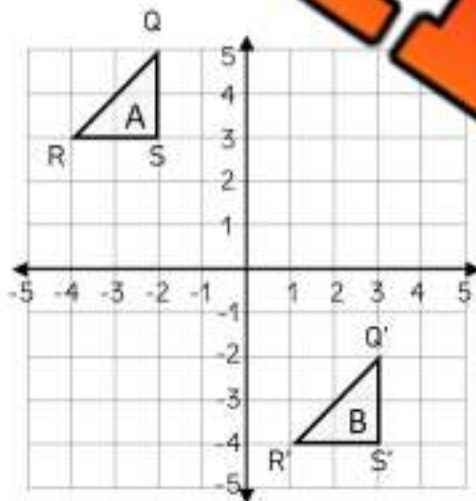
Transformations - Translations

Instruction

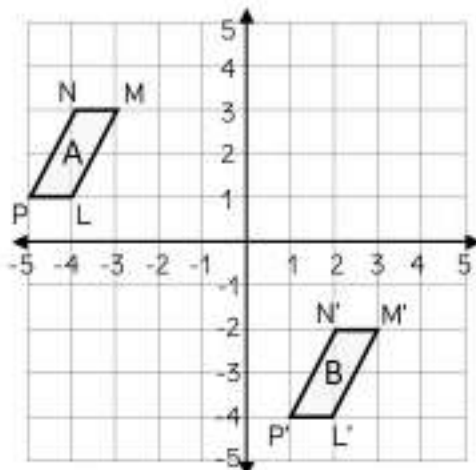
- 1) Fill in the coordinates 2) Describe the translation 3) Translate shape C



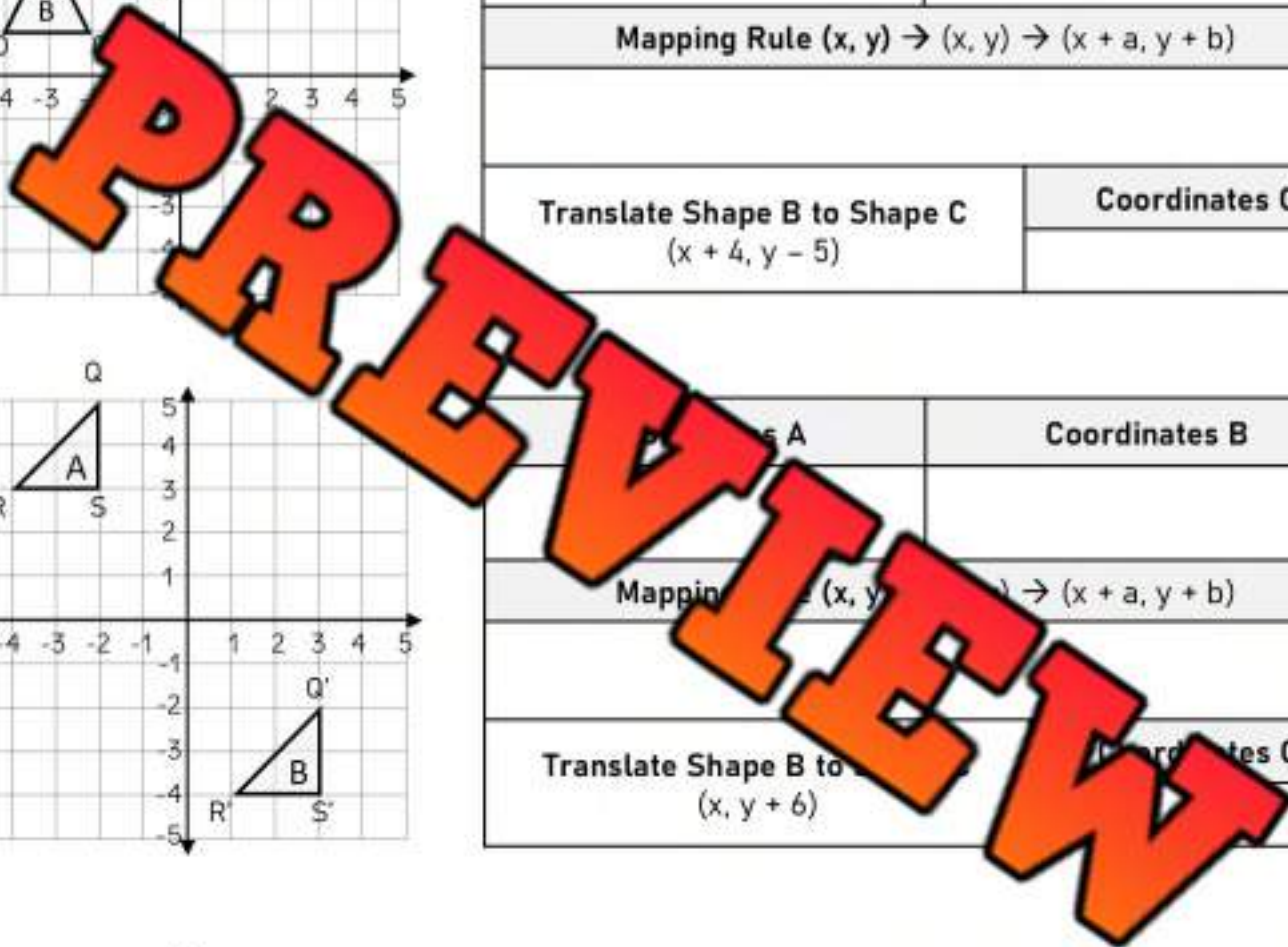
| Coordinates A | Coordinates B |
|--|---------------|
| | |
| Mapping Rule $(x, y) \rightarrow (x, y) \rightarrow (x + a, y + b)$ | |
| | |
| Translate Shape B to Shape C $(x + 4, y - 5)$ | Coordinates C |
| | |



| Coordinates A | Coordinates B |
|--|---------------|
| | |
| Mapping Rule $(x, y) \rightarrow (x, y) \rightarrow (x + a, y + b)$ | |
| | |
| Translate Shape B to Shape C $(x, y + 6)$ | Coordinates C |
| | |



| Coordinates A | Coordinates B |
|--|---------------|
| | |
| Mapping Rule $(x, y) \rightarrow (x, y) \rightarrow (x + a, y + b)$ | |
| | |
| Translate Shape B to Shape C $(x + 4, y - 5)$ | Coordinates C |
| | |



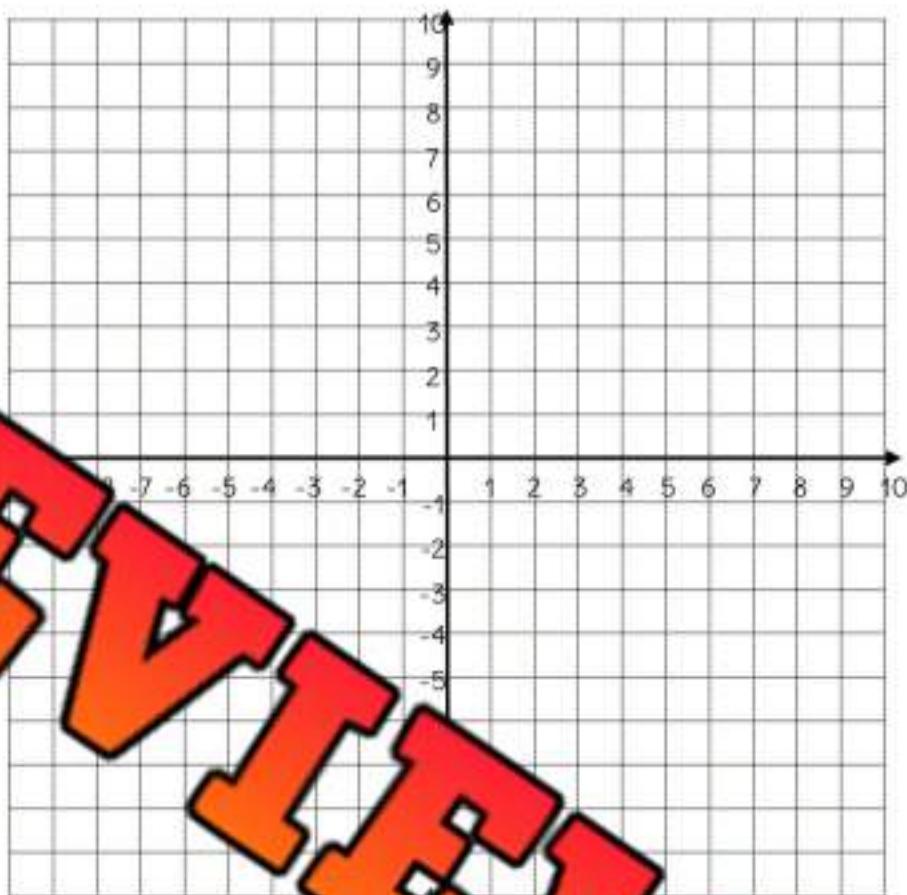
Translations – New Coordinates

Part 1 Draw the shapes using the coordinates provided. Then translate the shape

| |
|--------------------------------|
| Shape A |
| P(1,4), Q(2,2), R(7,2), S(8,4) |
| Translate the shape A |
| Right 3 |

| |
|------------------------------|
| Shape B |
| F(-8,4), G(-5,4) |
| Translate the shape B |
| Right 3, down 2 |

| |
|------------------------------|
| Shape C |
| J(-9,-8), K(-4,-5), L(-0,-8) |
| Translate the shape C |
| Right 5, up 2 |



