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Manitoba Math Curriculum Patterns & Relations – Grade 6

3-Part Lesson Format

Part 1 – Minds On!

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

LEARNING GOAL

We are learning to identify and describe increasing elements in different patterns so we can understand how patterns grow.

Increasing Patterns - Shapes

Drag the shapes to complete the last part of the pattern.



#	Figure 1	Figure 2	Figure 3	Figure 4
1)				
2)				
3)				
4)				

Part 2 – Action!

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

Part 3 – Consolidation!

- Exit Cards
- Quizzes
- Reflection
- And More!

Patterning Word Problems - Train Car Pattern

A cargo train adds the same number of new cars every ten years. In 1940 it had 40 cars. In 1950 it had 44 cars. In 1960 it had 48 cars.

1 2 3 4 5 6 7 8 9 0

a) Describe the pattern.

Year	1940	1950	1960	1970	1980	1990	2000	2010
Train Cars	40	44	48					

b) How many cars would you expect in 2030?

c) How many cars would you expect in 2120?





Manitoba Math Curriculum Patterns & Relations – Grade 6

Decreasing Patterns - Shapes

Drag the shapes in the last column to complete the shrinking pattern.

#	Figure 1	Figure 2	Figure 3	Figure 4
1)				
2)				
3)				
4)				

How many pages were left in his book each night using subtraction symbol.

Night	1	2	3	4	5
Pages	10	8	6	4	2

Term Number (Night)	1	2	3	4	5	6	7
Term Value (Pages)							

Circle if the pattern displayed on the graph is linear.

1)		☐ Linear	☐ Non-Linear
2)		☐ Linear	☐ Non-Linear



Manitoba Math Curriculum Patterns & Relations – Grade 6

Increasing Linear Patterns - Yes or No?

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

Term Number	Term Value
1	12
2	16
3	20
4	25
5	30
Linear	Non-Linear

Term Number	Term Value
1	25
2	50
3	75
4	100
5	125
Linear	Non-Linear

Term Number	Term Value
1	510
2	550
3	590
4	650
5	700
Linear	Non-Linear

Decreasing Decimal Pattern Rule

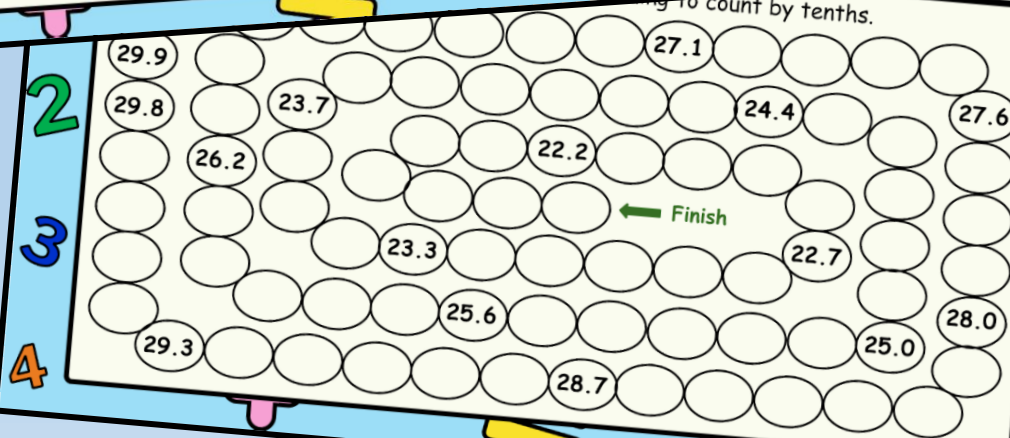
5.58"

Fill in the blanks to complete the decreasing patterns below.

1)	14.4	14.1	13.8	13.5	_____	_____	_____	_____
2)	35.0	34.4	33.8	33.2	_____	_____	_____	_____
3)	67.1	66.0	64.9	63.8	_____	_____	_____	_____
4)	78.4	77.1	75.8	74.5	_____	_____	_____	_____

Pattern

ing to count by tenths.





Workbook Preview

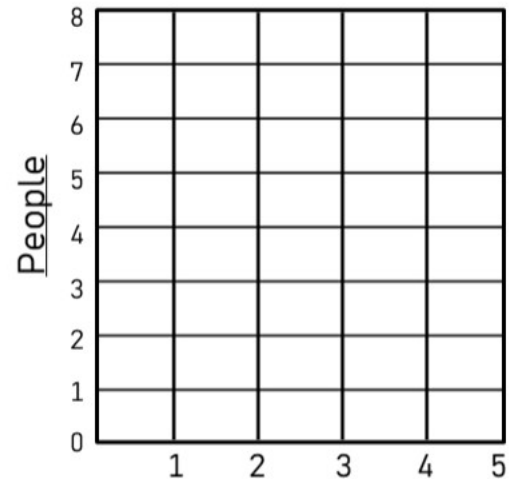
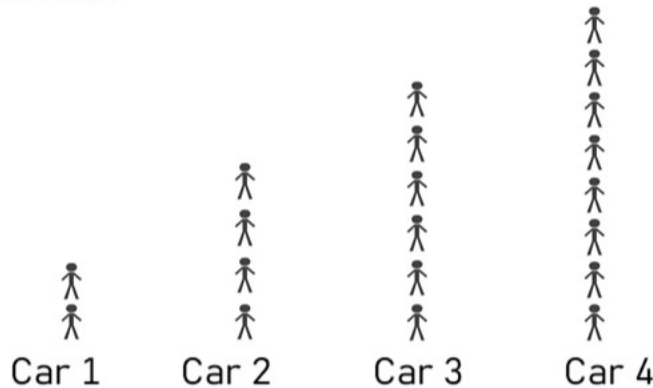


Graphing Growing Patterns

Questions

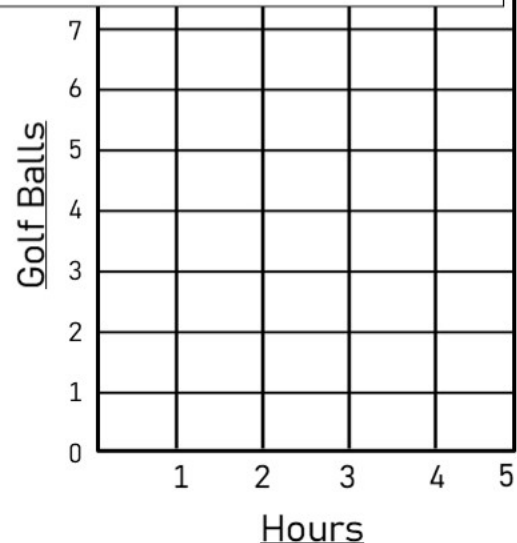
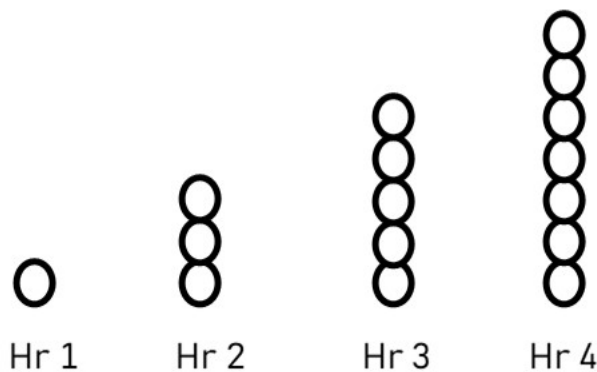
Translate the growing patterns into a table of values and a graph

1) A train has the following people in each train car.



Preview of 50 pages from this product that contains 223 pages total.

2) the woods. He finds the following balls each hour.



Term Number (Hour)	1	2	3	4	5	9
Term Value (Golf Balls)						

Name: _____

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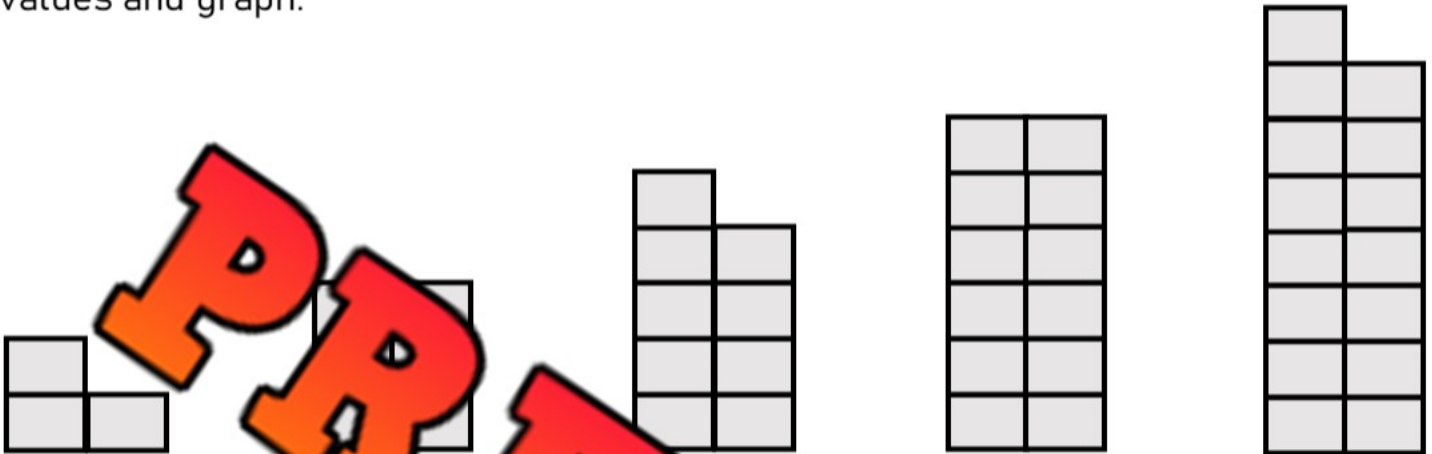
Curriculum Connection
PR.1, PR.2

Growing Pattern Challenge

Questions

Answer the question below using a table of values and a graph

Joel has created a pattern using his blocks. Translate the pattern using the table of values and graph.



