



Preview – Information



Thank you for your interest in this product. Within this preview, you will see:

- ✓ A selection of Ready-To-Use Google Slides Lessons.
- ✓ A selection of worksheets included in the workbook.

When you make a purchase, you will receive a folder that contains the .pdf workbook file and a link to where you can make a copy of the Google Slides Lessons unit to your Google Drive.

Thank you for shopping with us. Please let us know if you have any questions at:

rob@supersimplesheets.com



Google Slides Lessons Preview





Manitoba 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 Decimal Pattern Rules - Tenths

Fill in the boxes and blanks to complete the patterns by figuring out the pattern rules.

#	PATTERN				RULE			
1)	7.8	8.3	8.8					Start at _____, then add _____ each time
2)	22.9	23.2	23.5					Start at _____, then add _____ each time
3)	41.0	41.7	42.4					Start at _____, then add _____ each time
4)	53.5	54.6	55.7					Start at _____, then add _____ each time
5)	79.8	82.1	84.4					Start at _____, then add _____ 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 1, multiply by 2 each time. True/False Statements: a) The 6th number is 32. b) The pattern adds 2 each time. c) The 7th number is 64.	Pattern Rule: Start at 147.53, add 1.08 each time. Next numbers: 148.61, 149.69, 150.77 True/False Statements: a) The pattern will land on 155.09 b) The 5th number is 152.85. c) The pattern multiplies by 1.08 each time.
---	---



Manitoba Math Curriculum

Patterns & Relations – Grade 8

Recursive vs Functional Relationships

Complete the table by deciding whether Tavish is describing the recursive relationship or the functional relationship.

	Pattern					Tavish's Description	Recursive or Functional
1)	x	1	2	3	4	The pattern goes up by 6 each time.	
	y	9	15	21	27		
2)	x	2	4	6	8	The term number is multiplied by 7.	
	y	14	28	42	56		
3)	x	3	6	9	12	The term number is multiplied by 3 and then 4 is added.	
	y	13	22	31	40		
4)	x	1	2	3	4	The pattern goes up by 9 each time.	
	y	12	21	30	39		
5)	x	5	10	15	20	$3x + 3$	
	y	18	33	48	63		

Rule: add 12

In	Out
279	
	561

Rule: multiply 5

In	Out
13	
	225

Rule: subtract 23

In	Out
649	
	737

Rule: divide 9

In	Out
81	
	15

Fill in the tables and answer the questions.

1) Ronan rents a delivery van and pays a set rate for every 10 km he drives.

KM Driven (x)	0	10	20	30	40	50
Cost (y)	\$4.00	\$6.50	\$9.00	\$11.50	\$14.00	\$16.50

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



b) How much would it cost to drive 100 km?

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



Manitoba Math Curriculum Patterns & Relations – Grade 8

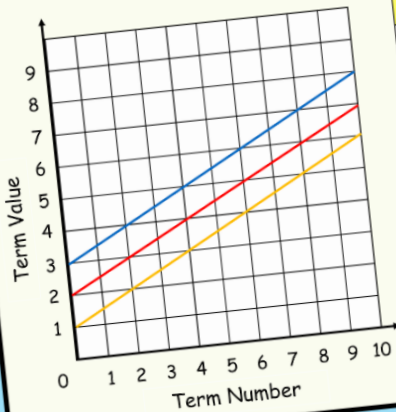
Decreasing Decimal Pattern Rules - Hundredths

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					

Linear and Non-Linear

Look at the graphs closely. Answer the questions below.

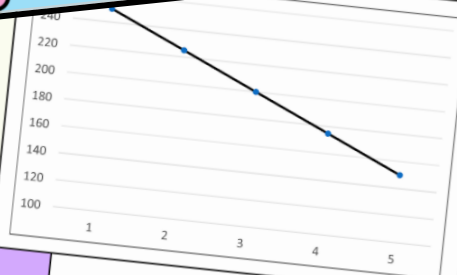


1) How are the lines the same?

2) How are the lines different?

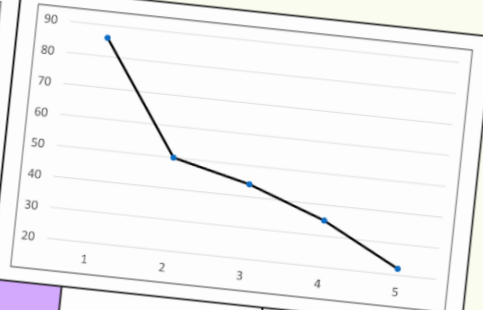
3) What could these three lines represent?

played on the graph is linear or not.



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.	3 - 55

Preview of 50 pages from this product that contains 216 pages total.

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 columns/rows of numbers in a table of values. 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	10	15	20	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 1 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 time	
	y	17	23	29	35		

Part 2

Provide a recursive and functional description of the patterns

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

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 expressions 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	
8	