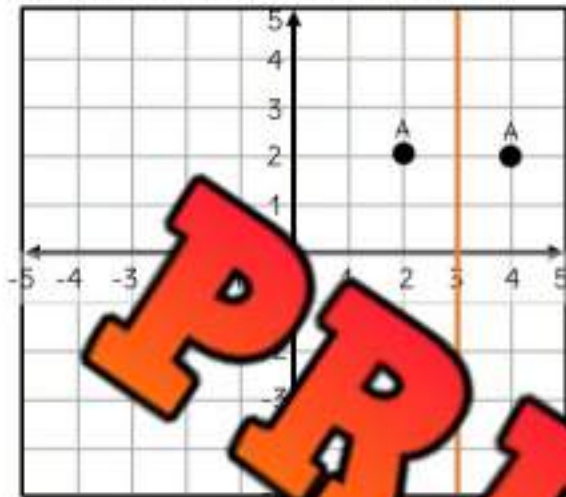
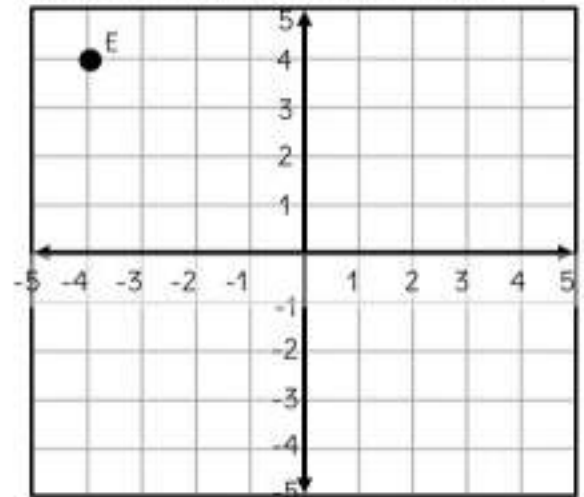
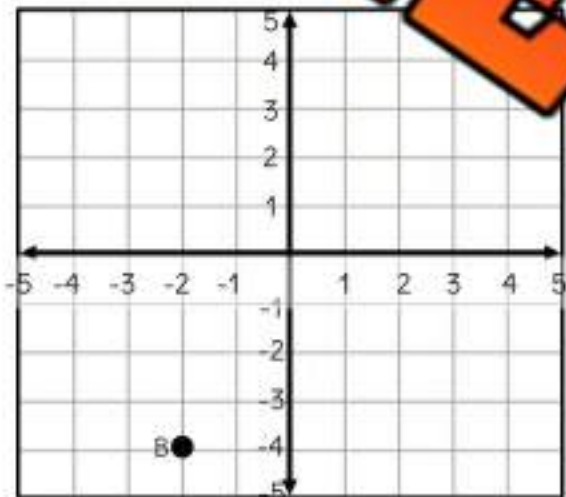
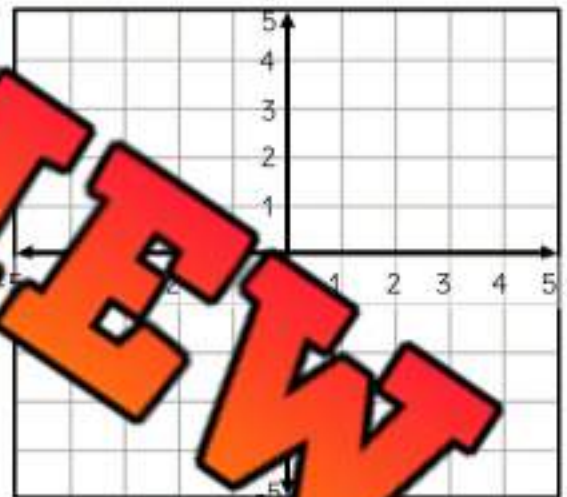
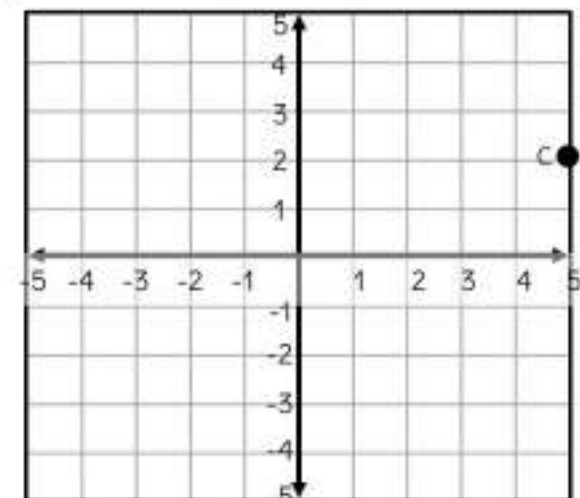
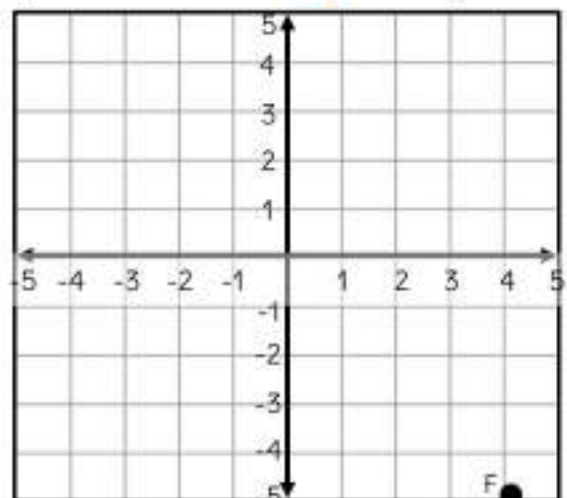
Part 2 Give the coordinates of each point after the translation

| | Original Coordinate | Translation | New Coordinates |
|----|-----------------------|--------------------|-----------------|
| 1) | P(5, -2) | $(x - 6, y + 4)$ | P(-1, 2) |
| 2) | S(-3, 7) | $(x + 4, y - 8)$ | |
| 3) | Q(-6, -2) | $(x + 3, y - 5)$ | |
| 4) | L(8, -4) P(-5, 11) | $(x - 2, y + 6)$ | |
| 5) | T(-10, 9) Y(-12, -8) | $(x + 9, y + 8)$ | |
| 6) | S(-15, -12) R(13, 11) | $(x - 8, y - 7)$ | |
| 7) | N(-22, 9) K(18, -13) | $(x - 12, y + 14)$ | |
| 8) | P(26, -23) E(-21, 21) | $(x + 15, y + 21)$ | |

Reflecting a Point Using a Mirror Line

Instructions

Graph the new position of each point. The first one is done for you

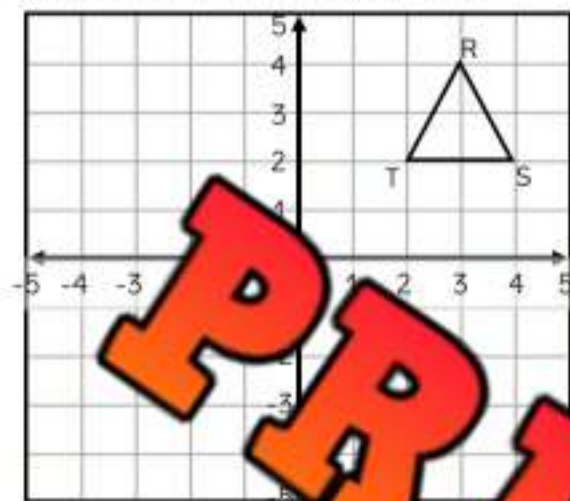
1) Reflection across the line $x = 3$ 2) Reflection across the line $y = 2$ 3) Reflection across the line $y = -4$ 4) Reflection across the line $x = -1$ 5) Reflection across the line $x = 2$ 6) Reflection across the line $y = -3$ 

Reflecting a Shape Using a Mirror Line

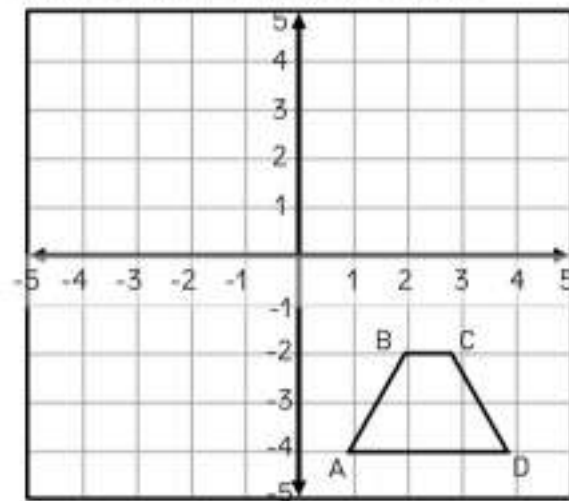
Instructions

Graph the new position of each shape after the given reflection

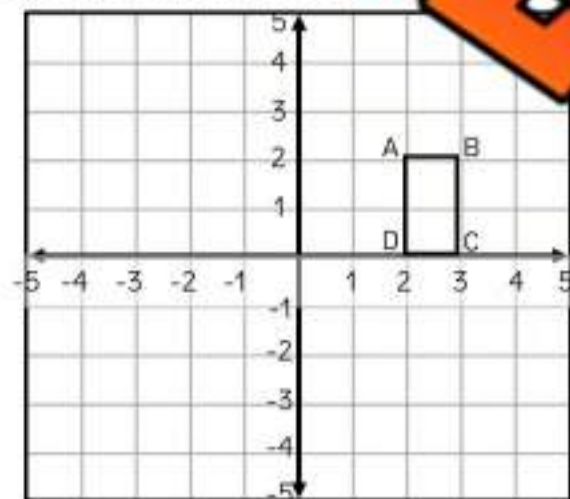
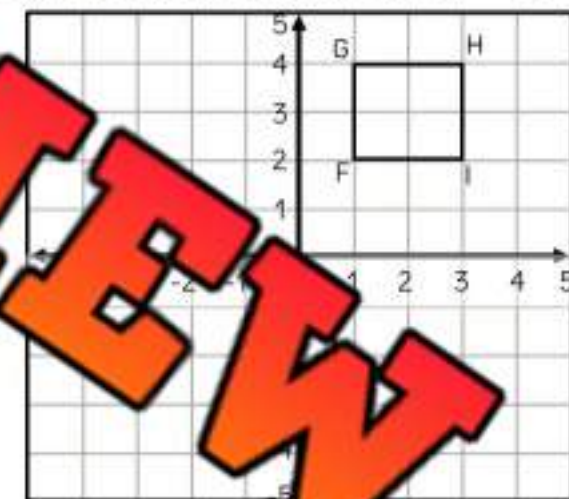
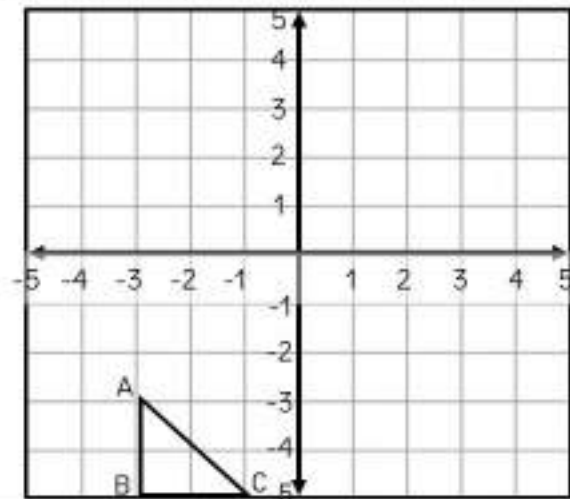
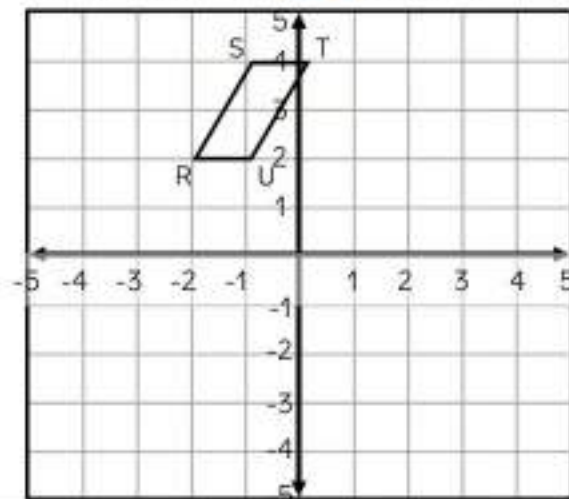
1) Reflection across the y-axis



2) Reflection across the x-axis



3) Reflection across the y-axis

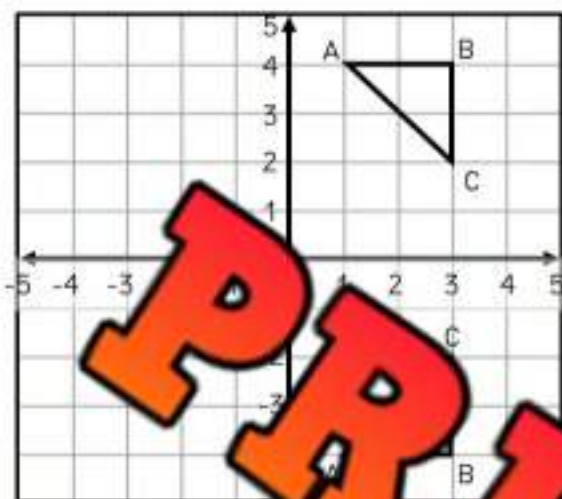
4) Reflection across the line $x = -1$ 5) Reflection across the line $y = -1$ 6) Reflection across the line $x = 1$ 