Term Number	Term Value

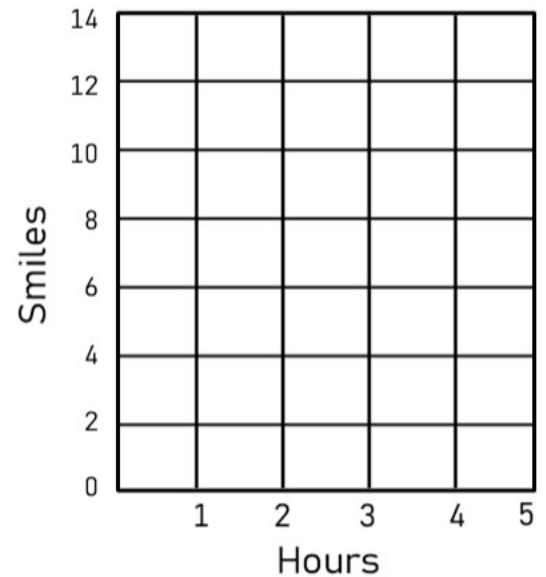


- 1) How many blocks would Joel use in his 10th shape if he continued his pattern?
- 2) What is the pattern rule? How much is added to the core each time?
- 3) Which shape (term number) would use 63 blocks?

Graphing Shrinking Patterns

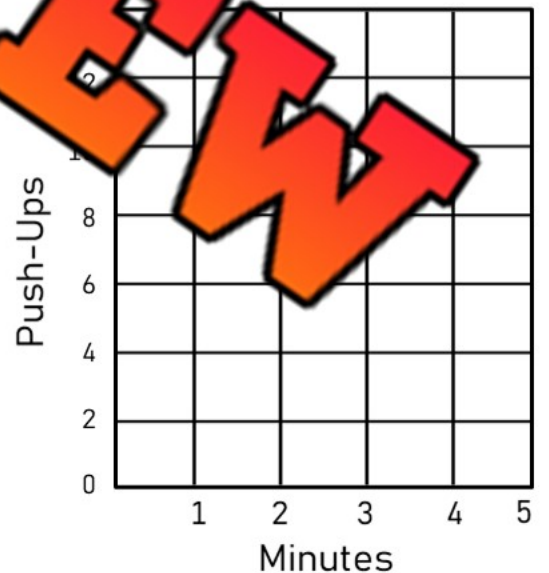
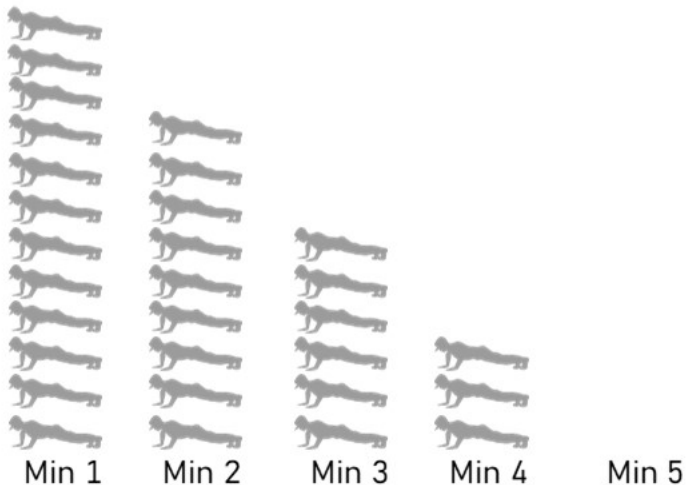
Questions Translate each shrinking pattern into a table of values and a graph

1) Jane kept track of how many times she smiled in an hour



Term Number				
Term Value				

2) Sam counted how many push-ups he could do every minute for 5 minutes.



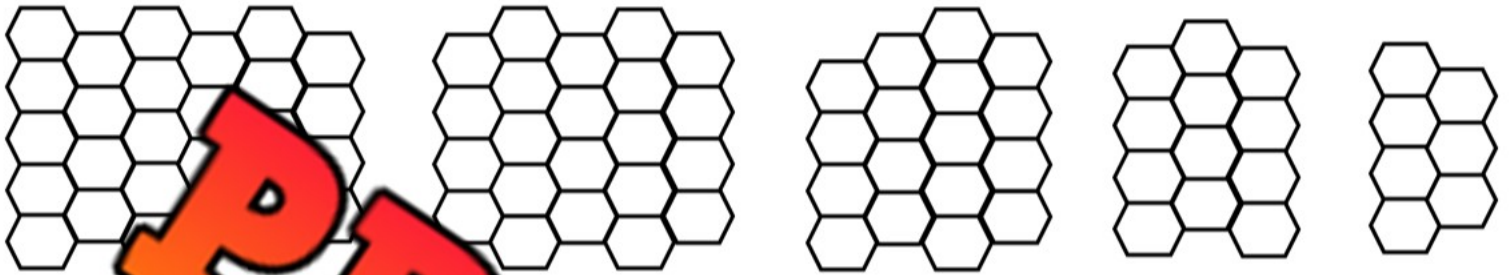
Term Number					
Term Value					

Shrinking Pattern Challenge

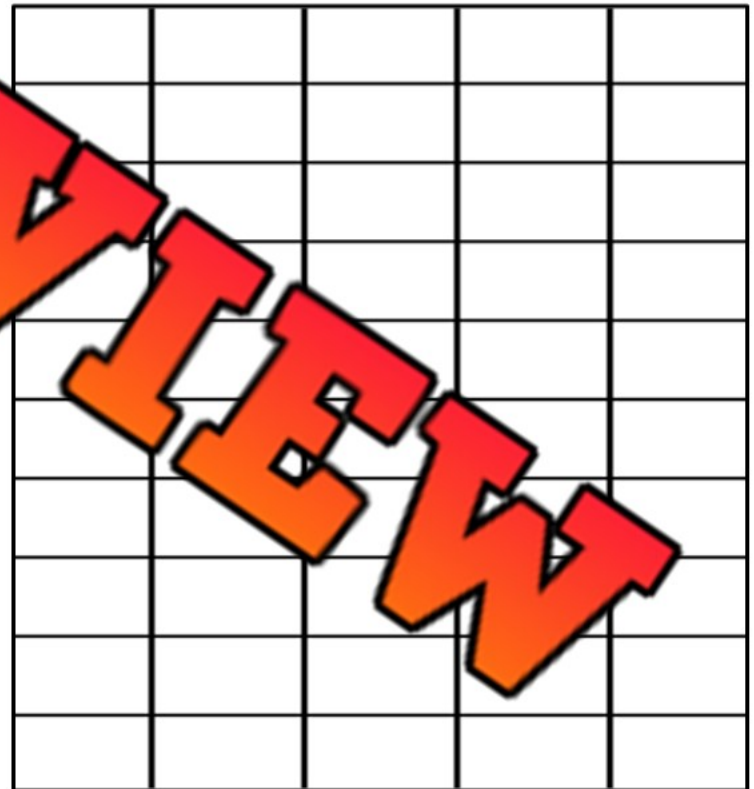
Questions

Answer the question below using a table of values and a graph

Jill makes a pattern using hexagons. Translate the pattern using the graph and table of values.



Term Number	Term Value



- 1) What is the pattern shrinking by each time?
- 2) Draw your own shrinking pattern below

Name: _____

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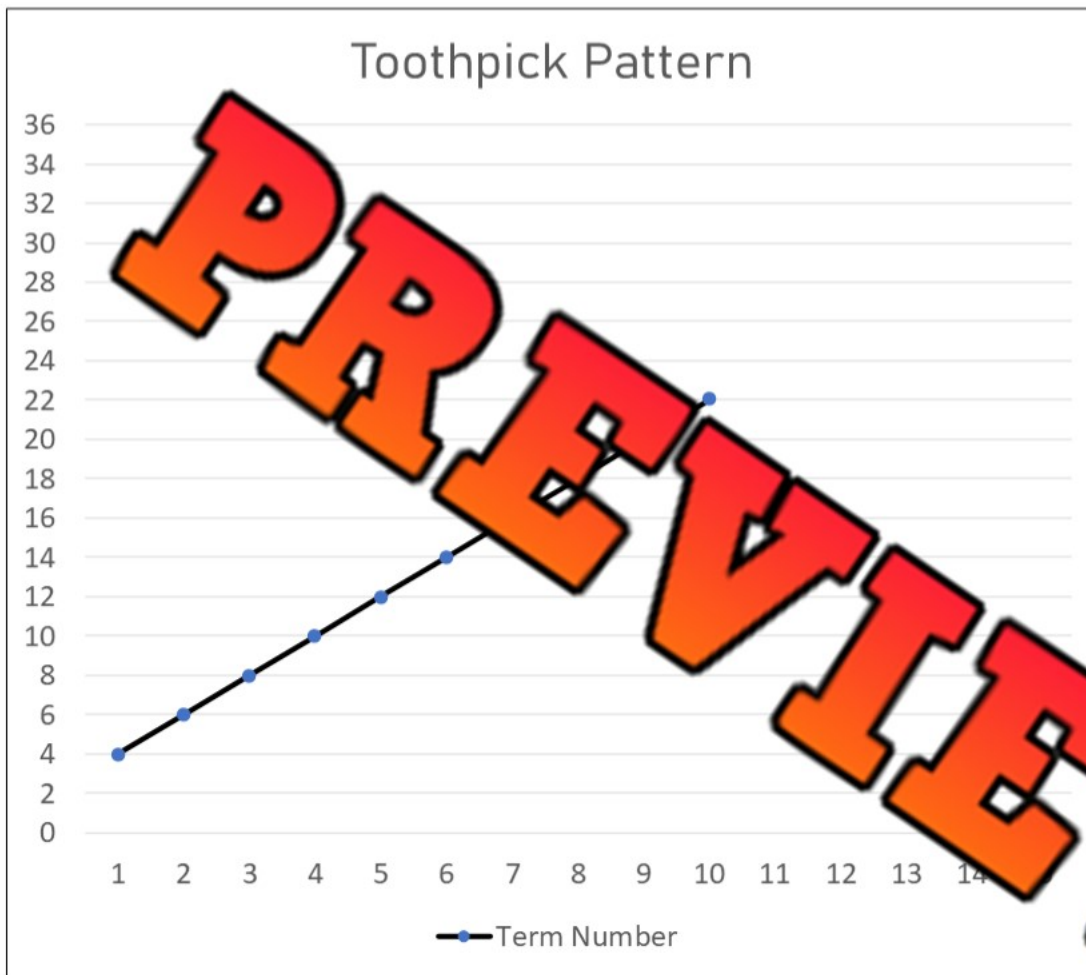
Curriculum Connection
PR.1, PR.2

Reading a Linear Pattern - Graph

A **linear** pattern is a pattern that increases or decreases by a value that remains the same. Linear patterns can be plotted as a straight line on a graph.