2) _____

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	

Matchstick Growing Patterns

Questions

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

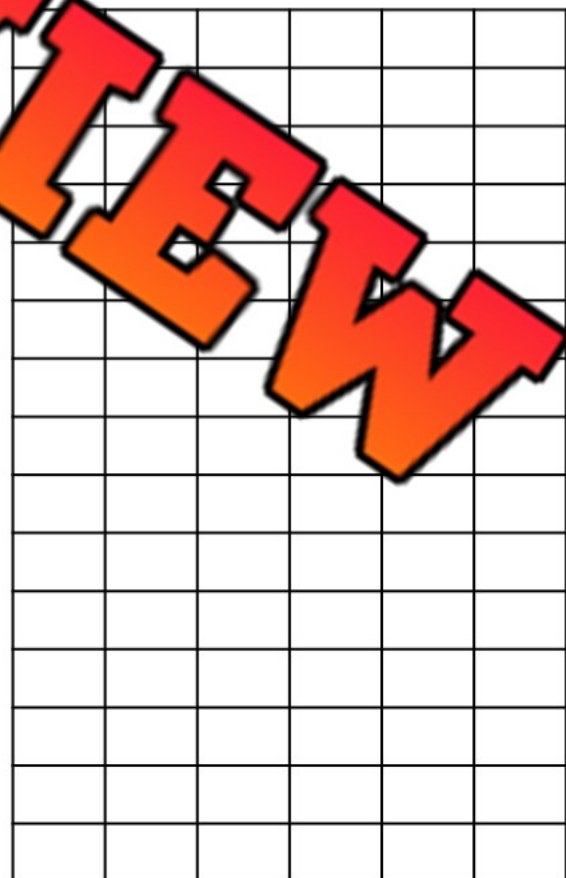
<u>F-1</u>	<u>F-2</u>	<u>F-3</u>	<u>F-4</u>	<u>F-5</u>
				

Figure	2	3	4	5	10	20
Number of Matchsticks						

Questions

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

Matchsticks



1 2 3 4 5

Figure Number

Matchstick Shrinking Patterns

Questions

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

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

Figure Number	2	3	4	5
Number of Matchsticks				

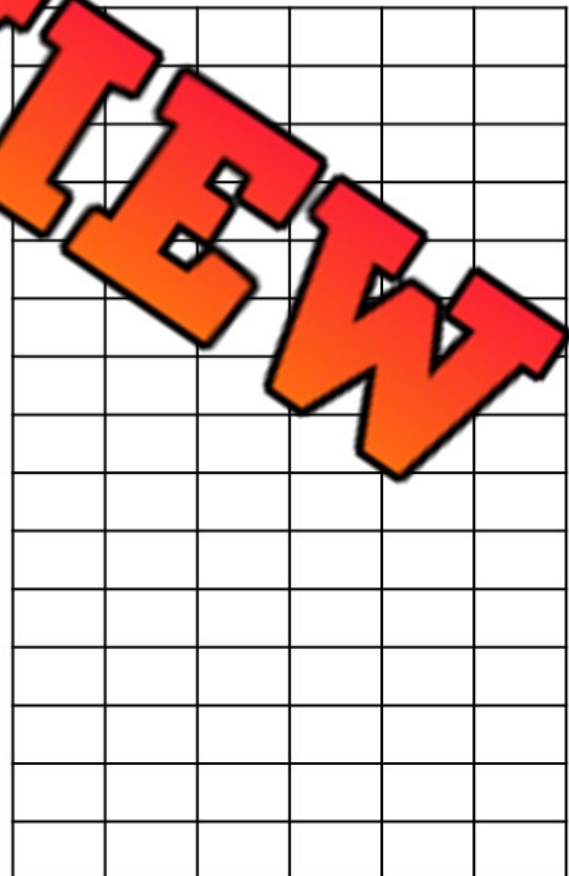
Questions

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

2) Is there a linear relationship between the two variables (term number and number of matchsticks)? Explain.

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

Matchsticks



1 2 3 4 5

Figure Number

Two-Variable Linear Relationships



Questions

Answer the questions 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 does the cone cost?

c) How much would 4 scoops of ice cream cost on a cone?

2) It costs \$15 for admission to an amusement park. 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)?