Reflections – Determine the Rule

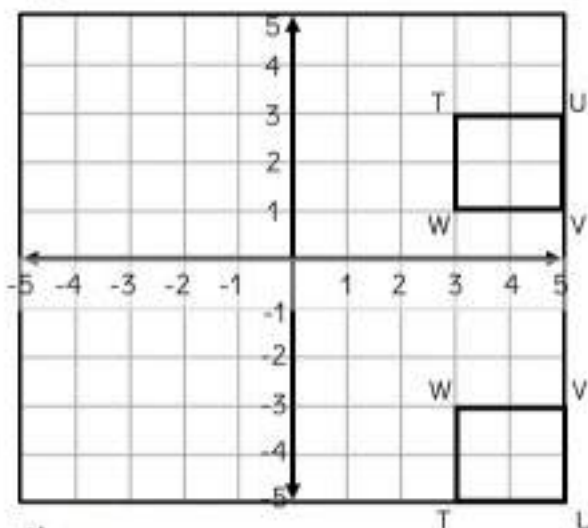
Instructions

Describe the rule for the reflection line – Ex. Reflection across the line $x = 2$

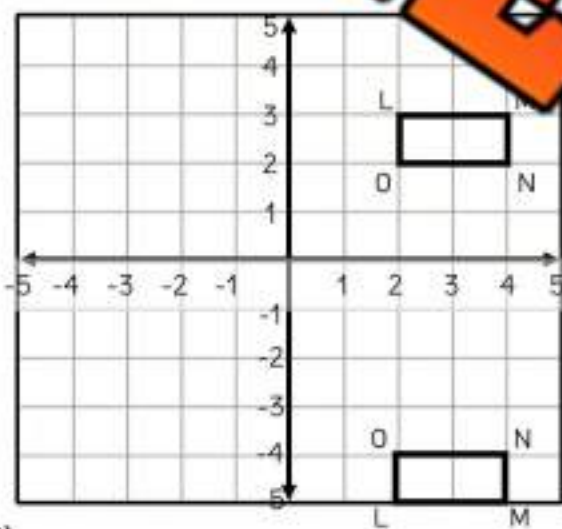
1) _____



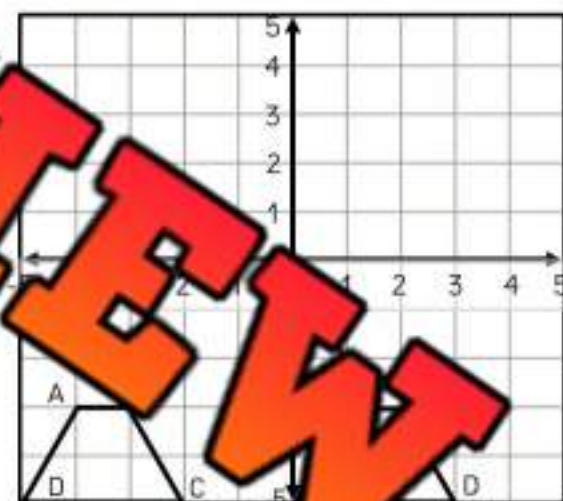
2) _____



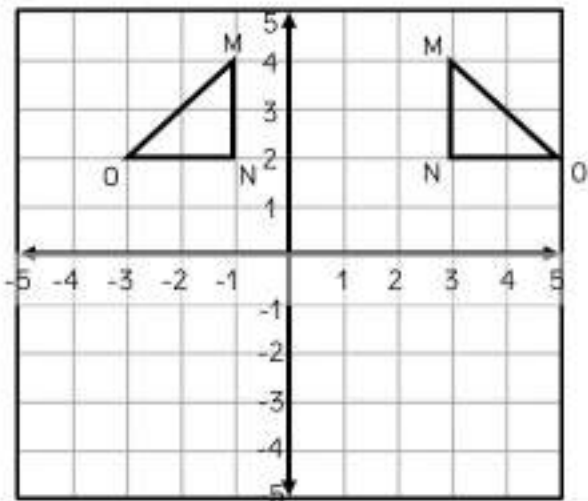
3) _____



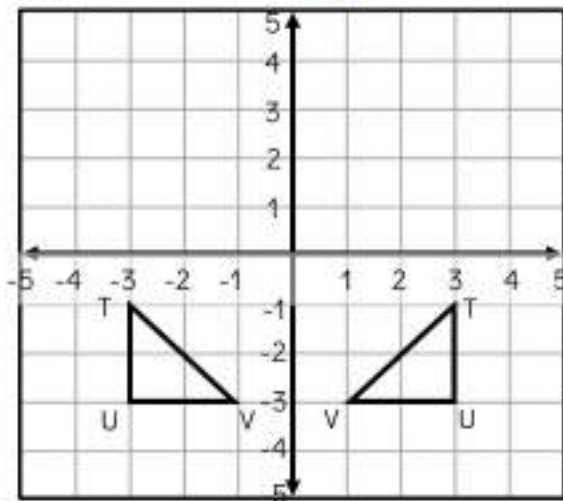
4) _____



5) _____



6) _____

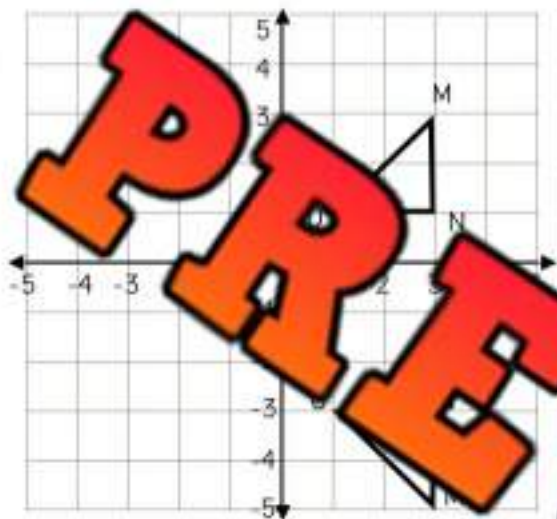


Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

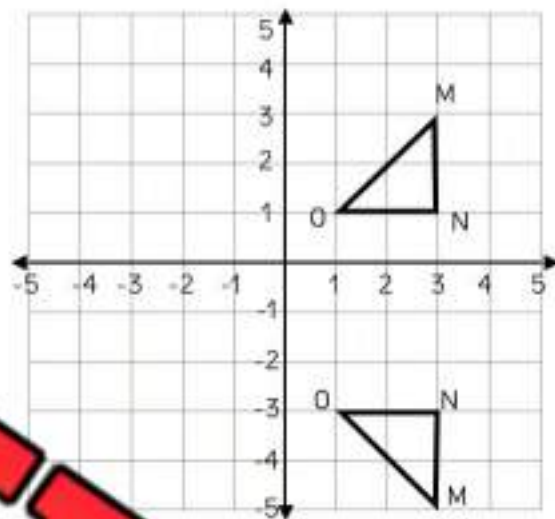
Describe the rule for the reflection line



Answer: _____

Name: _____

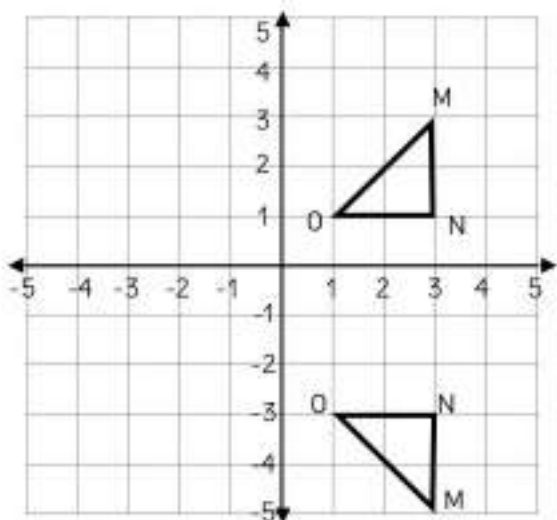
Describe the rule for the reflection line



Answer: _____

Name: _____

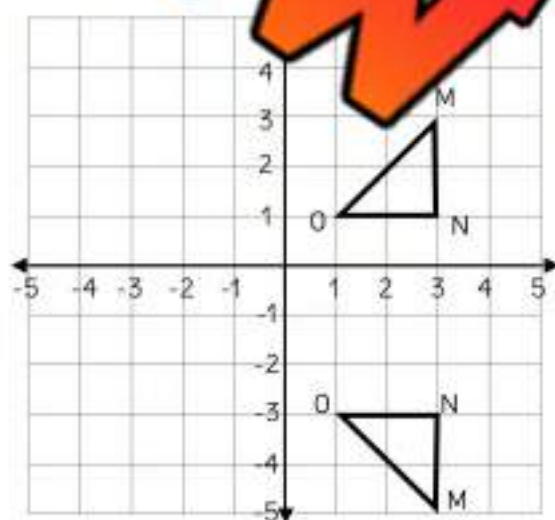
Describe the rule for the reflection line



Answer: _____

Name: _____

Describe the rule for the reflection line



Answer: _____

Reflections – Mapping Rules

Mapping Rules for Reflections

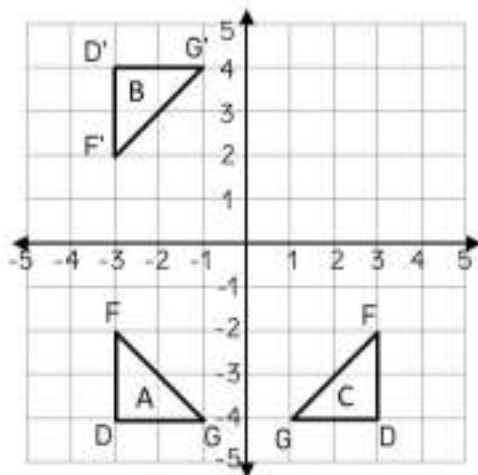
Each point on a shape moves according to the mapping rule.

The rule for a reflected shape in the x-axis is $(x, y) \rightarrow (x, -y)$

The rule for a reflected shape in the y-axis is $(x, y) \rightarrow (-x, y)$

In the example of Shape A being reflected to Shape B, point F (-3, -2) has been reflected across the x-axis, which means the new coordinates for F are (-3, 2).

If Shape A is reflected across the Y axis to Shape C, point F becomes _____.