Questions

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



Term Number	Term Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

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) Why is this graph a linear pattern?

Name: _____

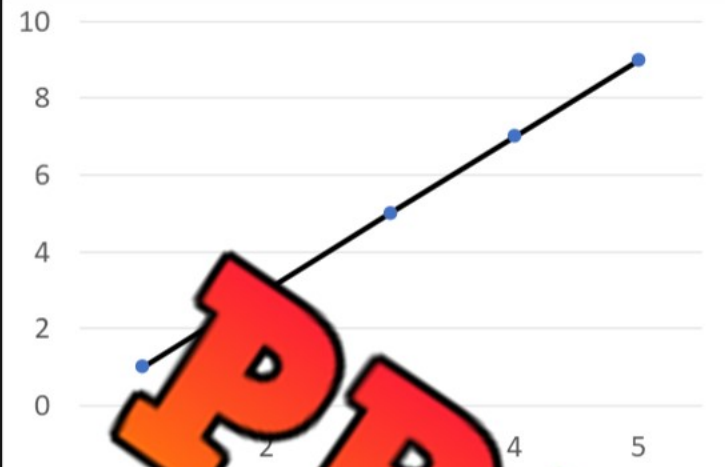
13

Curriculum Connection
PR.1

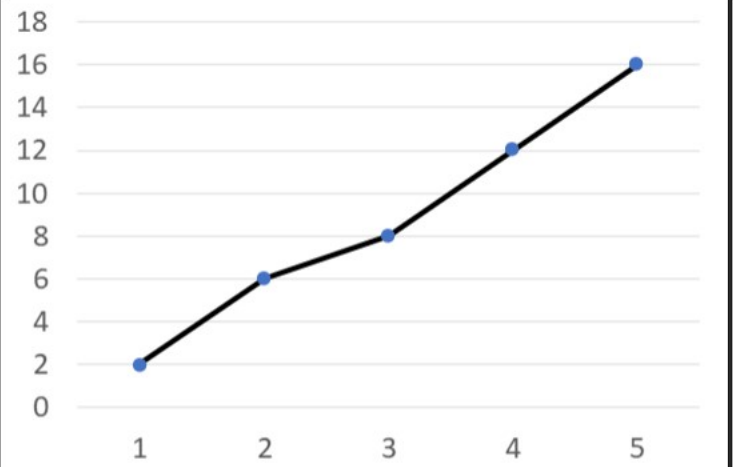
Increasing Linear Patterns - Yes or No?

Questions

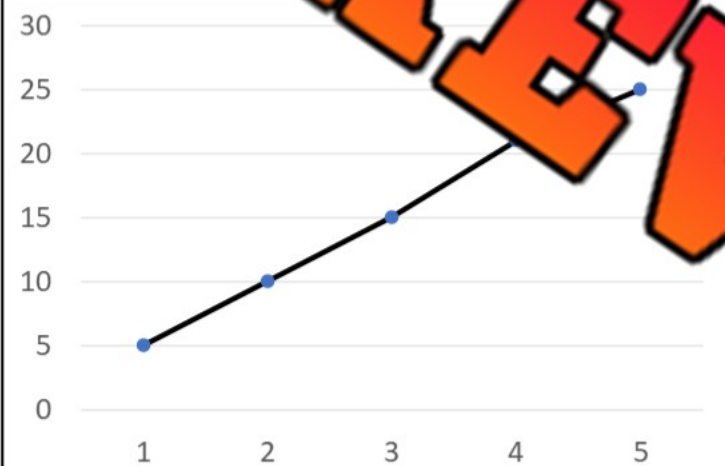
Circle if the pattern displayed on the graph is linear or not



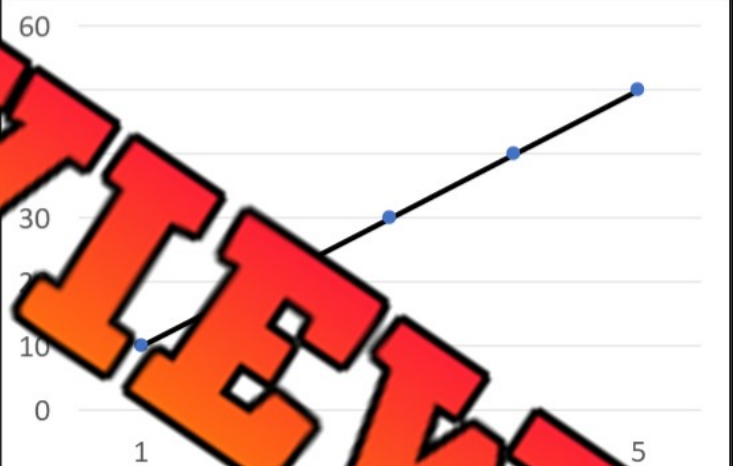
1) Linear Non-Linear



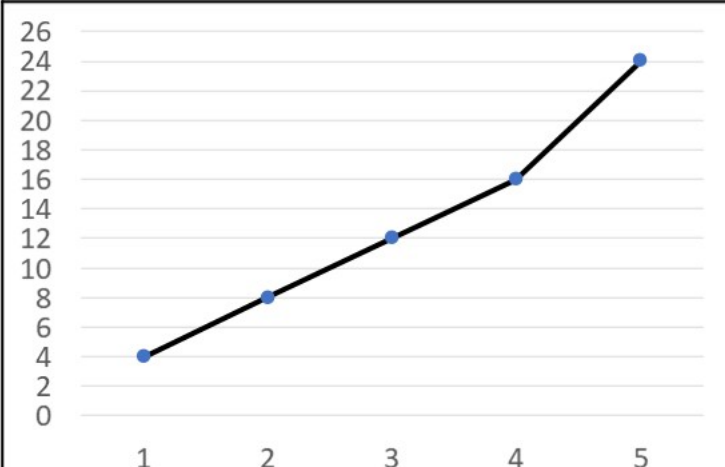
2) Linear Non-Linear



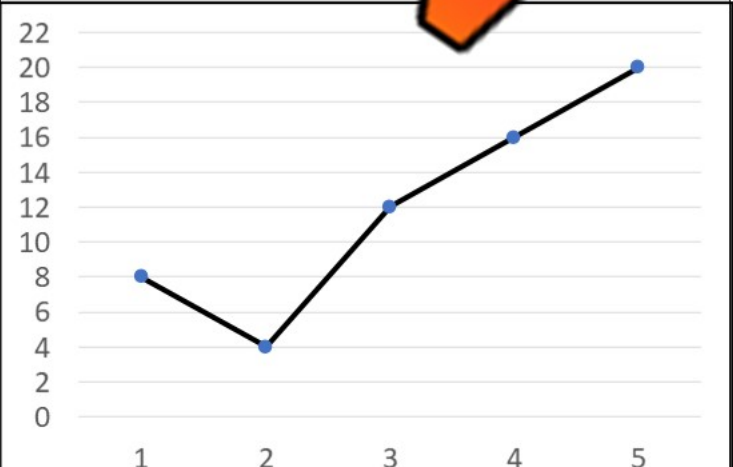
3) Linear Non-Linear



4) Linear Non-Linear



5) Linear Non-Linear



6) Linear Non-Linear

Name: _____

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Increasing Linear Patterns - Yes or No?**Questions**

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

1)

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

2)

Term Number	Term Value
1	10
2	16
3	20
4	26
5	32
Linear	Non-Linear

3)

Term Number	Term Value
1	15
2	18
3	21
4	25
5	28
Linear	Non-Linear

4)

Term Number	Term Value
1	14
2	19
3	24
4	29
5	34
Linear	Non-Linear

5)

Term Number	Term Value
1	14
2	32
3	50
4	68
5	86
Linear	Non-Linear

6)

Term Number	Term Value
1	25
2	75
3	125
4	175
5	225
Linear	Non-Linear

7)

Term Number	Term Value
1	112
2	126
3	138
4	152
5	166
Linear	Non-Linear

8)

Term Number	Term Value
1	210
2	260
3	310
4	360
5	410
Linear	Non-Linear

9)

Term Number	Term Value
1	500
2	650
3	700
4	850
5	1000
Linear	Non-Linear

Toothpick Linear Patterns

A **linear** pattern is a pattern that increases or decreases by a value that remains the same. Linear patterns can be plotted as a straight line on a graph.

Questions

Answer the question below using a table of values and a graph

Kelly has made a pattern using toothpicks. She has displayed her pattern below.