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

Name: _____

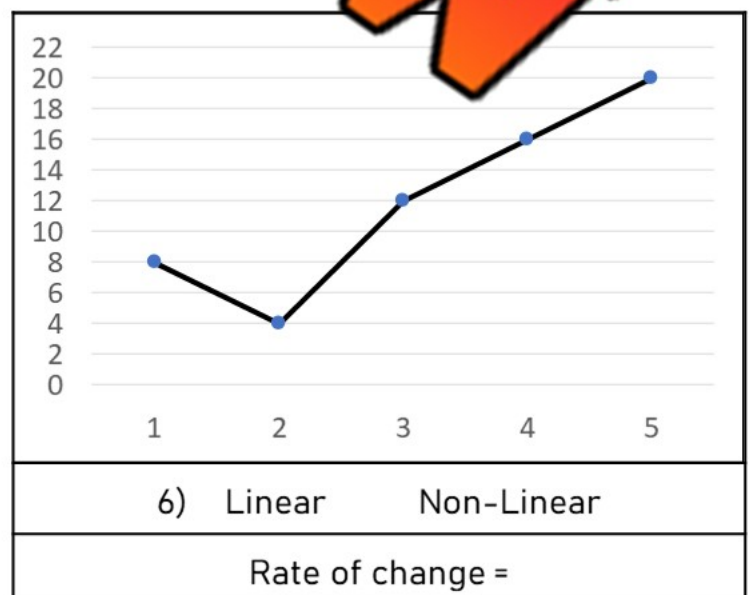
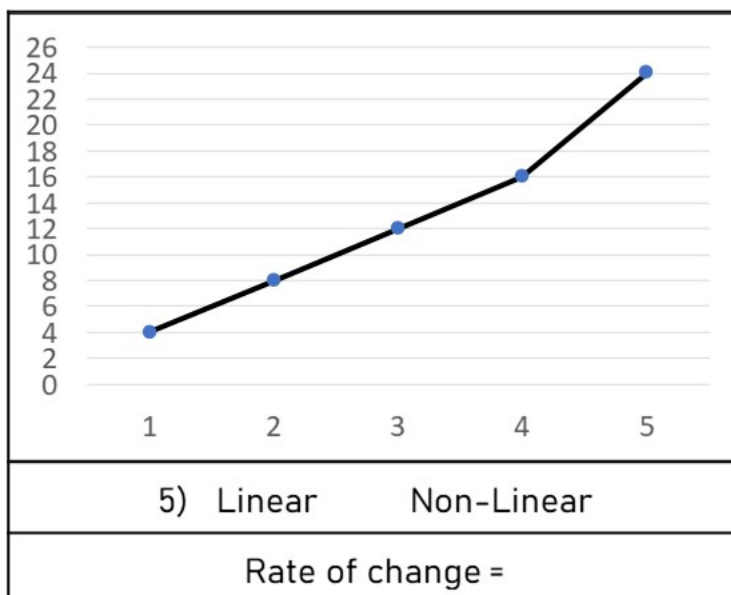
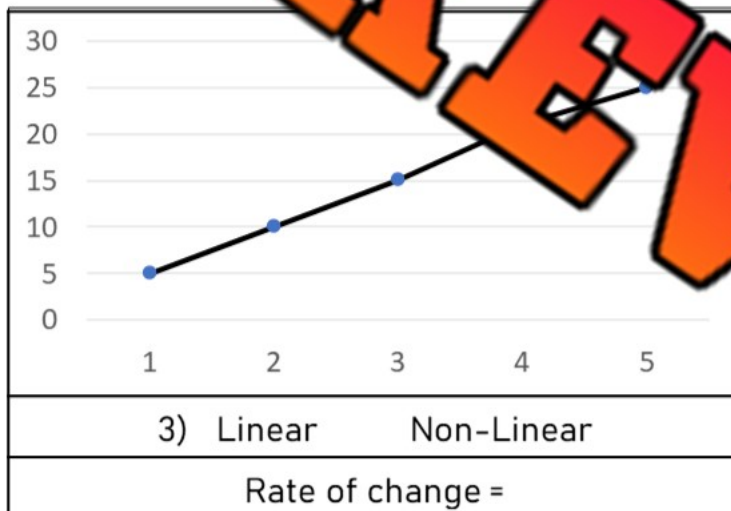
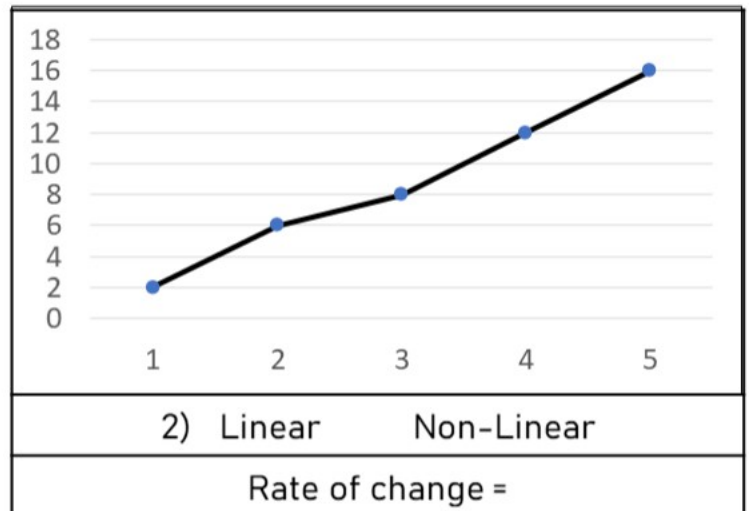
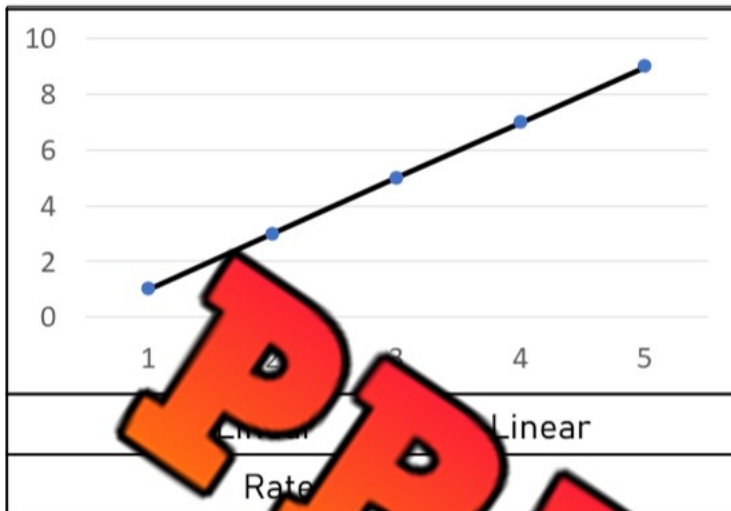
28

Curriculum Connection
PR.1

Increasing Linear Patterns - Yes or No?

Questions

Circle if the pattern displayed on the graph is linear or non-linear



Increasing Linear Patterns - Yes or No?