Instructions

Use the mapping rules to write the new coordinates

| | Original Coordinates | Reflected across the | New Coordinates |
|-----|----------------------|----------------------|-----------------|
| 1) | P(5, 4) | | P(-5, 4) |
| 2) | S(6, -3) | x-axis | |
| 3) | Q(-5, 7) | y-axis | |
| 4) | P(-8, -2) | y-axis | |
| 5) | T(-4, 8) Y(-12, -17) | x-axis | |
| 6) | S(-14, -6) R(5, 15) | x-axis | |
| 7) | N(-6, 8) K(6, -15) | y-axis | |
| 8) | P(14, -7) E(-10, 17) | x-axis | |
| 9) | S(-15, -18) R(7, 12) | y-axis | |
| 10) | N(-9, 14) K(8, -21) | x-axis | |

Reflections - Coordinates

Part 1

Draw the shapes using the coordinates provided. Then reflect the shapes

Shape A

P(6,4), Q(2,2), R(7,2)

Reflect over the x-axis

New Coordinates

P(,), Q(,), R(,)

Shape B

F(-3,2), G(-4,2)

Reflect over the y-axis

New Coordinates

F(,), G(,), H(,)

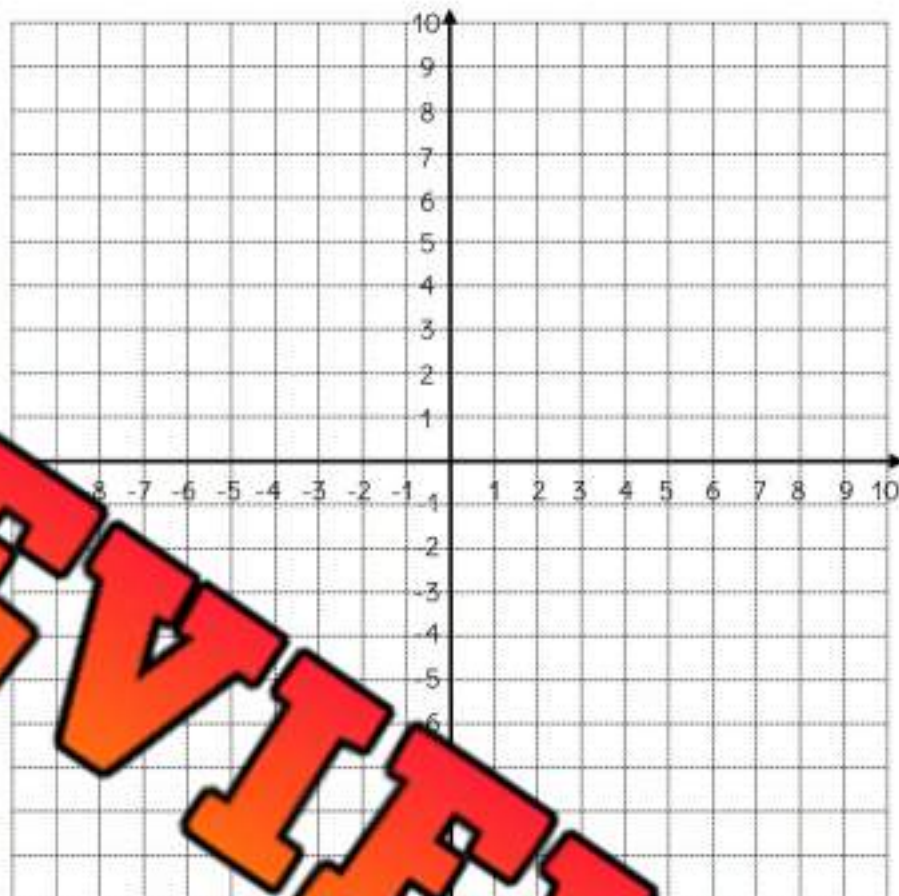
Shape C

J(-3,-9), K(-5,-2), L(-9,-5)

Reflect over the y-axis

New Coordinates

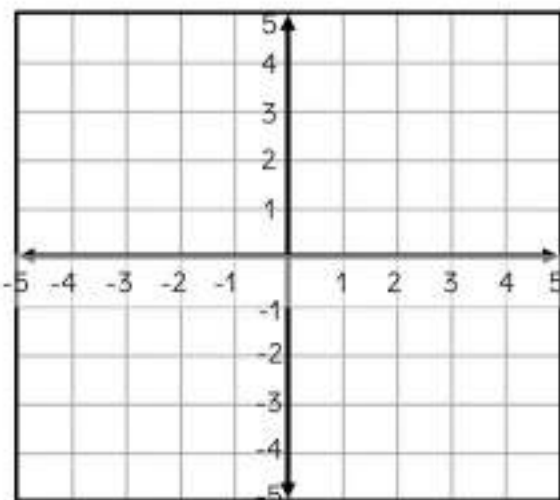
J(,), K(,), L(,)



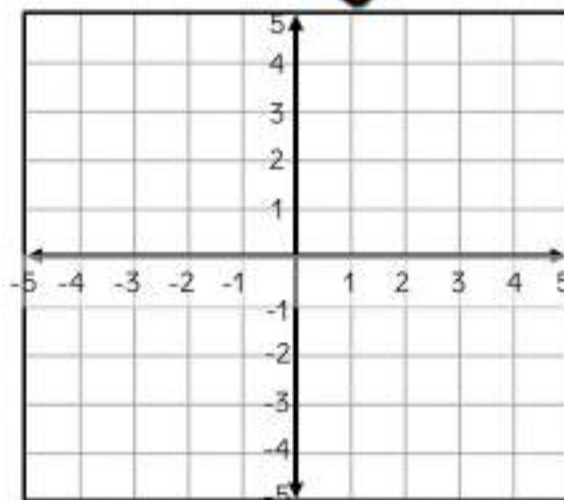
Part 2

Draw your own shape and then perform the reflection

1) Reflection across the y-axis



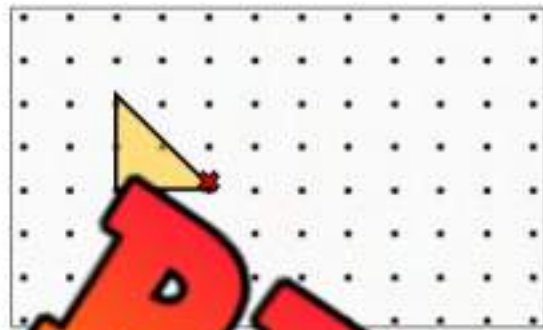
2) Reflection across the line $x = -1$



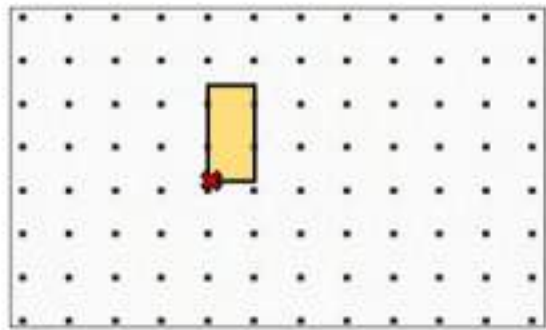
Drawing Rotations

Instructions

Rotate the shapes around the point marked ✖



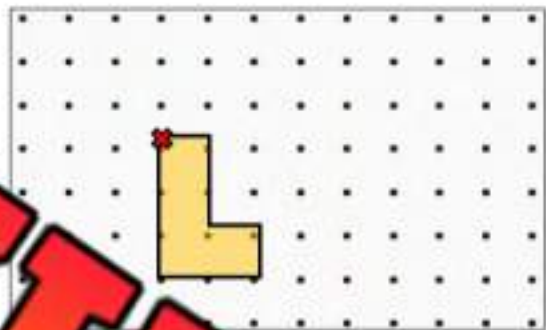
1) 90° clockwise rotation



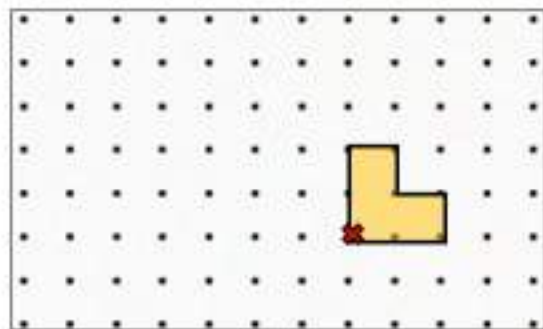
2) 180° clockwise rotation



3) 90° counter-clockwise rotation



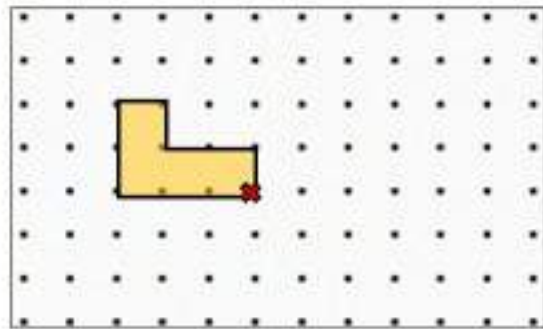
4) 360° clockwise rotation



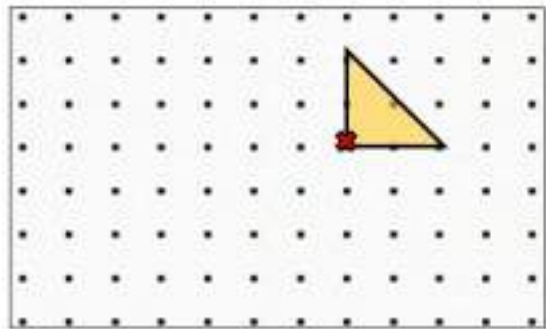
5) 90° counter-clockwise rotation



6) 180° counter-clockwise rotation



7) 90° clockwise rotation

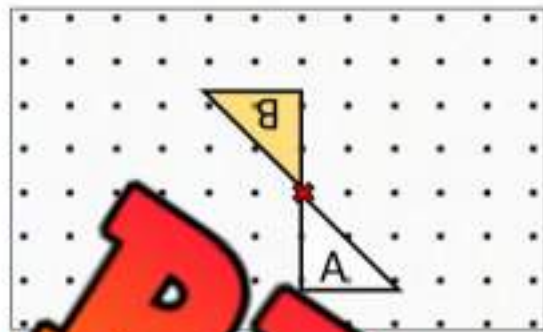


8) 180° counter-clockwise rotation

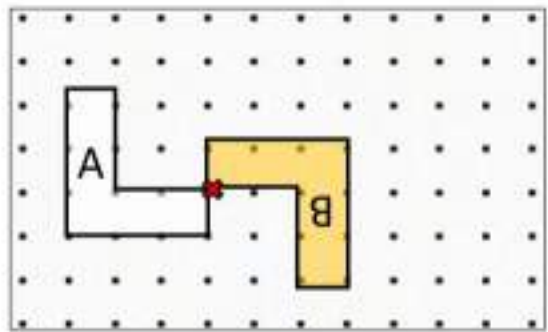
Describing Rotations

Instructions

Describe the rotations. Shape A is the original shape



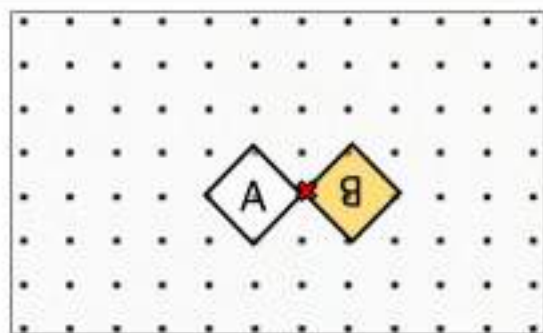
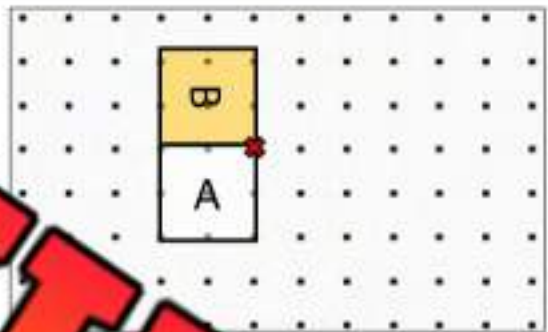
1) _____



2) _____



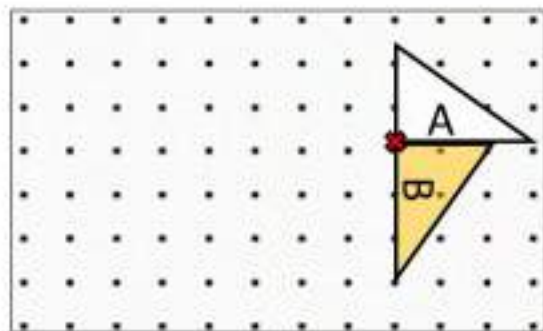
3) _____



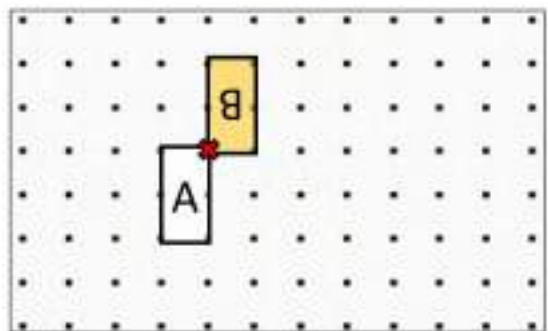
5) _____



6) _____



7) _____



8) _____

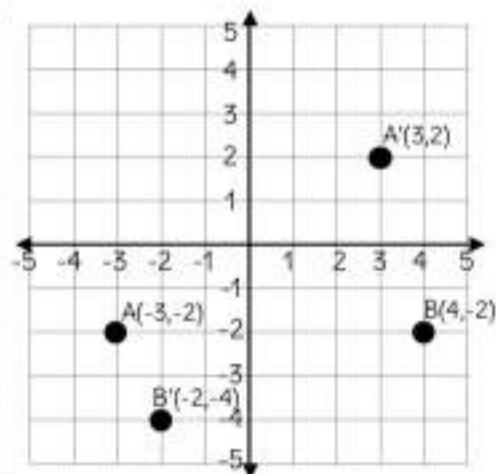
Rotating a Point

Mapping Rules for Rotations

Each point on a shape moves according to the mapping rule.