				
Term 1	Term 2	Term 3	Term 4	Term 5



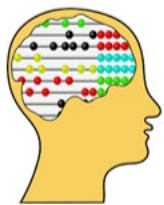
- Why is this a linear pattern?
- Extend the line on the graph. What will be the 7th and 10th term value?
7th term _____ 10th term _____

Name: _____

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Curriculum Connection
PR.1

Increasing Addition Patterns



Growing/Increasing Patterns

+10 +10 +10 +10 +10
 $\wedge \quad \wedge \quad \wedge \quad \wedge \quad \wedge$
 10, 20, 30, 40, 50, 60

+5 +5 +5 +5 +5
 $\wedge \quad \wedge \quad \wedge \quad \wedge \quad \wedge$
 3, 8, 13, 18, 23, 28



Part 1

Follow the rule by adding the next number in the pattern

1) (Add 4)
 47, 51, _____, _____

2) (Add 3)
 71, 74, 77, _____, _____, _____

3) (Add 6)
 102, 108, 114, _____, _____, _____

4) (Add 5)
 149, 154, 159, _____, _____, _____

5) (Add 10)
 277, 287, 297, _____, _____, _____

6) (Add 7)
 319, 326, _____, _____, _____

7) (Add 8)
 415, 423, 431, _____, _____, _____

8) (Add 9)
 61, 70, 79, _____, _____, _____

Part 2

Increasing Patterns - Addition

1)
 $\wedge \quad \wedge$
 33, 39, 45, _____, _____, _____

2)
 $\wedge \quad \wedge$
 52, 58, 64, _____, _____, _____

3)
 $\wedge \quad \wedge$
 91, 94, 97, _____, _____, _____

4)
 $\wedge \quad \wedge$
 162, 170, 178, _____, _____, _____

5)
 $\wedge \quad \wedge$
 201, 212, 223, _____, _____, _____

6)
 $\wedge \quad \wedge$
 314, 323, 332, _____, _____, _____

7)
 $\wedge \quad \wedge$
 473, 486, 499, _____, _____, _____

8)
 $\wedge \quad \wedge$
 614, 629, 644, _____, _____, _____

Name: _____

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Curriculum Connection
PR.1

Increasing Pattern Rules - Adding

Part 1

Continue the increasing patterns below

1) 47, 55, 63, _____, _____, _____

Pattern Rule: Start at 47, add _____ each time

2) 108, 117, 126, _____, _____, _____

Pattern Rule: Start at _____ add _____ each time

3) 203, _____, _____, _____, _____

Pattern Rule: Start at _____ add _____ each time

4) 326, 342, 358, _____, _____, _____

Pattern Rule: Start at _____ add _____ each time

5) 482, 499, 516, _____, _____, _____

Pattern Rule: Start at _____ add _____ each time

BONUS

Zara gets paid based on how fast she works. She is getting faster each day! Check out her paycheque for the last 5 weeks.

Week	Pay
1	100
2	120
3	150
4	190
5	240

Question

How much will she make in week 10 if the pattern continues?

Part 2

Write your own patterns using the pattern rule

1) _____, _____, _____, _____, _____

Pattern Rule: Start at 124, add 7 each time

2) _____, _____, _____, _____, _____, _____

Pattern Rule: Start at 465, add 15 each time

3) _____, _____, _____, _____, _____, _____

Pattern Rule: Start at 382, add 6 each time

4) _____, _____, _____, _____, _____, _____

Pattern Rule: Start at 505, add 12 each time

Writing Pattern Rules - Word Problems

Questions

Write the pattern rule for each of the word problems below

1) A baby is born 50cm long. It grows 2cm each month for one year.



2) Gerry has \$10 in his bank account. He is paid \$12 each week for his allowance.



3) A tree that grows double its size each year.



4) Claire is raking the leaves. Her yard has 5000 leaves on her property, and she cleans up half of the leaves every day.



5) There are 48 yogurt drinks in a pack. The child drinks 4 drinks a day.



6) The family has to drive 500km to get home. They drive 100km every hour.



7) There is 8cm of snow on the ground. During a snowstorm, 4cm of snow falls every hour.



8) A baby's hair is 3cm long. It grows triple its length each month.



Increasing Patterns - Word Problems

Questions

Solve the word problems below

1) Courtney is heading to college in 6 months. She begins saving more and more money. Her savings are represented in the table of values.



Month	Savings
April	500
May	800
June	1200
July	1700
August	

a) What is the pattern rule?

b) If the pattern continues, how much will she save in August?

2) Billy is improving each week. In the first 6 games of the season, his points per game increased. His points have been represented in the table below.



Games	Points
1	3
2	5
3	9
	15
	23

a) What is the pattern rule?

b) If the pattern continues, how many points will he score in the 10th game?

3) Emmett has a math test next week. He plans to study each night for the next 7 nights. The first night he will study for 10 minutes. The second night he will study for 10 minutes plus an additional 10 minutes. The third night he will study for 10 minutes plus an additional 20 minutes. The fourth night he will study for 10 minutes plus an additional 30 minutes.

Night	1	2	3	4	5	6	7
Minutes							

a) Complete the table of values

b) If his studying pattern continues, how many minutes will he study on the 7th night?



Counting by Tenths - Decimal Pattern

Questions

Continue counting by tenths by filling in the missing boxes

[illegible]

Name: _____

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Curriculum Connection
PR.1

Decreasing Subtraction Patterns

$\begin{array}{ccc} -3 & -3 & -3 \\ \wedge & \wedge & \wedge \\ 23, & 20, & 17, & 14, & 11, & 8 \end{array}$

Pattern Rule: Start at 23, subtract 3 each time.



Questions

Decreasing Patterns - Subtraction

1) 142, 139, _____, _____, _____

Pattern Rule

2) 165, 159, 153, _____, _____, _____

Pattern Rule

3) 241, 230, 219, _____, _____, _____

Pattern Rule

4) 378, 370, 362, _____, _____, _____

Pattern Rule

5) 412, 405, 398, _____, _____, _____

Pattern Rule

6) 475, 465, 455, _____, _____, _____

Pattern Rule

7) 563, 554, 545, _____, _____, _____

Pattern Rule

8) 627, 618, 609, _____, _____, _____

Pattern Rule

9) 775, 750, 725, _____, _____, _____

Pattern Rule

10) 853, 841, 829, _____, _____, _____

Pattern Rule

Name: _____

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Curriculum Connection
PR.1

Increasing Patterns - Multiplication



x2 x2 x2



2, 4, 8, 16, 32, 64

Pattern Rule: Start at 2, multiply by 2 each time.



Questions

Increasing Patterns - Multiplication

PREVIEW

1) 3, _____, _____, _____

Pattern Rule

2) 2, 10, 50, _____, _____, _____

Pattern Rule

3) 3, 18, 108, _____, _____, _____

Pattern Rule

4) 10, 100, 1000, _____, _____, _____

Pattern Rule

5) 10, 50, 250, _____, _____, _____

Pattern Rule

6) 1, 4, 16, _____, _____, _____

Pattern Rule

7) 4, 12, 36, _____, _____, _____

Pattern Rule

8) 3, 6, 12, 24, _____, _____, _____

Pattern Rule

9) 7, 21, 63, _____, _____, _____

Pattern Rule

10) 6, 24, 96, _____, _____, _____

Pattern Rule

Name: _____

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Curriculum Connection
PR.1**Pattern Rule - Division****Part 1**

Continue the decreasing patterns below

#	Pattern	Rule ÷ ____
1)	15 625, 3 125, 625, 125, 5	
2)	3 072, 768, 192, 48, 12, 3	
3)	5 184, 864, 144, 24, 4	
4)	70 567, 189, 63, 21, 7	
5)	1 024, 64, 4, 1, 16, 32, 16, 8	
6)	18 750, 3 750, 750, 150, 30, 6	

Part 2

Write your own patterns using the pattern rule

1) _____, _____, _____, _____, _____

Pattern Rule: Start at 256, divide by 2 each time

2) _____, _____, _____, _____, _____, _____

Pattern Rule: Start at 1 458, divide by 3 each time

3) _____, _____, _____, _____, _____

Pattern Rule: Start at 25 000, divide by 5 each time

4) _____, _____, _____, _____, _____, _____

Pattern Rule: Start at 4 096, divide by 4 each time

Input/Output Table - Subtraction

Rule: subtract 5

In	Out
138	133
154	149
181	176
196	191



Questions: Fill in the input/output tables below

Rule: subtract 4

In	Out
112	
138	
163	
195	

Rule: subtract 5

In	Out
206	
231	
260	
284	

Rule: subtract 3

In	Out
297	
305	
321	
330	

Rule: subtract 7

In	Out
308	
335	
367	
402	

Rule: subtract 20

In	Out
508	
529	
543	
588	

Rule: subtract 8

In	Out
611	
632	
648	

Rule: subtract 6

In	Out
623	
647	
668	
705	

Rule: subtract 12

In	Out
854	
879	
891	
903	

Rule: subtract 15

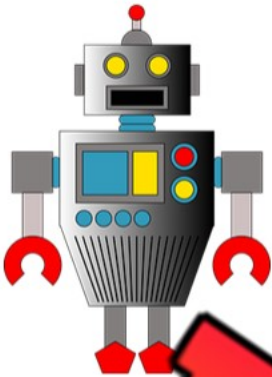
In	Out
905	
946	
978	
999	

Name: _____

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Curriculum Connection
PR.2

Pattern Rule - Input/Output Tables



Add 10

In	Out
20	30
30	40
50	60
90	100



Question: Fill in the input/output tables below

Rule: add 4

In	Out
43	
	72
	91
113	

Rule: add 3

In	Out
24	
47	
	87
	100

Rule: add 8

In	Out
71	
	94
113	
	149

Rule: subtract 7

In	Out
	58
96	
	131
164	

Rule: subtract 4

In	Out
112	
153	
	177
	193

Rule: subtract 12

In	Out
	141
	168
199	

Rule: subtract 11

In	Out
	215
	268
292	
305	

Rule: add 13

In	Out
	326
361	
385	
	400

Rule: add 15

In	Out
412	
436	
	468
	497

Table of Values

Questions

Answers the questions below by using the table of values

When you work an hour, you get paid 32 dollars. Fill in the table to learn more about your earnings.

1) How many dollars will you make if you work 5 hours?

2) How many dollars will you make if you work 10 hours?



Hours Worked	Money Made
1	
2	
3	
4	
5	
10	

Weeks	Distance Run (km)
1	
2	
3	
4	
5	
10	

You are training for a marathon, so you run 42km a day for 5 weeks.

1) How many km did you run after 5 weeks?

2) How many km will you run if you ran 42km for 10 weeks?

Chris is studying for a science test next week. Each night he studies for 45 minutes.

1) How many minutes does he study after 5 nights?

2) How many minutes does he study after 8 nights?

3) How many nights does he need to study to have studied for 585 minutes total?

Nights	Minutes
1	
2	
3	
4	
5	
8	

Patterning - Growing Baby

Challenge

Answer the question below. Show your thinking!

A baby grows much faster than an adult. Babies can gain 3 grams of weight every hour!