Questions

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

1)

Term Number (x)	Term Value (y)
1	5
2	9
3	13
4	17
5	21
Linear	Non-Linear

2)

Term Number (x)	Term Value (y)
1	37
2	44
3	51
4	57
5	64
Linear	Non-Linear

3)

Term Number (x)	Term Value (y)
1	88
2	96
3	104
4	112
5	120
Linear	Non-Linear

4)

Term Number (x)	Term Value (y)
1	2.5
2	4.5
3	6.5
4	8.5
5	10.5
Linear	Non-Linear

5)

Term Number (x)	Term Value (y)
1	4
2	16
3	36
4	64
5	100
Linear	Non-Linear

6)

Term Number (x)	Term Value (y)
1	200
2	275
3	350
4	425
5	500
Linear	Non-Linear

7)

Term Number (x)	Term Value (y)
1	44.0
2	47.5
3	50.5
4	54.0
5	57.5
Linear	Non-Linear

8)

Term Number (x)	Term Value (y)
1	140
2	280
3	420
4	580
5	720
Linear	Non-Linear

9)

Term Number (x)	Term Value (y)
1	112.1
2	112.3
3	112.5
4	112.7
5	112.9
Linear	Non-Linear

Pattern Rule - Input/Output Tables - Integers**Questions**

Fill in the input/output tables below

1)

In n	Out $n + (-5)$
1	
2	
3	
5	

2)

In n	Out $2n + (-3)$
1	
2	
3	
4	
5	

3)

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

4)

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

In
 x Out
 $x + (-6)$

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

6)

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

7)

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

8)

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

9)

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

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 Fill in the tables using the equation below

x	y
1	
2	14
3	20
4	
5	
6	

1) $y = 6x + 2$

x	y
	-2
	1
3	4
4	
5	
9	

2) $y = 3x - 5$

x	y
1	
2	
3	
4	
5	
11	

3) $y = -2x + 4$

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	23
5	30
6	37

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

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

1) _____

3) _____

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

x	y
1	-2
2	-4
3	-6
4	-8
5	
10	

x	y
1	-7
2	-18
3	-29
4	-40
5	

4) _____

5) _____

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	

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 ordered pairs?

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								

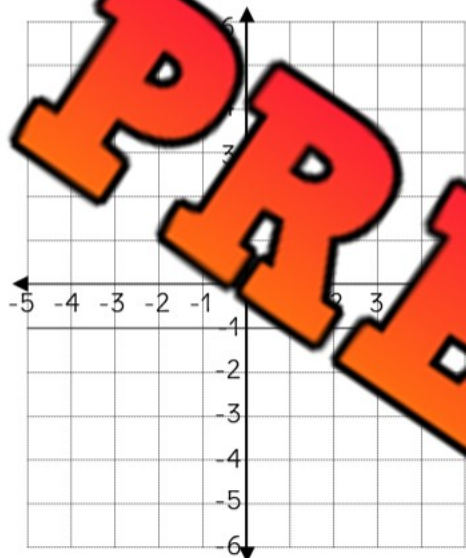
Linear Equations - Graphing 2 Variables

Questions

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

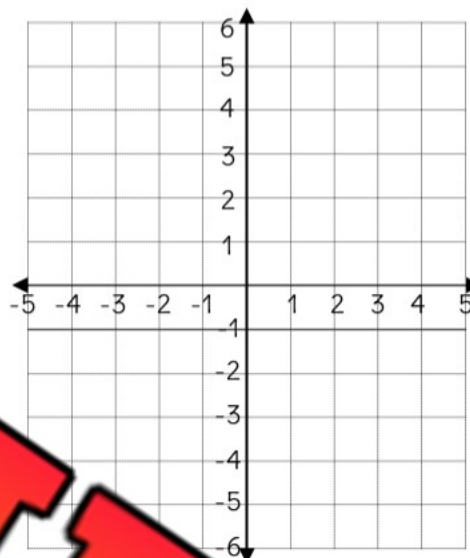
1) $y = 2x - 2$

x	0	1	2	3	4
y					



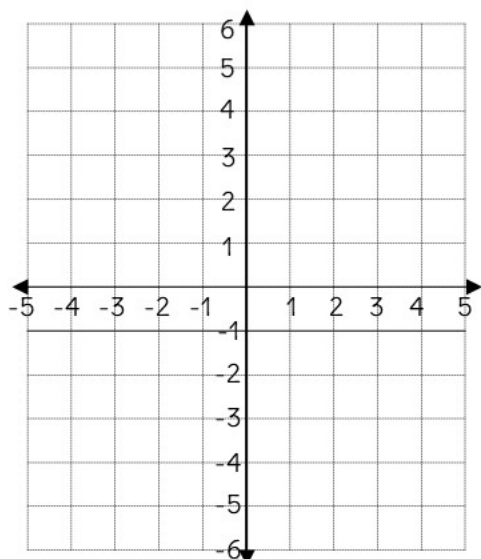
2) $y = 3x - 6$

x	0	1	2	3	4
y					

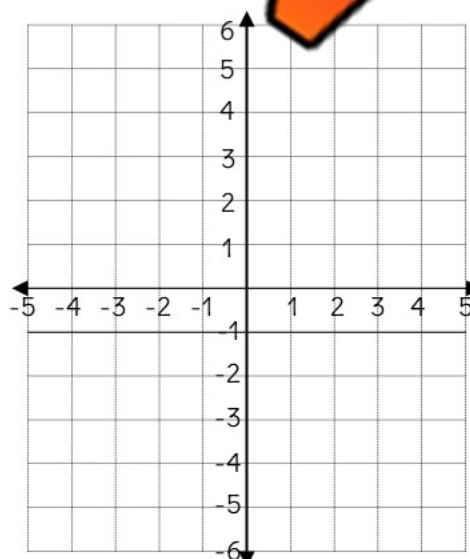


3) $y = -x + 2$

x	0	1	2	3	4
y					



x	0	1	2	3	4
y					



Two-Variable Linear Relationship - Scientist**Challenge**

Answer the word problem below



Mrs. Ferrety 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: $y = 3x + 40$