- a shape rotated 90° counterclockwise has a mapping rule of: $(x, y) \rightarrow (-y, x)$.
- a shape rotated 180° counterclockwise has a mapping rule of: $(x, y) \rightarrow (-x, -y)$.
- a shape rotated 270° counterclockwise has a mapping rule of: $(x, y) \rightarrow (y, -x)$.

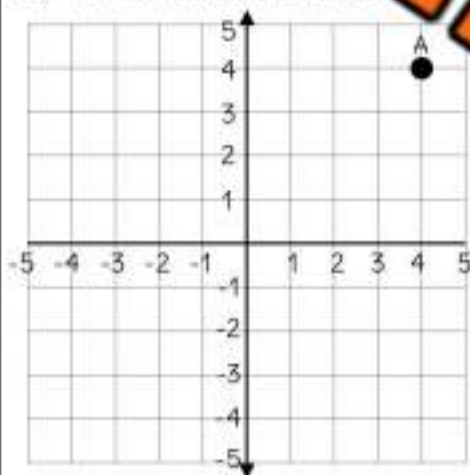
In the example, the shape was rotated 180° counter-clockwise.
In the example, the shape was rotated 90° clockwise.



Instructions

Write the new position after rotating around the origin

1) 90° clockwise rotation



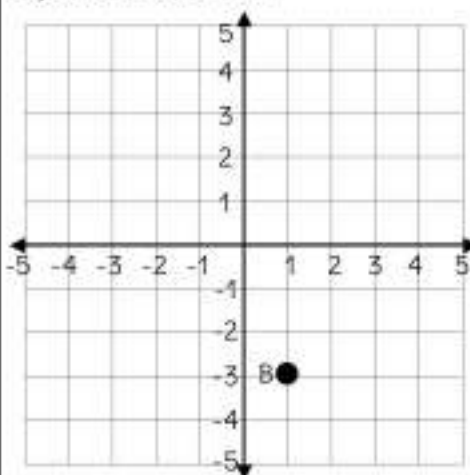
| |
|----------------------|
| Original Coordinates |
| A(,) |
| Rotated Coordinates |
| A(,) |

2) 90° counterclockwise rotation



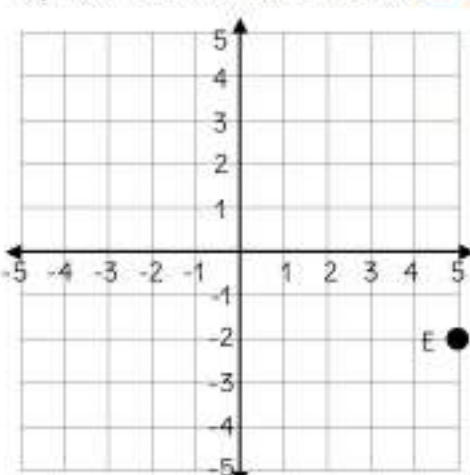
| |
|----------------------|
| Original Coordinates |
| E(,) |
| Rotated Coordinates |
| E(,) |

3) 180° rotation



| |
|----------------------|
| Original Coordinates |
| B(,) |
| Rotated Coordinates |
| B(,) |

4) 90° clockwise rotation

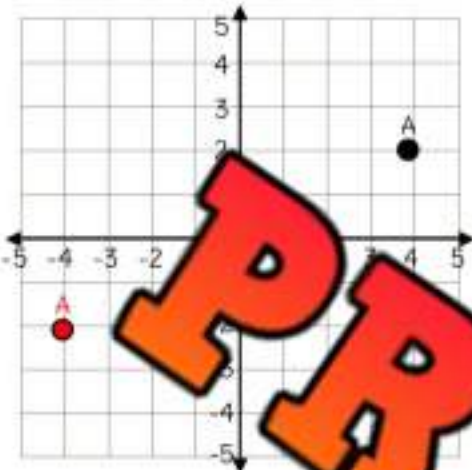


| |
|----------------------|
| Original Coordinates |
| E(,) |
| Rotated Coordinates |
| E(,) |

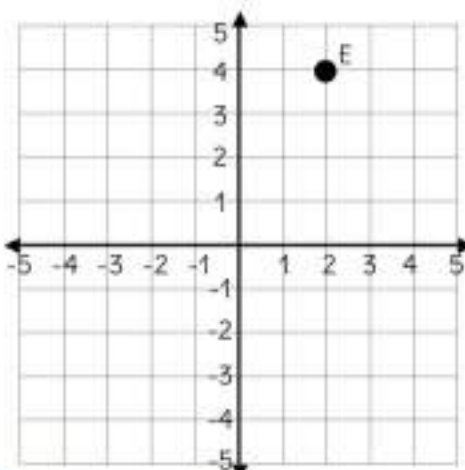
Rotating a Point

Instructions

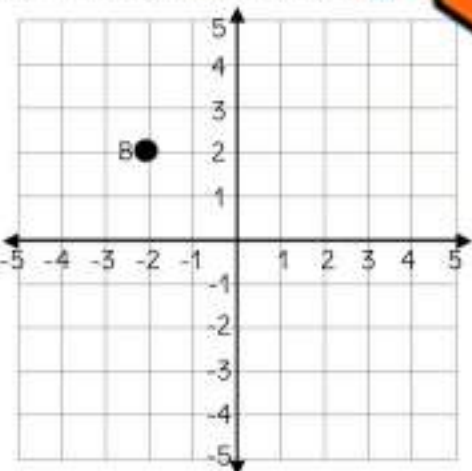
Graph the new position after rotating around the origin. The first one is done for you.

1) 180° rotation


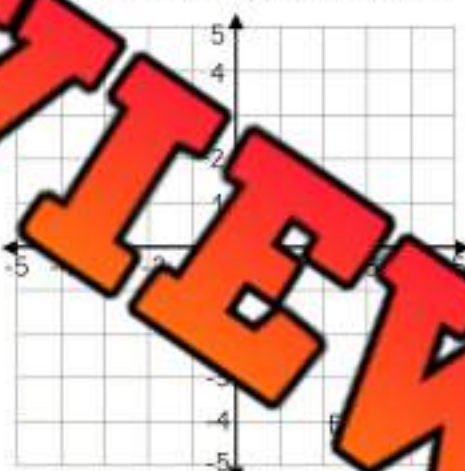
| |
|-----------------------------|
| Original Coordinates |
| A(4, 2) |
| Rotated Coordinates |
| A(-4, -2) |

2) 90° clockwise rotation


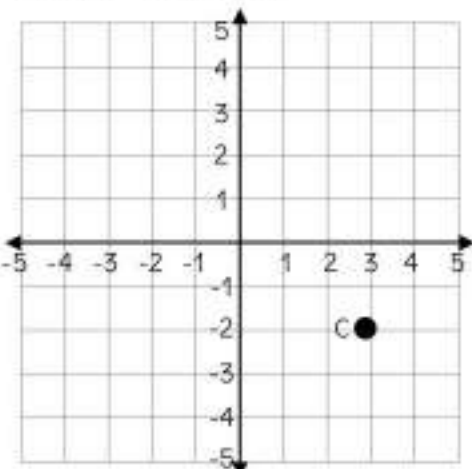
| |
|-----------------------------|
| Original Coordinates |
| E(. .) |
| Rotated Coordinates |
| E(. .) |

3) 90° counterclockwise rotation


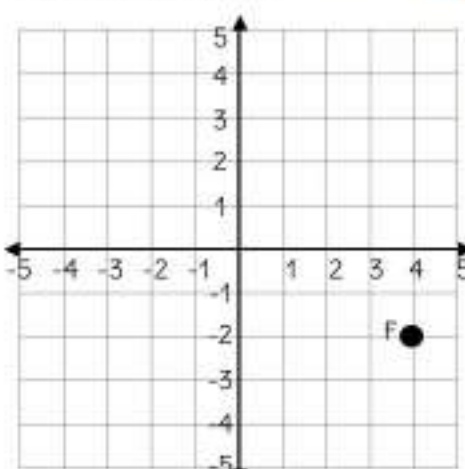
| |
|-----------------------------|
| Original Coordinates |
| B(. .) |
| Rotated Coordinates |
| B(. .) |

4) 90° clockwise rotation


| |
|-----------------------------|
| Original Coordinates |
| E(. .) |
| Rotated Coordinates |
| E(. .) |

5) 180° rotation


| |
|-----------------------------|
| Original Coordinates |
| C(. .) |
| Rotated Coordinates |
| C(. .) |

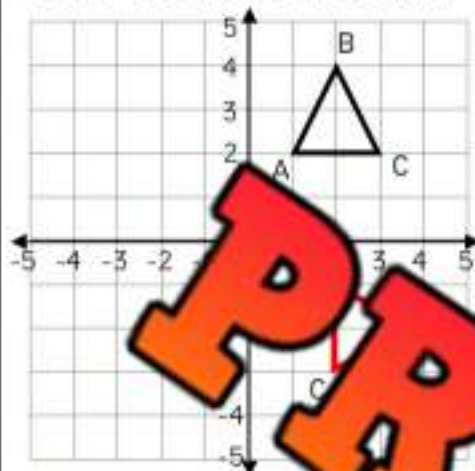
6) 360° rotation


| |
|-----------------------------|
| Original Coordinates |
| F(. .) |
| Rotated Coordinates |
| F(. .) |

Rotating Shapes

Instructions

Graph the new position of each shape after the given rotation

1) 90° clockwise rotation

Original Coordinates

A(1, 2)

B(2, 4)

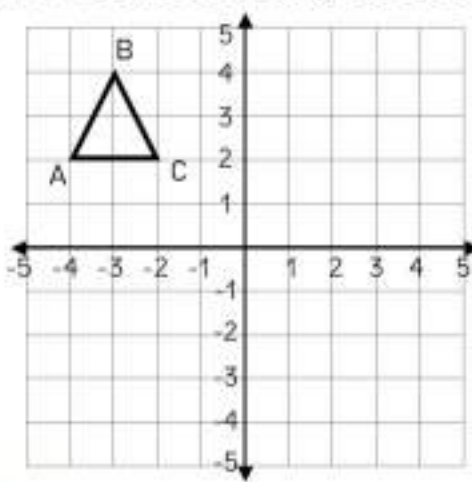
C(3, 2)

Rotated Coordinates

A(2, -1)

B(,)

C(,)

2) 90° counterclockwise rotation

Original Coordinates

A(,)