- a) If a baby was born weighing 4000 grams, how much would it weigh after 5 days?



- b) How much would it weigh in kilograms? Remember 1000g = 1kg

BONUS

How much would it weigh after 12 days?



_____g

_____kg

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 Find the pattern rule when you look across the table of values

Term Number	Term Value
1	3
2	6
3	9
4	12
5	15
8	

$n \times 3$

Term Number	Term Value
1	1
2	3
3	5
4	7
5	9
9	

$n \times 2 - 1$

Term Number	Term Value
1	4
2	5
3	6
4	7
5	8
11	

Term Number	Term Value
1	3
2	5
3	7
4	9
5	11
9	

Term Number	Term Value
1	4
2	7
3	10
4	13
5	16
10	

Term Number	Term Value
1	16
2	22
3	28
4	34
5	40
11	

Table of Values - Finding Term N

Practice

Find the pattern rule when you look across the table of values

Term Number	Term Value
1	10
2	11
3	12
4	13
5	14
8	

Term Number	Term Value
1	4
2	6
3	8
4	10
5	
9	

Term Number	Term Value
1	7
2	11
3	15
4	19
5	
11	

Term Number	Term Value
1	4
2	9
3	14
4	19
5	
11	

Term Number	Term Value
1	7
2	
3	
4	25
5	
11	

Term Number	Term Value
1	8
2	18
	28
	38

Word Problem

Use a table of values and find the n^{th} term

Shelly goes out looking for shells on a beach. She records how many shells she finds each day. She found 7 shells the first day, 11 shells the second day, 15 the third day, and 19 the fourth day. How many will he find on the 30th day if the pattern continues.



Finding Term N - Word Problems

Word ProblemUse a table of values and find the n^{th} term

- 1) Colton has been saving money since he was 5 years old. He is now 15. He saved \$25 when he was 1, \$45 when he was 2, \$65 when he was 3 and \$85 when he was 4.



i) How much will he save when he is 10?

ii) How much will he save when he is 20?

- 2) Becky is ramping up her exercise each week. In week 1, she exercised 60 minutes. In week 2, she exercised 110 minutes. In week 3, she exercised 160. In week 4, she exercised 210 minutes.

a) If the pattern continues...

i) How much will she exercise in week 10?

ii) How much will she exercise in week 30?

iii) How much will she exercise in one year? (week 52)



Patterning Word Problems - Blocks

Challenge

Answer the problems below

Matt is building a structure using blocks. The construction of his structure will be completed in 5 phases.

- a) Matt decided to add the same number of blocks during each of the 5 phases. He has 3 different design ideas. Fill in the tables below.

Phase	Blocks
1	1
2	
3	
4	22
5	

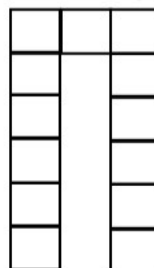
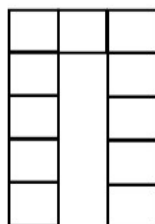
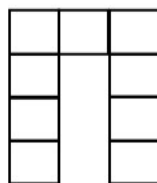
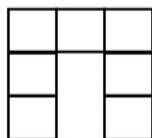
Phases	Blocks
1	
2	12
3	
4	
5	

Phases	Blocks
1	8
2	
3	
4	
5	36

- b) Whoops, Matt made a mistake when he completed the table. His structure was supposed to add the same number of blocks during each phase. Find his error and correct it.

Phases	1	2	3	4	5
Blocks	13	18	21		

- c) You want to build a house out of blocks, but each block costs \$1. You have created 4 different design plans. You have \$70 to spend. Which design will you choose?



Design	Blocks	\$
1		
2		
3		
4		

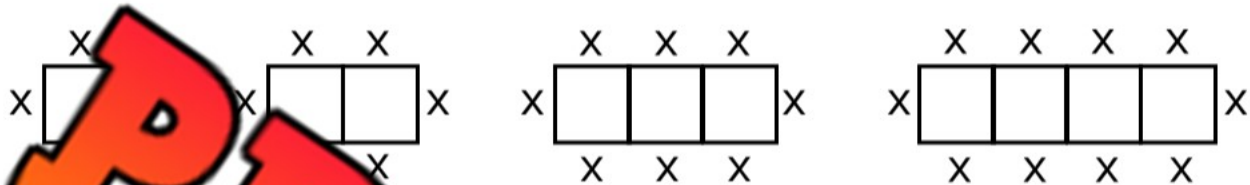
Picnic Word Problem - T-Tables

Challenge

Answer the word problem below. Use the T-Table to help.

You have been put in charge of organizing the end of the 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.



a) Fill in the table below to learn more about the pattern of how many people can attend the banquet.

Tables	1	2	3	4	5
# of Seats					

b) What is the pattern rule?

c) How many people could you seat if you had...

i) 10 tables: _____

ii) 15 tables: _____

d) What if you didn't put the tables together? Would 8 tables together fit more or less than 8 tables apart?

Name: _____

60

Curriculum Connection
PR.1, PR.2

Basketball Skills Challenge

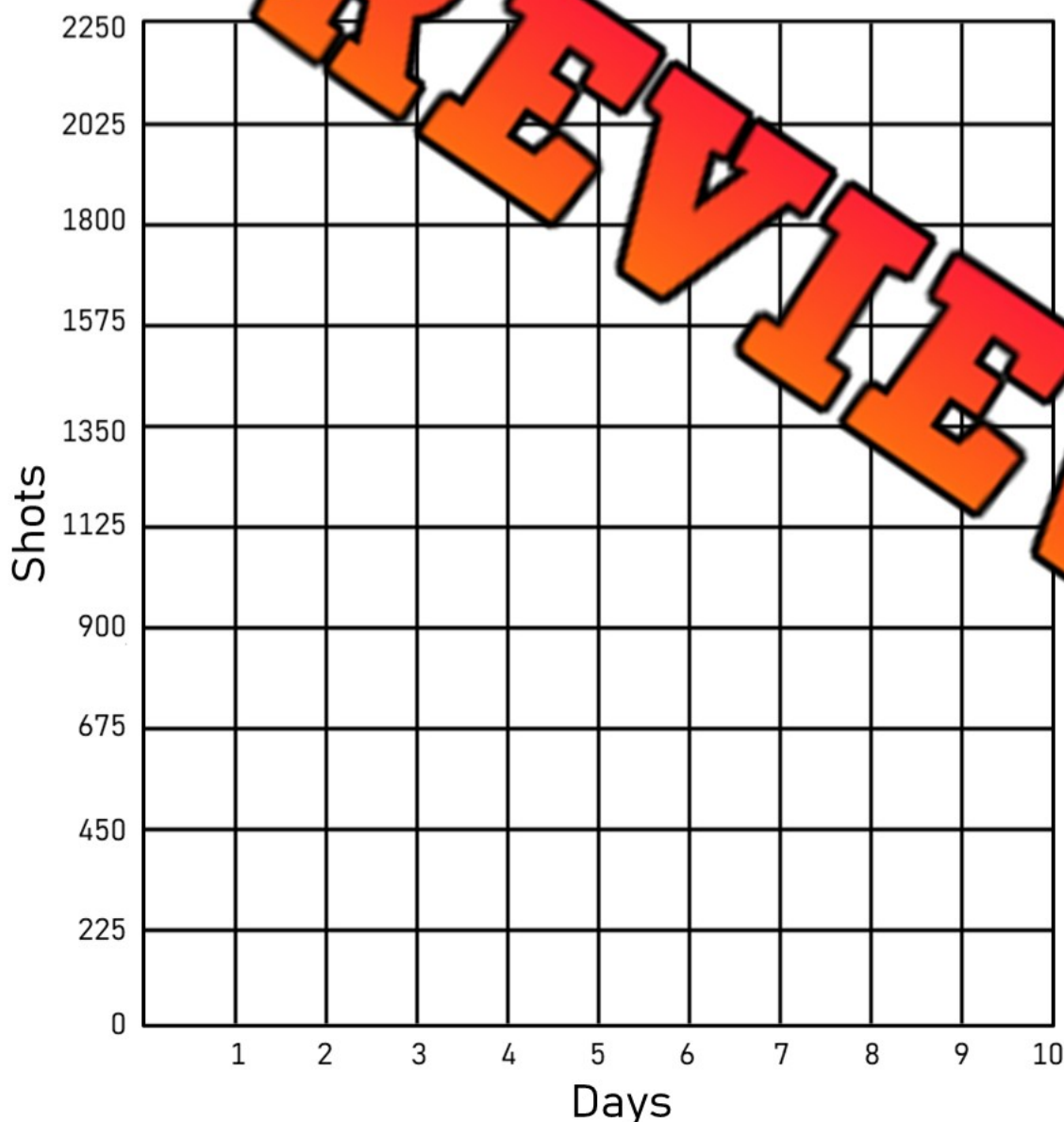
Questions

Complete the table of values and graph the results

Connor is practicing his shooting skills in basketball. He decides to take 225 shots each day for 10 days.