- b) Graph the values

Questions

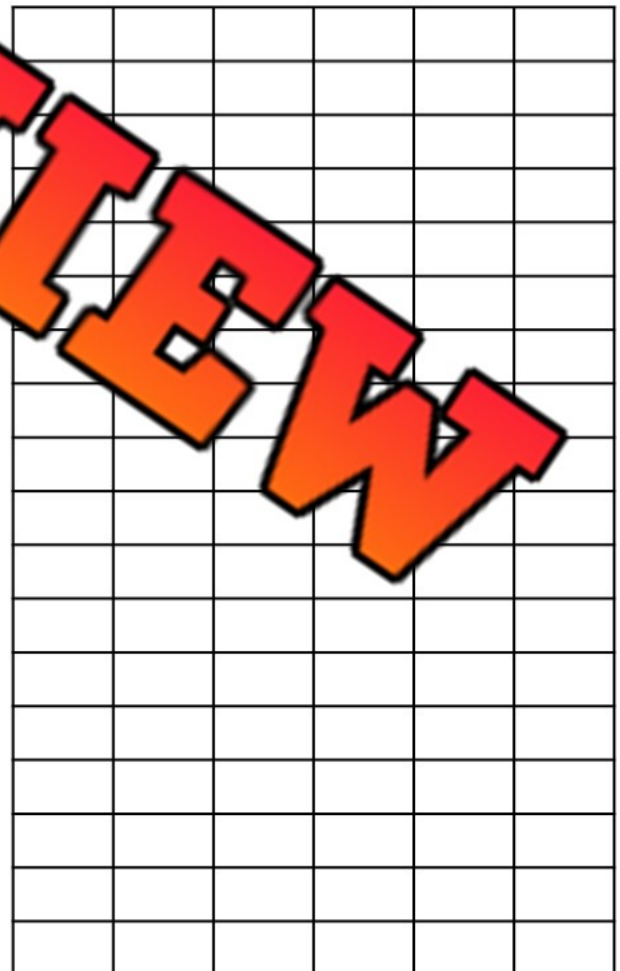
- a) Fill in the missing values in the ordered pairs below

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

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

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

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



Two-Variable Linear Relationship - Working

Word Problems

Investigate the relationship between the two-variables

Stephanie earns \$15 for every hour she works. She received a starting bonus of \$50 before even working an hour.

- 1) Fill in the table of values to represent the linear relationship between hours worked and money earned.



- 2) Graph the table

3) Questions

- a) Write the linear equation that represents this situation.
- b) Stephanie is scheduled to work 35 hours this week. How much will she earn with her bonus?
- c) Fill in the missing values in the ordered pairs below
 (10, _____), (42, _____), (75, _____)
 (_____, 320), (_____, 1055), (_____, 3050)
- d) Stephanie earned \$1580 in her first month of work, including her bonus. How many hours did she work?



Name: _____

47

Curriculum Connection
PR.1**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 table

3) Questions

a) Write the linear equation that represents this problem

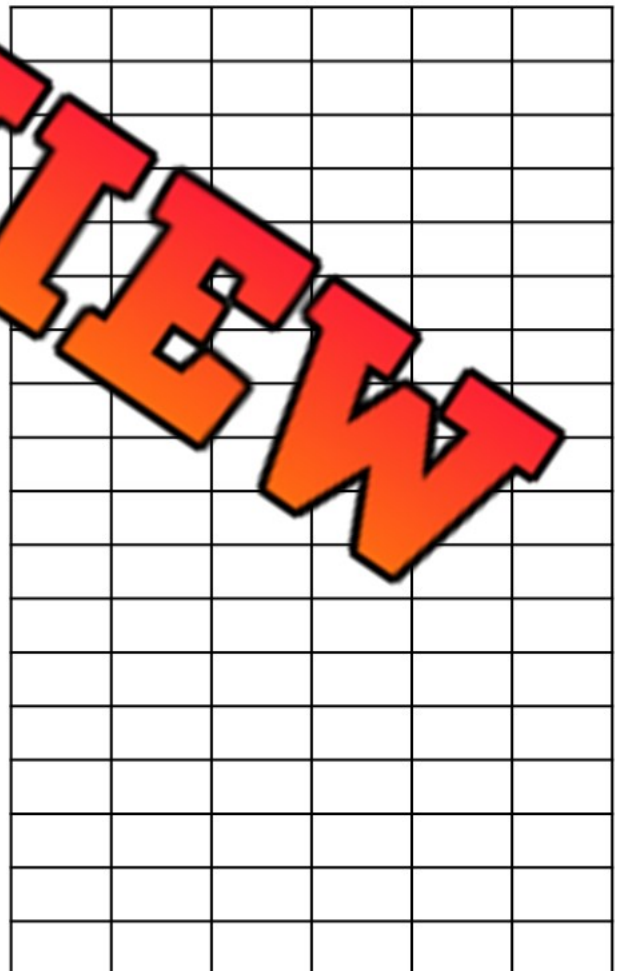
b) If Aiden's family drove 330km in one day, how much would they need to pay?

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?