B(,)

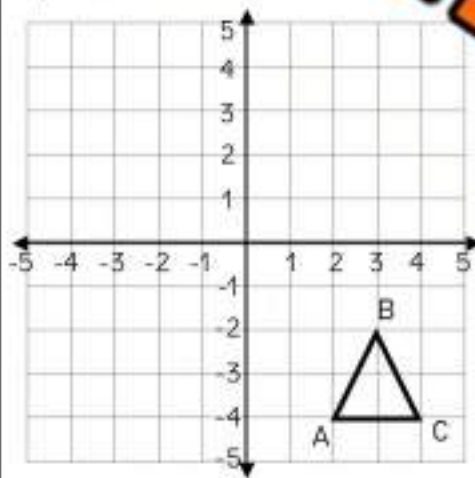
C(,)

Rotated Coordinates

A(,)

B(,)

C(,)

3) 180° rotation

Original Coordinates

A(,)

B(,)

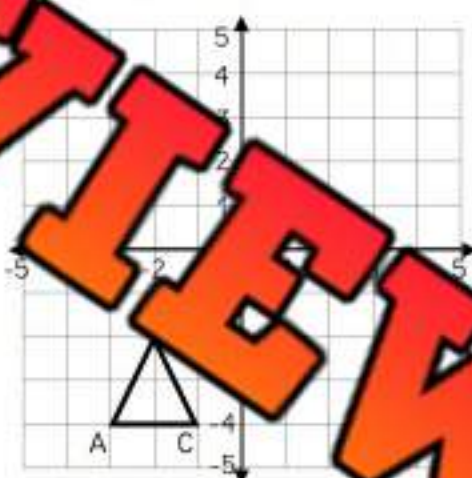
C(,)

Rotated Coordinates

A(,)

B(,)

C(,)

4) 90° clockwise rotation

Original Coordinates

A(,)

B(,)

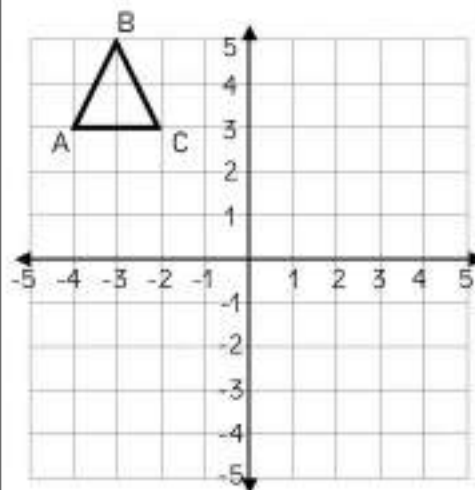
C(,)

Rotated Coordinates

A(,)

B(,)

C(,)

5) 90° clockwise rotation

Original Coordinates

A(,)

B(,)

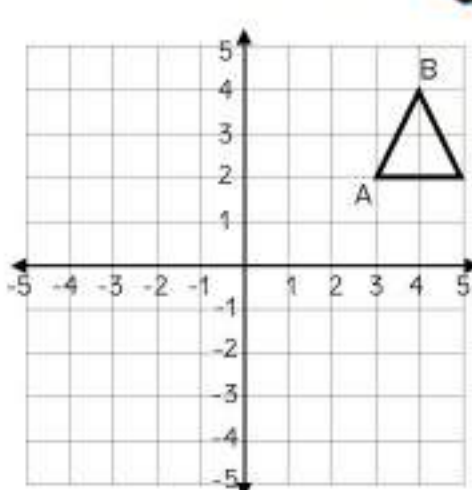
C(,)

Rotated Coordinates

A(,)

B(,)

C(,)

6) 90° counterclockwise rotation

Original Coordinates

A(,)

B(,)

C(,)

Rotated Coordinates

A(,)

B(,)

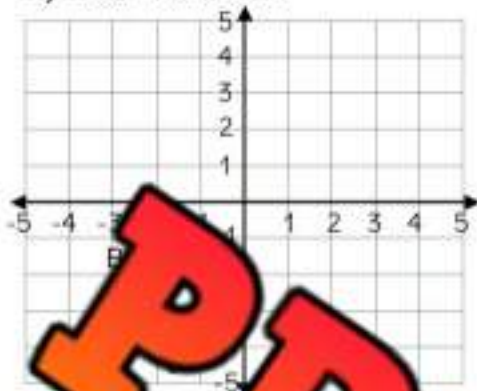
C(,)

Rotating Shapes

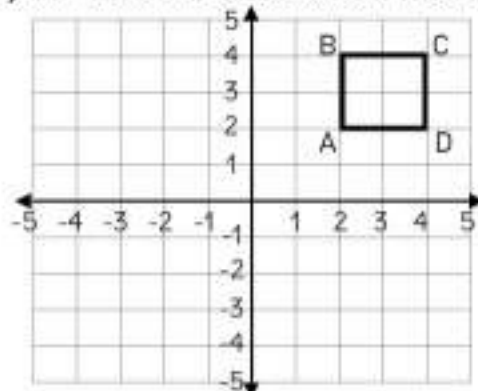
Instructions

Graph the new position of each shape after the given rotation

1) 180° rotation



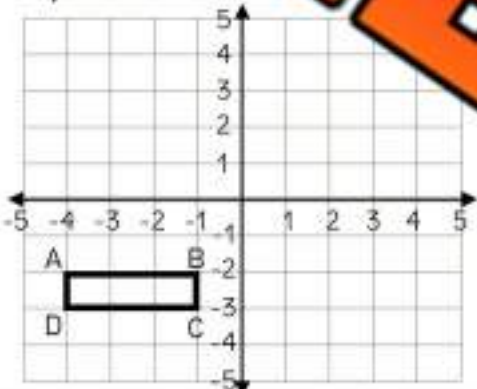
2) 90° counterclockwise rotation



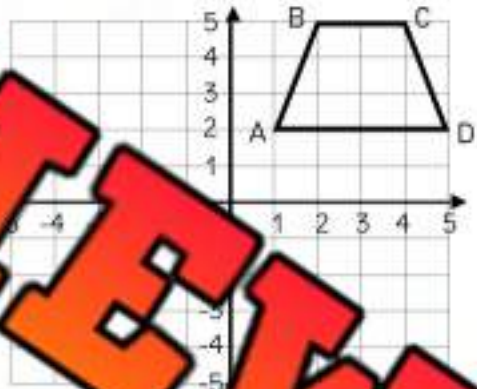
| | | | | |
|-----------------|--------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) | D(,) |
| Rotated | A(,) | B(,) | C(,) | D(,) |

| | | | | |
|-----------------|--------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) | D(,) |
| Rotated | A(,) | B(,) | C(,) | D(,) |

3) 90° clockwise rotation



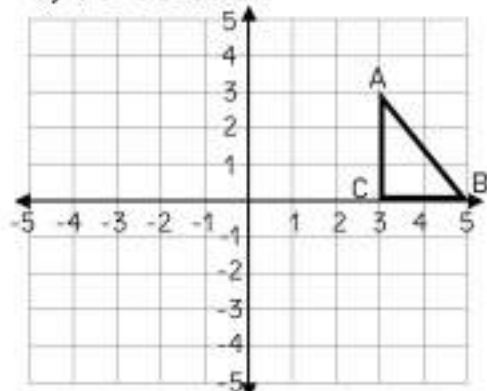
4) 90° counterclockwise rotation



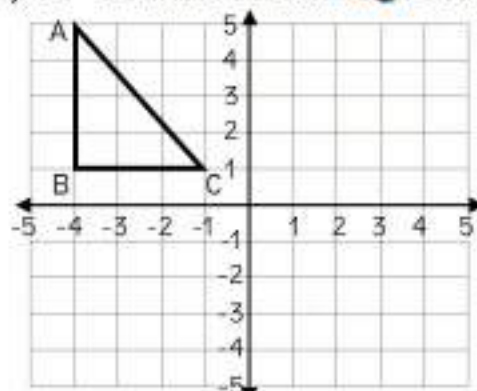
| | | | | |
|-----------------|--------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) | D(,) |
| Rotated | A(,) | B(,) | C(,) | D(,) |

| | | | | |
|-----------------|--------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) | D(,) |
| Rotated | A(,) | B(,) | C(,) | D(,) |

5) 90° rotation



6) 90° counterclockwise rotation



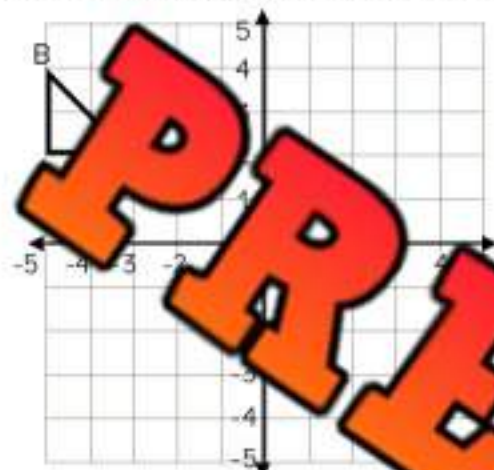
| | | | |
|-----------------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) |
| Rotated | A(,) | B(,) | C(,) |

| | | | |
|-----------------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) |
| Rotated | A(,) | B(,) | C(,) |

Exit Cards

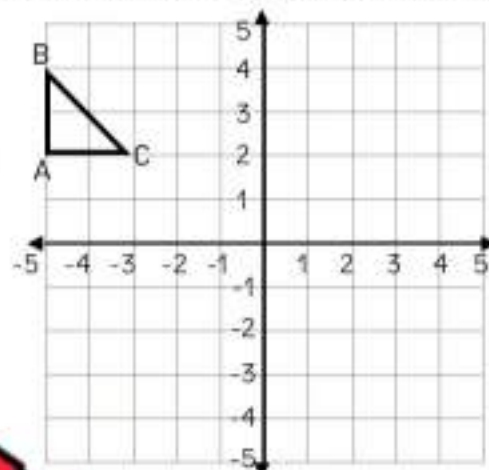
Cut Out Cut out the exit cards below and have students complete them at the end of class

Name: _____

Graph the new position of shape after the 180° counterclockwise rotation.

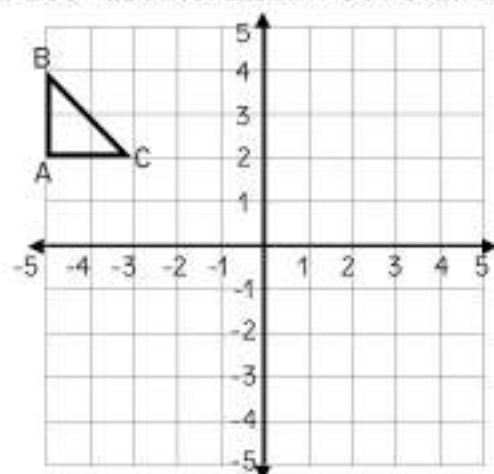
| | | | |
|----------|--------|--------|--------|
| Original | A(.) | B(.) | C(.) |
| Rotated | A(.) | B(.) | C(.) |

Name: _____

Graph the new position of shape after the 180° counterclockwise rotation.