Term Number (Days)	1	2	3	4	5	6	7	8	9	10
Term Value (Shots)										

Pattern Rule: _____



Questions

1. Which day did Connor finish 1500 shots?

2. How many shots did Connor take in 10 days?

3. A friend took 300 shots for 7 days, who would have taken more? Explain.

Name: _____

62

Curriculum Connection
PR.1, PR.2

Saving Money

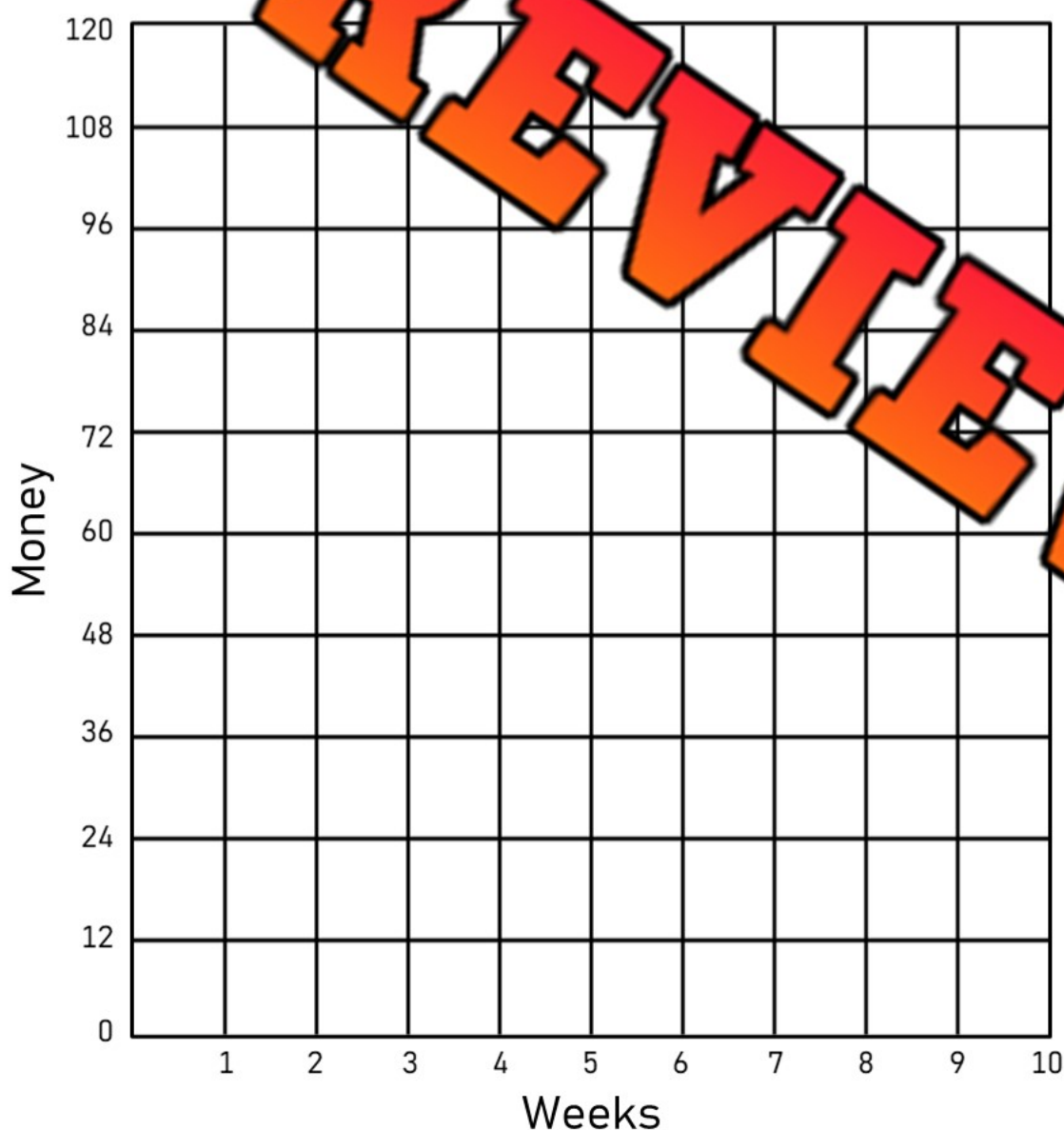
Questions

Complete the table of values and graph the results

Jesse is saving her pay cheques from work each week for 10 weeks. She makes \$450 each week. She is hoping she can buy a new bike for \$4 000. Fill in the table below to find out.

Term Number (Weeks)	1	2	3	4	5	6	7	8	9	10
Term Value (Money)										

Patte. . .



Questions

1. Can Jesse buy her new bike after week 10?

2. How much did she save in 10 weeks?

3. If she kept saving, how many weeks would she need to save \$6750.

4. How much money would she have after 13 weeks?

Name: _____

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Curriculum Connection
PR.3

Pre-Algebra - Balancing Addition Equations

Balancing equations means both sides of the equal sign must be the same.

Examples:

$$\begin{array}{c} 52 \\ \swarrow \downarrow \searrow \\ 37 + 15 = \boxed{52} \end{array}$$

$$\begin{array}{c} 78 \\ \swarrow \downarrow \searrow \\ 46 + 32 = \boxed{78} \end{array}$$

Questions

Fill in the missing number to balance the equation

1) $44 + \boxed{} =$

2) $53 + 9 = \boxed{}$

3) $67 + 12 = \boxed{}$

4) $15 + \boxed{} =$

5) $\boxed{} + 46 = 57$

6) $68 + \boxed{} = 81$

7) $\boxed{} + 12 = 95$

8) $\boxed{} + 25 =$

9) $\boxed{} + 59 = 66$

10) $72 + 14 = \boxed{}$

11) $64 + \boxed{} = 86$

12) $\boxed{} + 50 = 65$

13) $68 + \boxed{} = 82$

14) $83 + 15 = \boxed{}$

15) $89 + \boxed{} = 102$

16) $105 + \boxed{} = 116$

17) $121 + 14 = \boxed{}$

18) $145 + \boxed{} = 160$

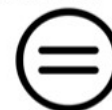
19) $177 + \boxed{} = 198$

20) $215 + 41 = \boxed{}$

21) $217 + \boxed{} = 229$

Addition - Find the Variable

A **variable** is a letter that represents an unknown number. When we don't know a number, we can use a letter to take the place of the unknown number.



Example: $15 + n = 35$

We can figure out the unknown number by balancing the equation. In this equation, $n = 20$.

Part 1 Find out the value of the variable

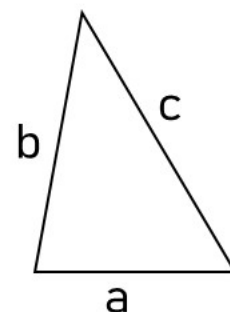
$9 + n = 20$ $n =$	$n + 13 = 20$ $n =$	$27 + n = 35$ $n =$
$41 + 1 = p$ $p =$	$36 + p = 51$ $p =$	$p + 48 = 79$ $p =$
$85 + y = 101$ $y =$	$y + 15 = 55$ $y =$	$124 + 15 = y$ $y =$
$165 + t = 181$ $t =$	$190 + t = 205$ $t =$	$205 + t = 220$ $t =$
$231 + a = 245$ $a =$	$256 + a = 271$ $a =$	$205 + a = 285$ $a =$
$281 + 9 = s$ $s =$	$290 + n = 300$ $s =$	$s + 10 = 300$ $s =$

Part 2 The formula for calculating the perimeter of a shape is to add the side lengths

Find the perimeter with the measurements given for the 3 side lengths.

1) $a=4$ $b=7$ $c=10$	$P=$
2) $a=7$ $b=12$ $c=16$	$P=$
3) $a=9$ $b=17$ $c=23$	$P=$

4) $a=12$ $b=25$ $c=30$	$P=$
5) $a=19$ $b=31$ $c=45$	$P=$
6) $a=15$ $b=23$ $c=36$	$P=$



Name: _____

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Curriculum Connection
PR.3, PR.4

Addition Equations - Perimeter of a Rectangle

When we calculate the perimeter of a rectangle, we need to add all the sides together. The order of how we decide to add the sides together will not affect the answer due to the commutative property of addition.

Formula 1 - $p = a + b + a + b$
 $p = 12 + 4 + 12 + 4$
 $p = 32$

$a = 12\text{cm}$



$b = 4\text{cm}$

Formula 2

$p = 2(a + b)$

$p = 2 \times (12 + 4) = 32$

Part 1

Write 2 equations for the side lengths below

#	Side Length A	Side Length B	Equation 1	Equation 2
1	7	6		
2	5			
3	9			
4	11			
5	13	16		
6	20	17		
7	17	11		
8	22	14		
9	19	22		
10	27	14		

Part 2

Using multiplication and addition, write two equations for the side lengths

#	Side length A	Side Length B	Equation 1	Equation 2
1	7	3	$2 \times (7 + 3) = 20$	$2 \times (3 + 7) = 20$
2	5	4		
3	9	5		
4	6	8		

Word Problems - Writing Addition Equations

Questions

Answer the questions below

1) Alex and Ryan had 37 points together in a basketball game. Ryan had 21 points. Which equation will tell us how many points Alex had?

$a + 21 = 37$	$37 + 21 = a$
$21 + a = 37$	$21 - a = 37$



2) Bruce and another person earned \$75 together at work. Bruce can't remember how much he made, but he knows the other person made \$39. Which equation will tell us how much Bruce made?

$b + 39 = 75$	$39 + b = 75$
$75 + 39 = b$	$75 + 39 = b$



3) Mary and Brianna found 121 Easter eggs together. Mary found 65. Which equation will tell us how many Brianna found?



$121 + b = 65$	$65 + b = 121$
$b + 65 = 121$	$121 + b = 65$

4) Brad scored 38 points in a basketball game. He had 12 points in the second half. Which equation will tell us how many points he had in the first half?

$p + 38 = 12$	$38 + 12 = p$
$38 + p = 12$	$12 + p = 38$



5) It snowed 31cm in two days. The first day it snowed 14cm. Which equation will tell us how much it snowed the second day?



$s + 14 = 31$	$31 + 14 = s$
$14 + s = 31$	$31 + s = 14$

Word Problems - Solving Addition Equations

Questions

Write the algebraic equations and answer the question

1) Luna drove 321km to get to a friend's house and then they drove to the mall. When they got to the mall, she had driven 418 km in total. How many km did she drive to the mall (m)?



2) Carter got 5 points for beating level 1 in a video game. He got 238 more points for beating level 2. How many total points (t) did he have after level 2?

Bonus - He had 5 points after beating level 3. How many points did he get in level 3 (L)?



3) The Lakers scored 122 points against the Toronto Raptors. Kobe Bryant had 81 points for the Lakers. How many points (p) did the rest of the team have?



4) Wyatt's boat can hold 500 litres of gas. He went out boating and when he docked the boat after he was done, the tank had 128 litres of gas. How many litres (L) did he use?



5) Leo had \$736 in his bank account. He deposited some more money after gardening for a summer. Now he has \$980. How much money (m) did he make gardening?



Solving Addition Equations - Shopping Trip**Questions**

Solve the problems below. The first one is done for you

1) Jan spent x amount of dollars on new clothes at the mall. She bought jeans (j) for \$79, a shirt (s) for \$35, and a hat (h) for \$49. Find the value of x .