Linear Equations - Graphing 2 Variables

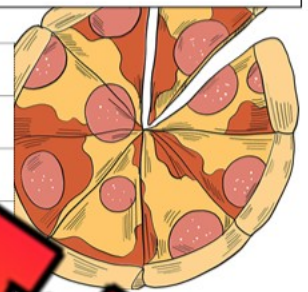
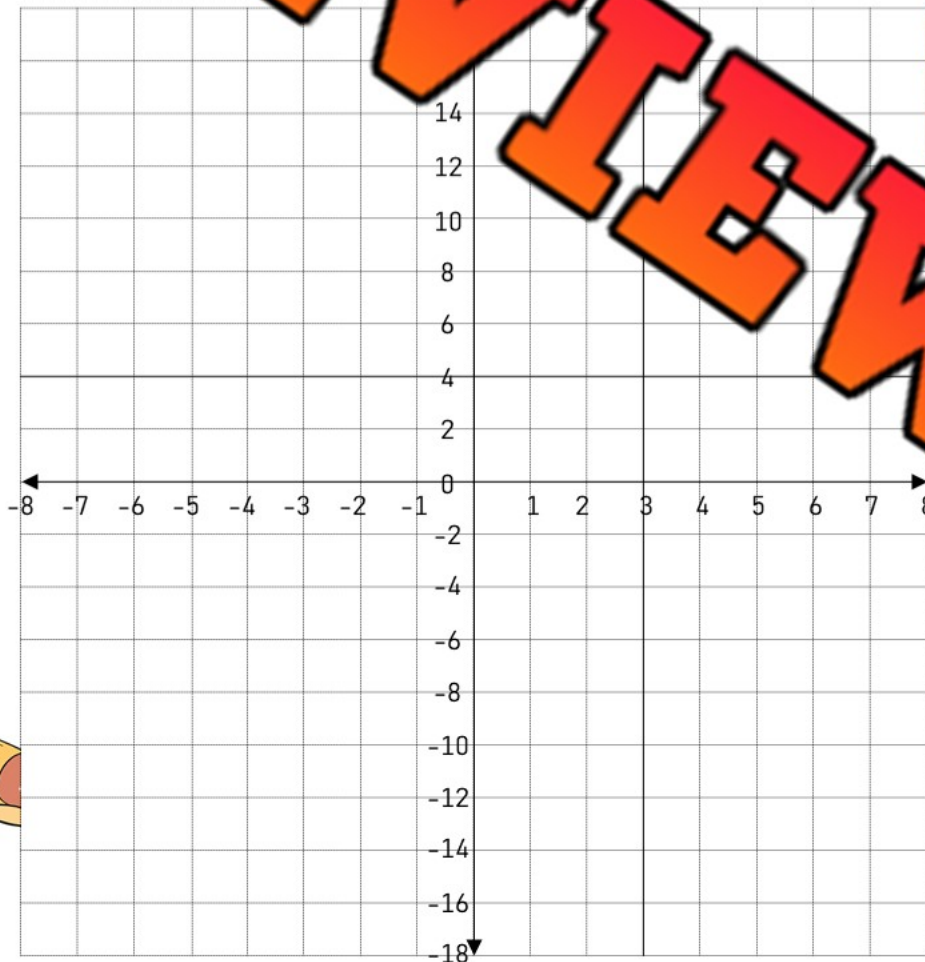
Questions Fill in the table of values and then graph the results using ordered pairs

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 results using the graph. Connect the dots using a line. Is the relation linear or not linear?



Linear Equations - Graphing 2 Variables

Questions 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: $y = 5x - 10$

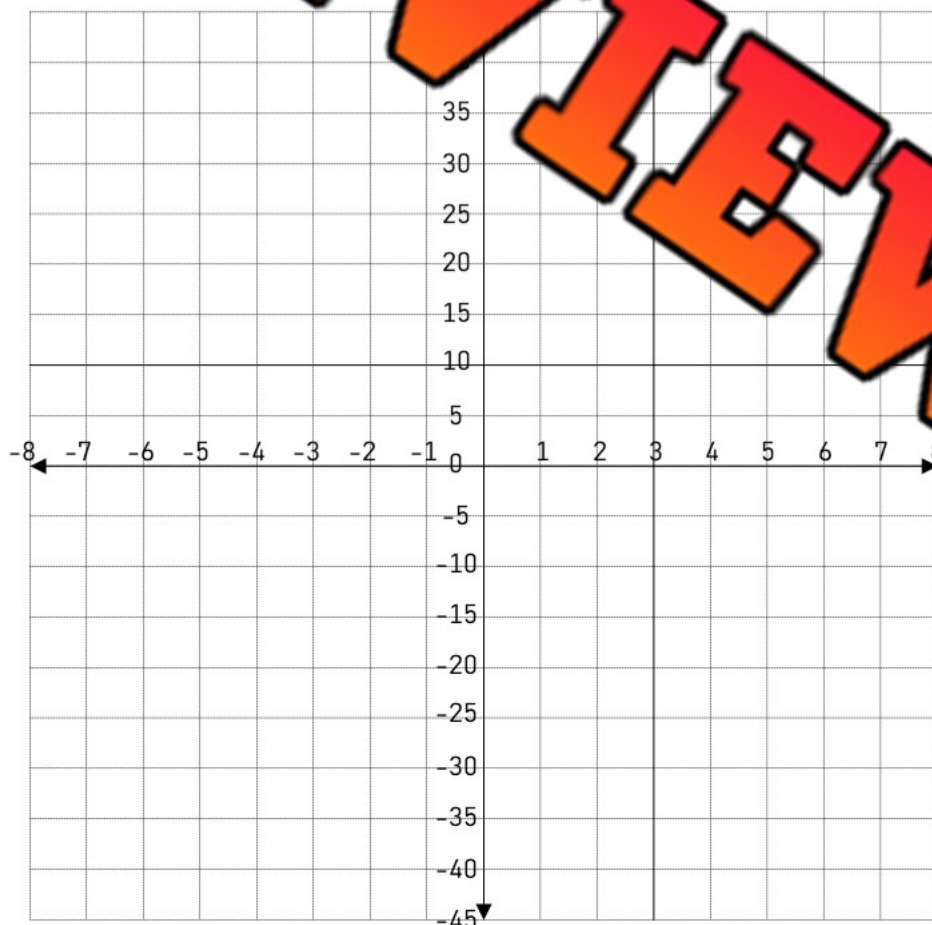
a) Fill in the table of values using the equation above.