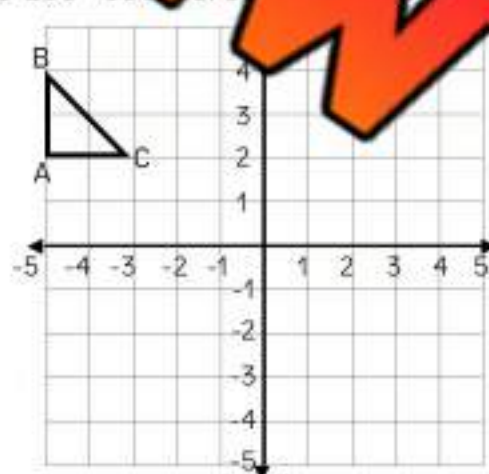
| | | | |
|----------|--------|--------|--------|
| Original | A(.) | B(.) | C(.) |
| Rotated | A(.) | B(.) | C(.) |

Name: _____

Graph the new position of shape after the 180° counterclockwise rotation.

| | | | |
|----------|--------|--------|--------|
| Original | A(.) | B(.) | C(.) |
| Rotated | A(.) | B(.) | C(.) |

Name: _____

Graph the new position of shape after the 180° counterclockwise rotation.

| | | | |
|----------|--------|--------|--------|
| Original | A(.) | B(.) | C(.) |
| Rotated | A(.) | B(.) | C(.) |

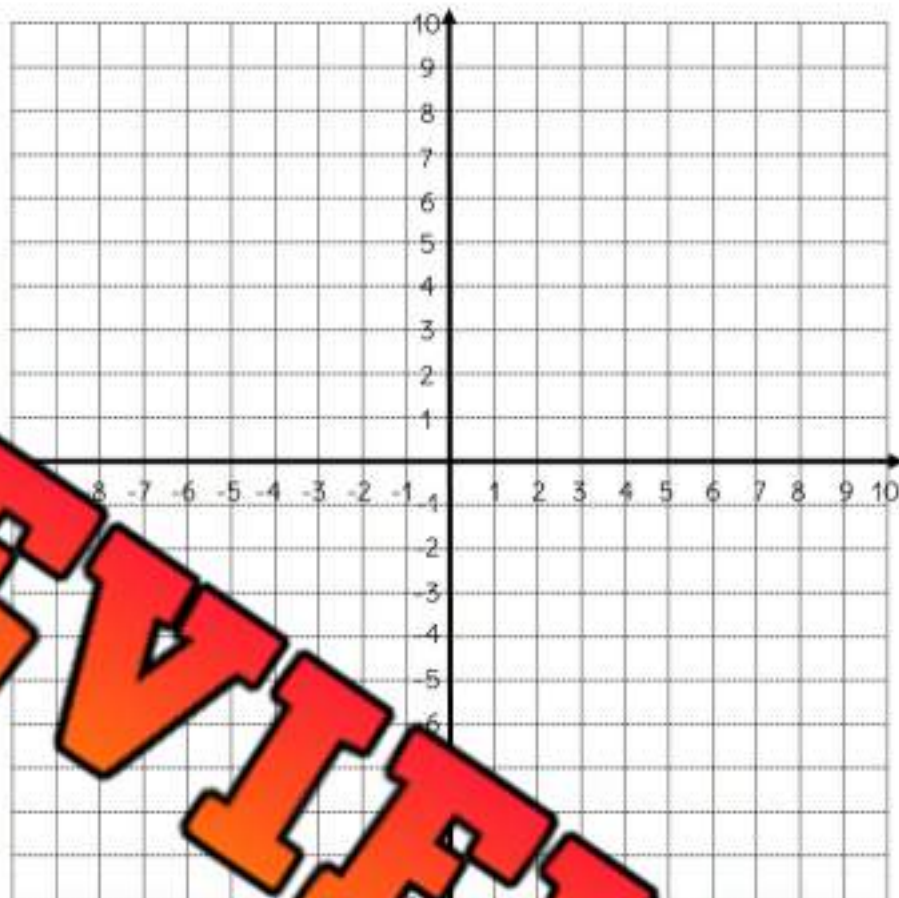
Rotations – Coordinates

Part 1 Draw the shapes using the coordinates provided. Then rotate the shape about the origin

| Shape A |
|--------------------------------------|
| P(9,2), Q(6,4), R(3,2) |
| 90° counterclockwise rotation |
| New Coordinates |
| P(,), R(,) |

| Shape B |
|------------------------------------|
| F(-9,2), G(-9,5), H(-6,5) |
| 180° rotation |
| New Coordinates |
| F(,), G(,), H(,) |

| Shape C |
|--------------------------------------|
| J(-2,-9), K(-8,-6), L(-2,-2) |
| 90° counterclockwise rotation |
| New Coordinates |
| J(,), K(,), L(,) |



Part 2 Give the coordinates of each point after the rotation

| | Original Coordinate | Rotation Instructions | New Coordinates |
|----|---------------------|-------------------------------|-----------------|
| 1) | P(5, 4) | 90° counterclockwise rotation | P(-4, 5) |
| 2) | S(2, 6) | 180° rotation | |
| 3) | Q(-3, 7) | 360° rotation | |
| 4) | P(-5, -8) | 90° counterclockwise rotation | |
| 5) | T(-6, 3) Y(-2, -5) | 90° clockwise rotation | |
| 6) | S(-8, -4) R(5, 7) | 180° rotation | |
| 7) | N(-5, 5) K(6, -7) | 90° clockwise rotation | |
| 8) | P(6, -3) E(-6, 5) | 180° rotation | |

Math Activity: Transformation Battleship

Objective

What are we learning about?

Students will apply their knowledge of coordinate planes and geometric transformations (translations, reflections, and rotations) in a strategic game of battleship.

Materials

What you will need for the activity.

- Graph paper
- Pens
- Eraser
- Coloured pencils/markers



Instructions

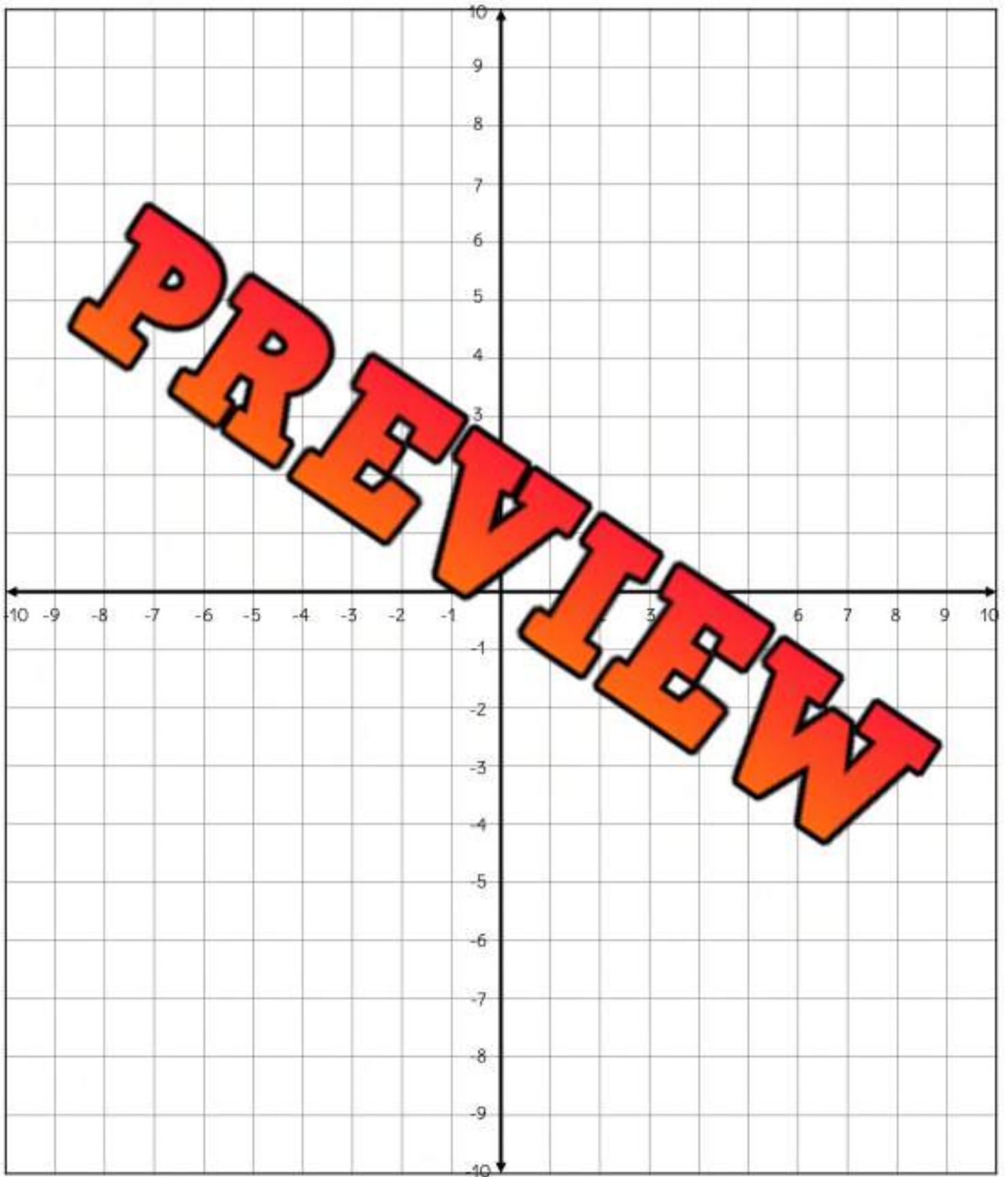
What you will do for the activity

1. Divide the students into pairs. Each student gets two pieces of graph paper. One will be used for their own ships, and the other will be used to track their opponent's ships. Have students draw a coordinate plane on one piece of graph paper, labeling the x-axis and y-axis from -10 to 10.
2. Each student draws 3 ships on their coordinate plane. Ships could be rectangles. In the end, students should create 3 ships that are 15 "units" long.
3. Before starting the game, each student must apply a set of transformations to each of their 3 ships so that they have 6 in total. The transformations should include at least one translation, one reflection, and one rotation for each ship.
4. Students take turns calling out coordinates to "fire" at their opponent's ships. For example, a student might call out (3, -2). Their opponent checks their coordinate plane to see if any part of a ship occupies that coordinate. If a ship is hit, the opponent says "hit" and marks the hit on their tracking graph paper. If there is no ship at that coordinate, the opponent says "miss." To sink a ship, you must call out all four corners (vertexes).
5. Each student tracks their hits and misses on their opponent's ships using the second piece of graph paper. They can use different coloured pencils or markers to indicate hits and misses.
6. The game continues until one student has successfully hit all the points of their opponent's ships. That student is declared the winner.
7. After the game, have a discussion about the transformations used. Ask students to share how they transformed their ships and what strategies they used to place and find the ships.