Equation : $x = j + s + h$

$$x = 79 + 35 + 49$$

 $x = \$163$ Therefore, Jan spent \$163.

2) Aiden went to a pet store. He bought dog food (f) for \$78 and bones (b) for \$49. He also bought a new dog toy (t) for \$62. How much did he spend (s)?

Equation : _____



3) Josiah spent \$830 total (t) at a sports store. He bought new skates (s) for \$475, new gloves (g) for \$190, and a new pair of ice skates (n) for a number of dollars. How much is n worth?

Equation : _____



4) Barry bought 4 new t-shirts (s) that all cost the same amount. The total (t) price of \$208. How much is s worth?

Equation : _____ = _____ + _____ + _____ + _____



5) Henry bought a new computer setup for a total (t) of \$999. He bought a computer for c number of dollars. He also bought a keyboard (k) for \$82 and a mouse (m) for \$58. How much is c worth?

Equation : _____



Subtraction - Find the Variable

A **variable** is a letter that represents an unknown number. When we don't know a number, we can use a letter to take the place of the unknown number.

Example: $39 - n = 25$

We can figure out the unknown number by balancing the equation. In this equation, $n = 14$.

Question

Find out the value of the variable

1) $28 - n = 28$ $n =$	2) $n - 15 = 20$ $n =$	3) $47 - n = 35$ $n =$
4) $68 - p = 68$ $p =$	5) $74 - p = 53$ $p =$	6) $p - 16 = 50$ $p =$
7) $76 - y = 61$ $y =$	8) $76 - y = 61$ $y =$	9) $92 - 13 = y$ $y =$
10) $105 - t = 91$ $t =$	11) $114 - t = 101$ $t =$	12) $131 - t = 119$ $t =$
13) $153 - a = 137$ $a =$	14) $168 - a = 145$ $a =$	15) $175 - a = 158$ $a =$

Part 2

Calculate the change a customer gets when they buy something

When a customer buys something, the formula for calculating their change (c) is money given (m) subtract the price (p) of the item. Therefore, $c = m - p$

$m = 20$ $p = 15$	$c = 20 - 15$	$c = 5$
$m = 30$ $p = 19$	$c = \underline{\quad} - \underline{\quad}$	$c =$
$m = 50$ $p = 27$	$c = \underline{\quad} - \underline{\quad}$	$c =$

$m = 60$ $p = 51$	$c = \underline{\quad} - \underline{\quad}$	$c =$
$m = 100$ $p = 77$	$c = \underline{\quad} - \underline{\quad}$	$c =$
$m = 100$ $p = 61$	$c = \underline{\quad} - \underline{\quad}$	$c =$

Word Problems - Solving Subtraction Equations**Questions**

Write the equation using the variable and then solve the equation

1) Sofia started the weekend with \$421 in her bank account. She went shopping (s) at the mall and now has \$76. How much did she spend at the mall?



2) Chloe is running a 5000m race. She has run 2931m already. How many metres does she have left to run the race?



3) Michael is driving to an amusement park. The park is 573km away. He will need to stop for gas at the 350km mark. How many km will he have left (L) after he stops?



4) Jacob is climbing Mount Everest to Base Camp. It is 5,404m high. He stops for a break with 1,650m left. How many metres has he climbed (c) and how many more does he have to climb?



5) Willow is driving to her cottage in northern Alberta. The total distance is 801km. She has driven 427km already. How much more distance (d) does she need to drive?



Solving Subtraction Equations - Vacation

Questions

Solve the problems below. The first one is done for you

1) Ron is driving 1,350km (x) to a resort with his family. They drive 415km on the first (f) day and 480km on the second (s) day. How many km do they have left (L)?

Equation : $L = x - f - s$ or $x - f - s = L$

$$L = 1350 - 415 - 480$$

$L = 455\text{km}$ Therefore, Ron and his family have 455km remaining to drive.



2) They go to a restaurant (b) \$400 on dinner out for 3 nights. They spent \$95 on the first (f) night and \$105 on the second (s) dinner. How much do they have left for the third dinner (t)?

Equation : _____

Therefore, _____



3) The family heads to the water slide paying \$200 in total (t). The two adults (a) cost \$48 each. The two kids (k) cost \$20 each. How much do they have left (L)?

Equation : _____

Therefore, _____



4) The family buys a 50 pack of gummies (g). Ron (r) has 6 and the kids (k) have 8. The kids (k) eat 26 together. How many gummies are left (L)?

Equation : _____

Therefore, _____



5) On the drive home, they take a short cut. The drive is 981km (d). They drive 311km the first day (f) and 511km the second (s) day. How many km do they have left (L)?

Equation : _____

Therefore, _____



Multiplication - Find the Variable

When we multiply a number by a variable, we do not need to use the multiplication sign. It is known that any variable next to a number means the operation we are using is multiplication.

Example: $7n = 14$ means $7 \times n = 14$

We can figure out the unknown number by balancing the equation - $n = 2$.

Question Find out the value of the variable

1) $2n = 10$ $n =$	2) $n \times 8 = 16$ $n =$	3) $s \times 6 = 48$ $s =$
4) $10 \times p = 40$ $p =$	5) $a = 30$ $a =$	6) $6k = 18$ $k =$
7) $3n = 18$ $n =$	8) $n \times 5 = 25$ $n =$	9) $n \times 6 = 66$ $n =$
10) $5n = 25$ $n =$	11) $6 \times 4 = t$ $t =$	12) $8 \times 4 = p$ $p =$
13) $3n = 24$ $n =$	14) $10n = 100$ $n =$	15) $7 \times 9 = u$ $u =$
16) $9s = 27$ $s =$	17) $5 \times 8 = s$ $s =$	18) $4 \times t = 32$ $t =$

Part 2 Calculate the area using the variables for Length and Width

The formula for calculating area is: $A = L \times W$

Calculate the area in the questions below using the values for the variables L and W

L = 5 W = 8	A =	L = 4 W = 12	A =
L = 9 W = 7	A =	L = 8 W = 5	A =
L = 6 W = 11	A =	L = 3 W = 13	A =

Name: _____

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Curriculum Connection
PR.3, PR.4**Equation Pairs - Area of a Rectangle - Multiplication**

Liam believes you can find the area of a rectangle in two different ways. Can you write the two equations you could use to solve the area of a rectangle?

Remember - $a = l \times w$ 

3cm

7cm

Option 1

$a = 7 \times 3$

$a = 21\text{cm}^2$

Option 2

$a = 3 \times 7$

$a = 21\text{cm}^2$

Question Write two equations that represent the area of a rectangle

#	Length	Width	Equation 1	Equation 2
1	7cm	3cm		
2	5cm	4cm		
3	9km	6km		
4	10cm	8cm		
5	7m	4m		
6	9m	5m		
7	6cm	12cm		
8	8km	11km		
9	4cm	9cm		
10	7m	6m		

Name: _____

92

Curriculum Connection
PR.3, PR.4

Writing Multiplication Equations - Lottery Tickets

Amelia is selling lottery tickets for \$15 a ticket. She needs to calculate how much money her customers owe her for her tickets.



Part 1

Use multiplication equations to fill in the table

#	# of Tickets (t)	Equation 1 $t \times 15 = ?$	Equation 2 $15 \times t = ?$
1			
2			
3			
4	3		
5	7		
6	9		
7	10		
8	5		

Part 2

Amelia sells tickets to two different people in the morning

#	# of Tickets Person 1	# of Tickets Person 2	Equation
1	5	3	$(5 \times 15) + (3 \times 15) = 120$
2	4	7	
3	9	2	
4	2	5	
5	6	6	

Name: _____

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Using Variables to Solve Multiplication Equations

There are some instances where we know the values of variables and need to plug them into an equation. For example:

$$ab = c$$

$$a = 6$$

$$b = 8$$

$$6 \times 8 = c$$

$$c = 48$$



Questions

Find out the value of the variable

$$ab = c \quad a = 7 \quad b = 4$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = c$$

$$c =$$

$$en = f \quad e = 3 \quad n = 6$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = f$$

$$f =$$

$$ry = p \quad r = 5 \quad y = 8$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = p$$

$$p =$$

$$tg = h \quad t = 3 \quad g = 7$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = h$$

$$h =$$

$$ab = c \quad a = 6 \quad b = 8$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = c$$

$$c =$$

$$en = f \quad e = 2 \quad n = 8$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = f$$

$$f =$$

$$ry = k \quad r = 4 \quad y = 9$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = k$$

$$k =$$

$$tg = h \quad t = 3 \quad g = 5$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = h$$

$$h =$$

$$ab = c \quad a = 6 \quad b = 7$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = c$$

$$c =$$

$$en = f \quad e = 3 \quad n = 8$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = f$$

$$f =$$

$$ry = p \quad r = 4 \quad y = 12$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = p$$

$$p =$$

$$tg = h \quad t = 11 \quad g = 4$$

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = h$$

$$h =$$

Solving Multiplication Equations

Questions

Solve the problems below. The first one is done for you

1) The Mighty Bears play 3 games (g) a week for 7 weeks (w). How many games in total did they play (p)?

Equation : $p = g \times w$ or $g \times w = p$

$$p = 3 \times 7$$

$p = 21$ Therefore, the Mighty Bears played 21 games in total.



2) Jaxon picked (a) apples from each tree at an apple orchard. He picked 72 apples. How many trees (t) did he pick apples from?

Equation : _____



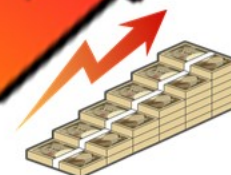
3) Kai puts 8 small chlorine pucks (p) in his pool each week. He went through 96 total (t) chlorine pucks last summer. How many weeks (w) did he have the pool running last summer?

Equation : _____



4) Isaiah invests (i) 225 each week for 10 weeks (w). How much money (m) has he have invested after 10 weeks?

Equation : _____



5) Ivy paid (p) \$525 for her lawn to be cut for the summer. She was charged \$25 per time (t). How many times was her lawn cut (c)?