x	1	2	3	4	5	6	7	8
y								

b) Represent the results using 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

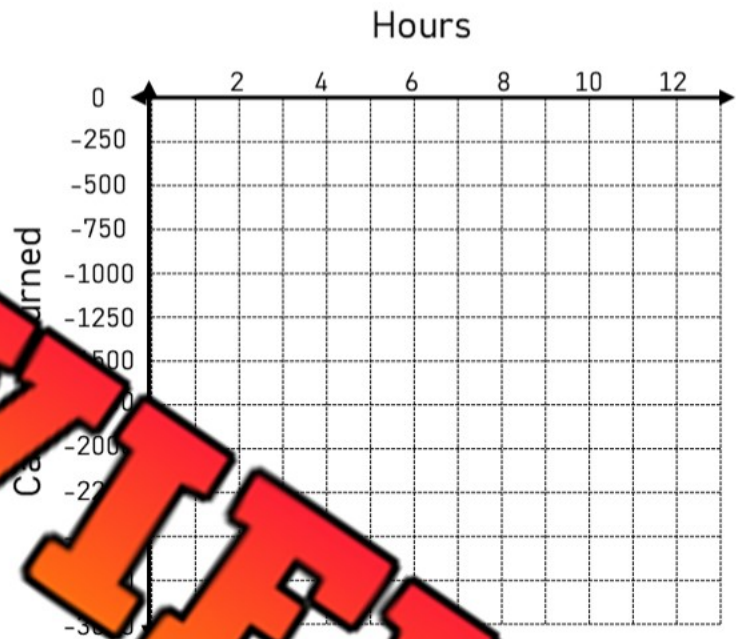


Questions

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 for 1 hour a week, how many calories would 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.

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

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

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

Graphing Linear Equations - Advertising

Questions

Answer the questions below



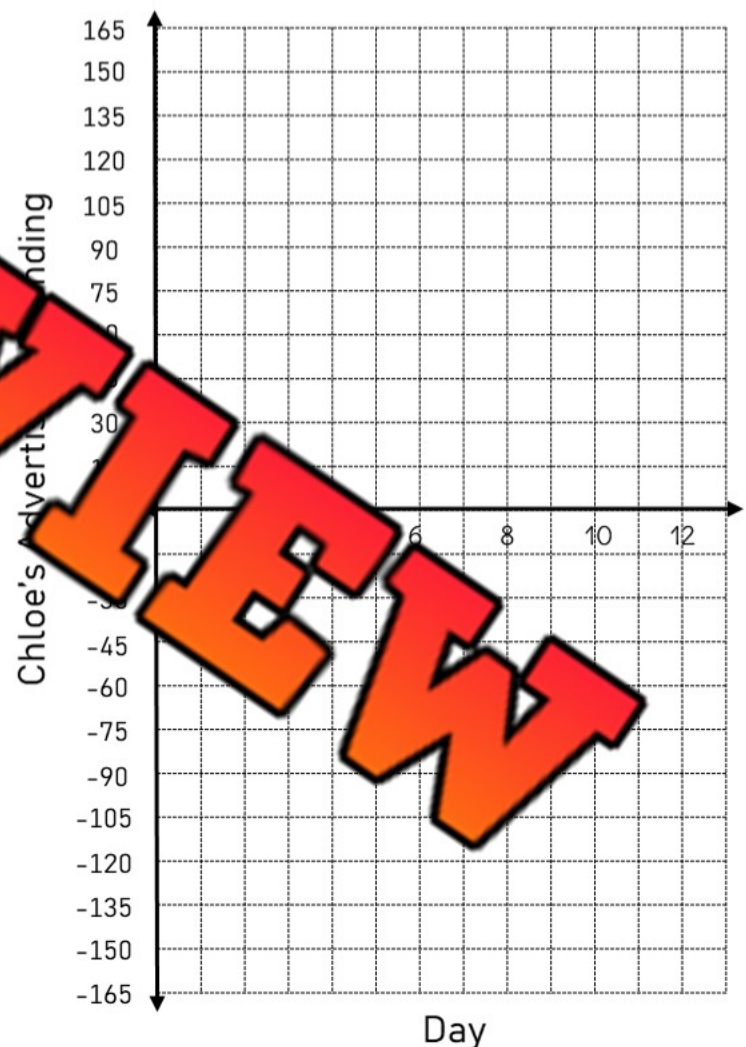
Chloe has an advertising budget of \$150. She decides to spend \$15 a day. Use negative integers to fill in the table of values that tracks her advertising spending. Display the table of values as a graph as well.

1) After _____ days, how much of the full budget will Chloe have left? _____

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 -15 20 $+$ $=$



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?

Name: _____

52

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?			Expression:		
F =			2	3	4
# of Matchsticks					
				5	6
					20

Part 2

In the table below and answer the questions

1) Cole's pay for today is represented in the table below

Hours Worked	0	1	2	3	4	5	6	7	8
Money Earned (\$)	0	27	54	81					

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

2) It costs \$30 for admission to an amusement park. Once inside you can go on as many additional rides as you want. The table below shows the total cost for admission and rides.