Name: _____

Grid Paper



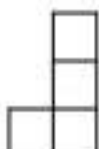



Cartesian Plane

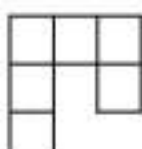

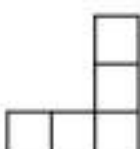
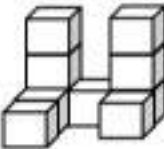
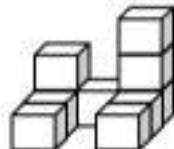
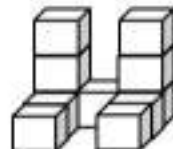


Geometry Test

Part 1

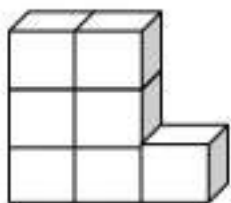
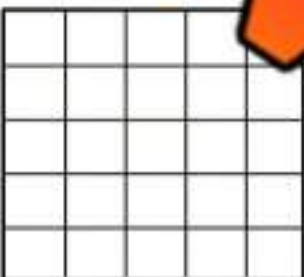

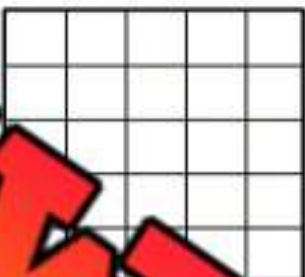
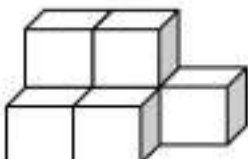
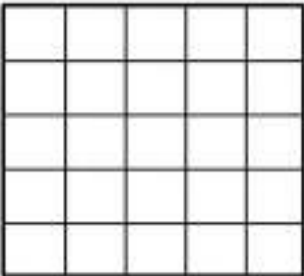
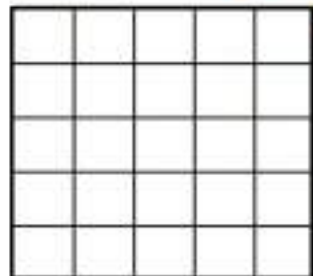
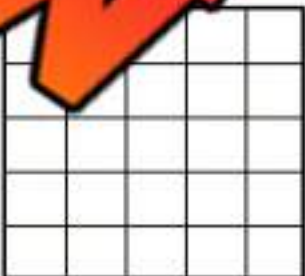
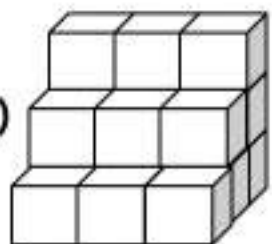
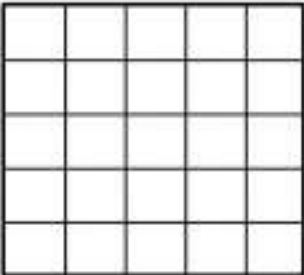
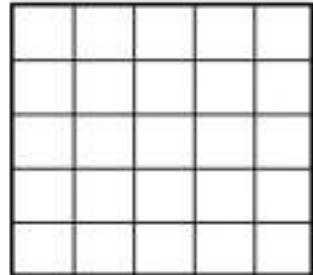
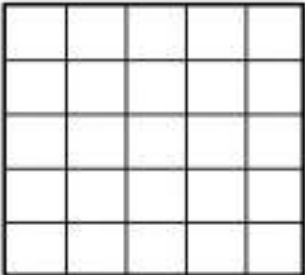
Look at the front, top, and side views and circle the matching 3D object

| Top View | Front View | Side View |
|---|---|---|
|  |  |  |
|  |  |  |

| Top View | Front View | Side View |
|--|---|---|
|  |  |  |
|  |  |  |

Part 2

Draw the front, top, and side views of the objects below

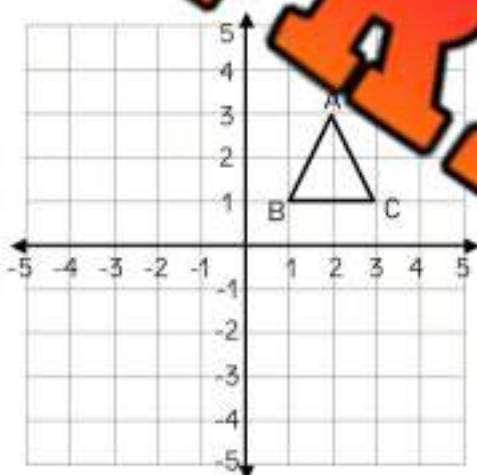
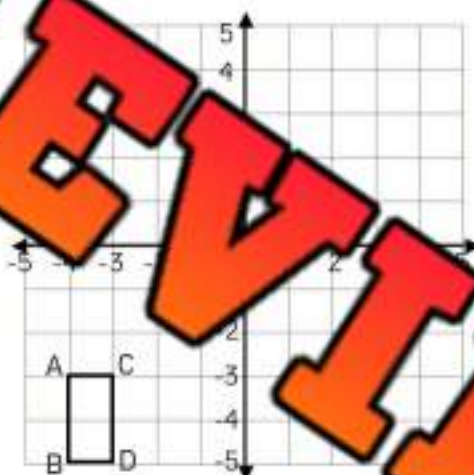
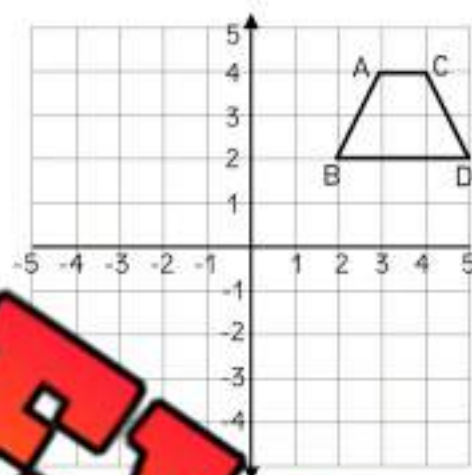
| Original Shape | Top View | Front View | Side View |
|--|---|--|---|
| 1)  |  |  |  |
| 2)  |  |  |  |
| 3)  |  |  |  |

Part 3

Give the coordinates of each point after the translation

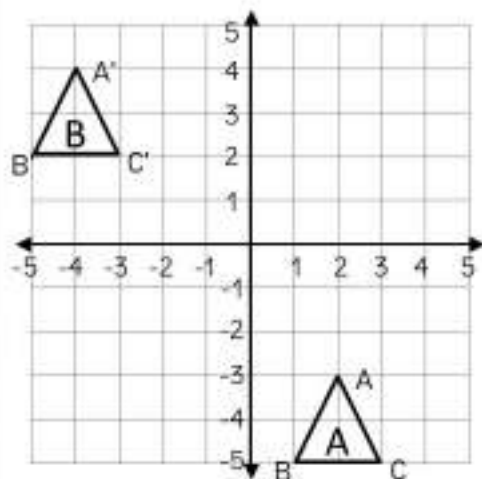
| | Original Coordinate | Translation - Mapping Rule | New Coordinates |
|----|---------------------|----------------------------|-----------------|
| 1) | P(3, -4) | $(x - 4, y + 6)$ | P(-3, 0) |
| 2) | S(-5, 8) | $(x + 12, y - 8)$ | |
| 3) | Q(-9, -5) | $(x + 5, y - 9)$ | |
| 4) | L(1, 5) P(-3, -8) | $(x - 6, y + 11)$ | |
| 5) | T(9, -5) | $(x + 12, y + 7)$ | |

Part 4 Translate the shape using the mapping rule

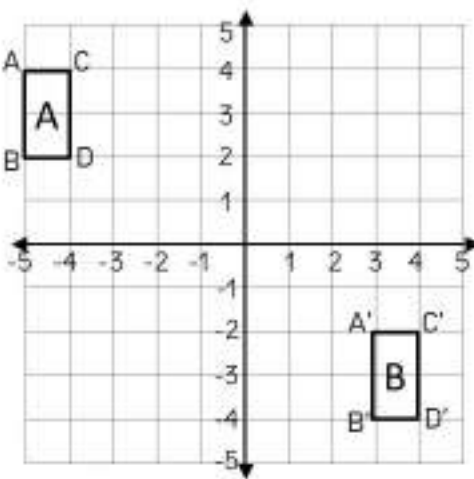
Mapping Rule $(x - 5, y - 5)$ Mapping Rule $(x + 5, y + 7)$ Mapping Rule $(x + 6, y - 5)$

Part 5

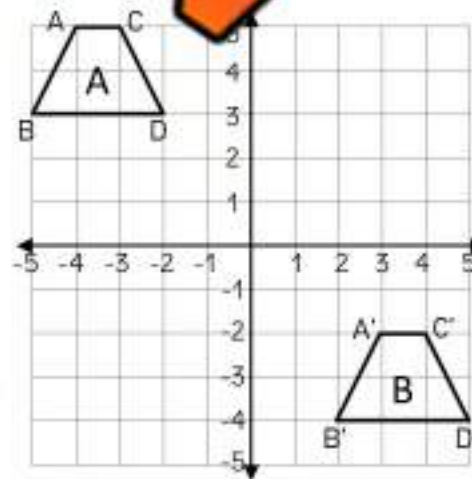
Fill in the mapping rule of the translations below



Mapping Rule



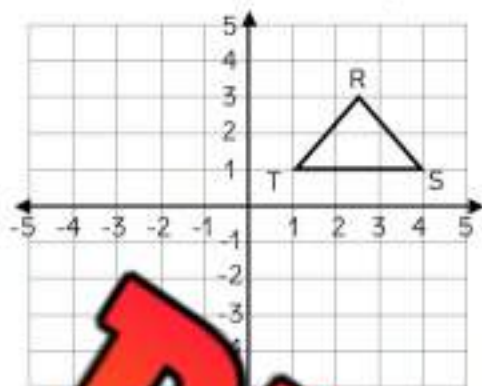
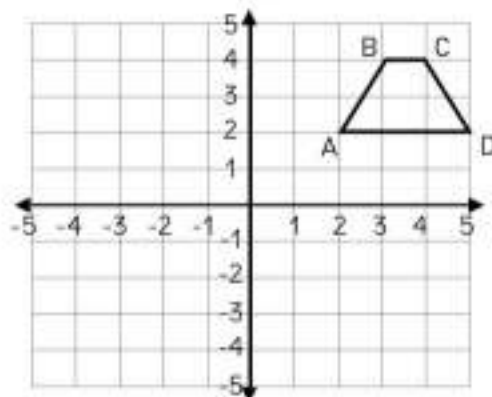
Mapping Rule



Mapping Rule

Part 6

Graph the new position of each shape after the given reflection

1) Reflection across the line $y = -1$ 2) Reflection across the line $x = 1$ 

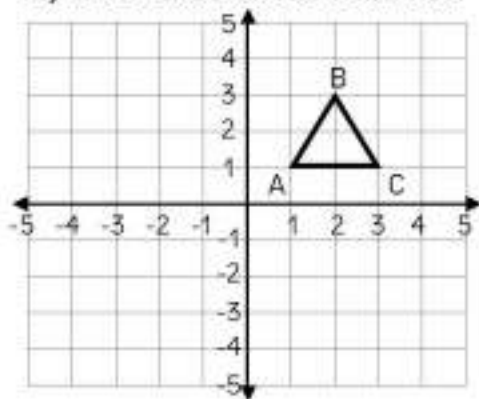
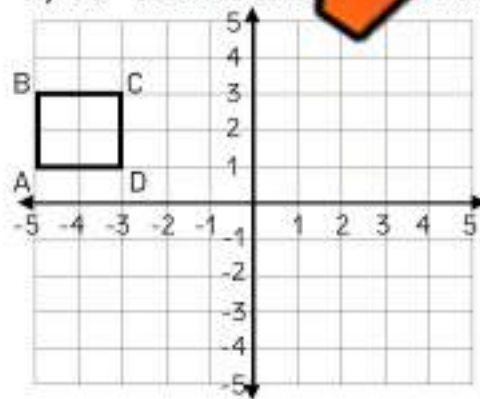
Part 7

Use the given rules to write the new coordinates after the reflection

| | Original Point(s) | Reflection across the | New Coordinates |
|----|----------------------|-----------------------|-----------------|
| 1) | P(7, 3) | y-axis | |
| 2) | S(9, -2) | y-axis | |
| 3) | Q(-5, 4) | x-axis | |
| 4) | P(-7, -3) | y-axis | |
| 5) | T(-6, 8) Y(-13, -17) | x-axis | |

Part 8

Graph the new position of each shape after the given rotation

1) 270° clockwise rotation2) 90° counterclockwise rotation

| | | | |
|----------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) |
| Rotated | A(,) | B(,) | C(,) |

| | | | | |
|----------|--------|--------|--------|--------|
| Original | A(,) | B(,) | C(,) | D(,) |
| Rotated | A(,) | B(,) | C(,) | D(,) |