Equation : _____



Therefore, _____

Pre-Algebra - Balancing Division Equations

Balancing equations means both sides of the equal sign must be the same.

Examples

$$\begin{array}{c} 5 \\ \wedge \\ 25 \div 5 = \boxed{5} \end{array}$$

$$\begin{array}{c} 6 \\ \wedge \\ 18 \div \boxed{3} = 6 \end{array}$$

Questions

Fill in the missing number to balance the equation

1) $36 \div \boxed{}$

2) $35 \div 7 = \boxed{}$

3) $20 \div 5 = \boxed{}$

4) $24 \div \boxed{}$

5) $\boxed{} \div 4 = 3$

6) $35 \div \boxed{} = 7$

7) $\boxed{} \div 5 = 4$

8) $\boxed{} \div 6 = 8$

9) $\boxed{} \div 3 = 9$

10) $36 \div 4 = \boxed{}$

11) $56 \div \boxed{} = 8$

12) $72 \div \boxed{} = 9$

13) $24 \div \boxed{} = 3$

14) $99 \div 9 = \boxed{}$

15) $64 \div \boxed{} = 8$

16) $48 \div \boxed{} = 6$

17) $20 \div 4 = \boxed{}$

18) $48 \div \boxed{} = 12$

19) $49 \div \boxed{} = 7$

20) $36 \div 3 = \boxed{}$

21) $72 \div 6 = \boxed{}$

Division - Find the Variable

A **variable** is a letter that represents an unknown number. When we don't know a number, we can use a letter to take the place of the unknown number.

Example: $27 \div n = 3$

We can figure out the unknown number by balancing the equation - $n = 9$.

Question

Find out the value of the variable

1) $45 \div n = 5$ $n =$	2) $n \div 9 = 3$ $n =$	3) $s \div 5 = 3$ $s =$
4) $24 \div 4 = p$ $p =$	5) $24 \div p = 6$ $p =$	6) $48 \div r = 8$ $r =$
7) $36 \div n = 6$ $n =$	8) $n \div 8 = 7$ $n =$	9) $t \div 11 = 5$ $t =$
10) $90 \div n = 9$ $n =$	11) $s = t$ $t =$	12) $81 \div 9 = p$ $p =$
13) $64 \div n = 8$ $n =$	14) $77 \div n = 11$ $n =$	15) $s = 11$ $s =$
16) $48 \div s = 4$ $s =$	17) $42 \div 7 = s$ $s =$	18) $s =$

Part 2

Calculate the area using the variables Length and Width

Servers at a restaurant share tips (t) equally at the end of the day. The number of people that share the tips depends on how many servers (s) were working. We can use a formula to find out how much money (m) each server takes home: $m = t \div s$

$t = 150$ $s = 5$	$m = 150 \div 5$	$m = 30$
$t = 180$ $s = 3$	$m = \div$	$m =$
$t = 250$ $s = 5$	$m = \div$	$m =$

$t = 120$ $s = 3$	$m = \div$	$m =$
$t = 210$ $s = 7$	$m = \div$	$m =$
$t = 320$ $s = 4$	$m = \div$	$m =$

Name: _____

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Curriculum Connection
PR.3, PR.4

Writing Division Equations - Sharing

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



Questions

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

#	Treat	# of Staff (s)	Formula	Answer
1	16 donuts (d)	8	$d \div s = t$	$16 \div 8 = 2$
2	12 cookies (c)	6	$c \div s = t$	
3	20 muffins (m)			
4	16 slices of pizza (p)	4		
5	10 bagels (b)	10		
6	15 donuts (d)	5		
7	24 cookies (c)	8		
8	18 muffins (m)	6		
9	28 pastries (p)	4		
10	32 cookies (c)	8		
11	36 slices of pizza (p)	9		
12	24 bagels (b)	3		
13	25 muffins (m)	5		

Word Problems - Writing Division Equations

Questions

Answer the questions below

1) Neil has 180 crayons that he wants to split into equal groups of 20. Which equation shows how many groups (g) of 20 he will have?



$$g \div 180 = 20$$

$$g \div 20 = 180$$

$$180 \div 20 = g$$

$$180 \div g = 20$$



2) Katie has 25 friends over for a big party. She wants to have 2 treats for each friend. Which equation shows how many treats in total (t) she will need?



$$25 \div t = 2$$

$$2 \div 25 = t$$

$$25 \div t = 2$$

$$t \div 25 = 2$$



3) The kindergarten class has 300 blocks. Which equation shows how many blocks (b) each student can have?



$$300 \div 15 = b$$

$$b \div 300 = 15$$

$$300 \div 15 = b$$

$$b \div 300 = 15$$

4) Mrs. Wilson brought in 90 candies for her students. She has 30 students. Which equation shows how many candies (c) each student will get?

$$c \div 90 = 30$$

$$90 \div c = 30$$

$$90 \div 30 = c$$

$$30 \div c = 90$$



5) Mr. Rogers is donating \$1000 to different charities. He gives \$200 to the charities of his choice. Which equation shows how many charities (c) he donated to?



$$c \div 1000 = 200$$

$$200 \div c = 1000$$

$$1000 \div 200 = c$$

$$1000 \div c = 200$$

Solving Division Equations

Questions

Solve the problems below. The first one is done for you

1) Jonathon has 1000 potatoes (p) from his farm. He wants to sell them in bags (b) of 20. How many bags will he have in total (t)?

Equation : $t = p \div b$

$$t = 1000 \div 20$$

$t = 50$ Therefore, Jonathon will have 50 bags of potatoes to sell.



2) Mr. W. teaches 5 subjects (s) for 225 minutes total (t). If he teaches the 5 subjects equally, how many minutes (m) will he teach each subject?

Equation : _____

_____ Therefore, _____



3) Jayden is inviting 9 friends to a party. He has a total of 117 cookies (c) for his friends to share evenly. How many cookies will each friend get (g)?

Equation : _____

_____ Therefore, _____



4) Matthew has 228 toys (t) stored in 12 different boxes. How many toys are in each box?

Equation : _____

_____ Therefore, _____



5) A group of friends go on a trip together. They all agree they will equally split up the driving duties. The total (t) distance is 1950km. Each friend drove (d) 325km. How many friends (f) went on the trip?

Equation : _____

_____ Therefore, _____



Writing Algebraic Expressions - Treats

A mathematical expression is similar to an equation, but it does not have an equal sign. We use expressions to describe a mathematical situation.

Questions

Write the expressions for the situations below

1) Lindsay has y amount of cookies. She gives 32 cookies away to the students in her class.

Expression: _____



2) Courtney has b brownies. She eats 2 brownies.

Expression: _____



3) Alyse makes t cupcakes to share equally with her 4 friends.

Expression: _____



4) Hani gives 2 freezies to f of his friends.

Expression: _____



5) Scott has 11 sodas in his fridge and buys s more sodas.

Expression: _____



6) Dan buys 2 dozen donuts and eats d number of donuts for breakfast.

Expression: _____



7) Steve buys x number of cookies and gives 15 to his staff.

Expression: _____



8) Alexa has 35 suckers that she shares equally with her f number of friends.

Expression: _____



9) Brian has 200 gummy worms and takes n number of gummies from his brother.

Expression: _____



10) Howard gives 3 books each to s number of students.

Expression: _____

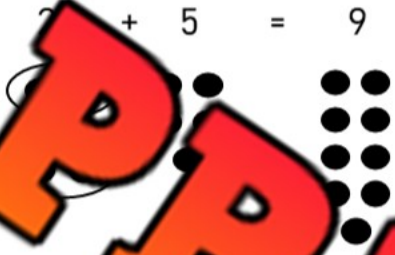
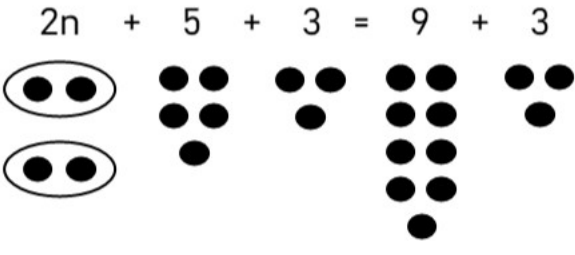
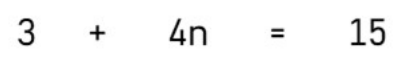


Equivalent Forms of an Equation

When we add or subtract the same amount from both sides of an equal sign, the equation does not change. Investigate this theory below.

Questions

Draw circles to represent the equations

#	Original Equation	Change	New Equation
1	$2 + 5 = 9$ 	Add 3	$2n + 5 + 3 = 9 + 3$ 
2	$5 + =$ 	Subtract 3	
3	$12 - n = 7$ 	Add 3	
4	$3n + 4 = 13$ 	Subtract 5	
5	$3 + 4n = 15$ 	Add 7	

Equivalent Forms of an Equation

Questions

Write four equivalent forms of the equations below

#	Original Equation
1	$4n = 20$
	Add 4 to each side
	Subtract 4 from each side
	Multiply each side by 2
	Divide each side by 4

#	Original Equation
2	$2x - 16 = 12$
	Add 8 to each side
	Subtract 13 from each side
	Multiply each side by 3
	Divide each side by 6

#	Original Equation
3	$5n - 5 = 25$
	Add 50 to each side
	Subtract 20 from each side
	Multiply each side by 4
	Divide each side by 5

Equivalent Forms of an Equation

When we change an equation by adding, subtracting, multiplying, and dividing the same amount from both sides, does the equation change? Investigate below!

Questions

Fill in the table below

#	Original Equation	Change	New Equation
1	$5n = 20$ $n = 4$	Add 10 to each side	$5n + 10 = 20 + 10$ $n = 4$
2	$n = 7$	Add 7 to each side	
3	$15 + n = 27$ $n =$	Subtract 12 from each side	
4	$6n = 12$ $n =$	Multiply each side by 2	
5	$2n = 16$ $n =$	Divide each side by 2	
6	$52 - n = 34$ $n =$	Subtract 15 from each side	
7	$68 + n = 85$ $n =$	Add 13 to each side	
8	$5n = 50$ $n =$	Multiply each side by 4	
9	$3n = 27$ $n =$	Divide each side by 3	