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

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

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: • $ax = b$ • $x/a = b$ • $ax + b = c$ • $x/a + b = c$ • $a(x + b) = c$ where a, b and c are integers.	57 - 108

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

$$7(5 + 3)$$

$$7 \times 5 + 7 \times 3$$

$$35 + 21$$

$$56$$

	5	3
7	35	21

Example 2

$$4(y + 8)$$

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

$$4y + 32$$

	y	8
4	4y	32

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

1) $9(4 + 6)$

2) $6(3 + n)$

3) $8(7 + 3)$

4) $3(5 + 2)$

5) $6(f + 11)$

6) $-3(5 + p)$

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) $-4(-12 + k)$

Name: _____

60

Curriculum Connection
PR.2

Writing Algebraic Expressions

Using algebraic expressions helps us understand mathematical situations. We can use a variable to replace a changing number, like how many \$10 tickets are sold to a game – $t \times 10$

Part 1

Write each algebraic expression in words.
Use the words, "a number" in place of the variable

1) $9 - t$

Nine subtract a number

2) $n +$

3) $6 + b$

4) $12r$

5) $\frac{y}{8} + 5$

6) $9 - t + 21$

7) $\frac{21}{y} + 13$

8) $(8b) - (4x)$

Part 2

Write an algebraic expression for each statement

1) Twelve times a number subtract eight

2) Divide a number by seven and multiply it by a different number

3) A number is subtracted by fourteen divided by five

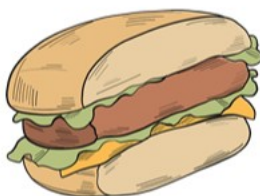
4) Triple a number subtracted by double a different number

5) Divide eighty by a number, then multiply by four

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 the algebraic expression and then evaluate using the menu prices

Customer Order	Expression	Answer
1) 2 burgers, 1 fry	$2 \times b + f$ $4.50 + 3.25$	
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		

Name: _____

66

Curriculum Connection
PR.2**Evaluating Algebraic Expressions - (x ÷)****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 2Evaluate the following expressions for $y = -8$

1) $\frac{y}{2}$	2) $\frac{56}{y}$	4) $\frac{y}{2} + 5$
5) $\frac{48}{y} + 7$	6) $\frac{88}{y} + y$	7) $\frac{50}{y} \times y$

Challenge!

Use three -5s 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)		-10
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)		
4)	$\frac{12y}{n}$	

	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 each situation using a variable in brackets to represent the situations

- 1) Gianna and her friends saved up money to make 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 split 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?



Writing Equations

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

$$8 + n$$

$$n = 6$$

Equation

Eight more than a number is 14

$$8 + n = 14$$

$$n = 6$$

Part 1 Write equations for each sentence

		Equation	Answer
1)	Eleven less than a number is ten		
2)	Sixty-two more than a number is one		
3)	Eight times a number minus 3 is		
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

1) $12 + 10 = 2$

2) $13 + (-18) = -5$

3) $(-21) + 13 = -8$

4) $35 - (-10) = 45$

5) $45 - (-17) = 26$

6) $(-22) - 11 = -11$

7) $53 - (-15) = 68$

8) $71 - 12 = 54$

9) $(-48) + (-12) = 60$

10) $(-67) - (-9) = -58$

11) $38 - 144 = 182$

12) $212 - (-12) = -224$

Part 2

Fill in the missing number to balance the equation

1) $\square + (-12) = -19$

2) $\square - 14 = 23$

3) $\square - 9 = -26$

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) $100 + \square = -172$

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
Richard	-4	-6	4	-5	
Ch		-2	5		-5
Dominic		-4		9	-6
Kayden			-1	-5	
Silas	5	3	9		-1
Lillian	5	8	2		9
Brooklyn	-4	-2			-5
Natalie		7	2	-6	-4
Andrew	-5	4	1	-	
Santiago		-3	-8	-4	-22

Results

Who won the golf tournament?

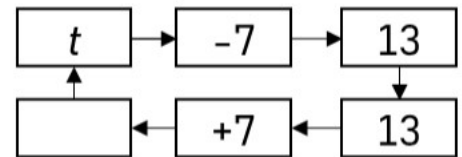
1) Who won the golf tournament?	
2) The entry fee for the tournament was \$75. All the money went to the prize (p). Write an equation that determines the value for (p).	
3) More golfers joined the tournament. The prize ended up being \$1125. Write an equation that determines how many golfers (g) participated in the tournament.	

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 blank in the flow chart

1) $t - 4 = 9$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	6) $t - 13 = 5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
2) $r - 6 = -8$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	7) $r - 4 = -1$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
3) $c + 9 = 5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	8) $c - 11 = 17$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
4) $b + 11 = -2$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	9) $b + 6 = -11$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.
5) $p - 8 = -5$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.	10) $p + 16 = -9$	Flow chart template: Top row (three boxes, right arrows), Bottom row (three boxes, left arrows), Up arrow from bottom-left to top-left, Down arrow from top-right to bottom-right.

Finding the Value of a 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 - $n = 2$.

Part 1

Find out the value of the variable

1) $3n$ $n =$	2) $(-4n) = 16$ $n =$	3) $(-9s) = 54$ $s =$
4) $7 \times (-4)$ $p =$	5) $\frac{77}{-7} = -11$ $n =$	6) $\frac{-28}{k} = -7$ $k =$
7) $(-3n) = (-18)$ $n =$	8) $6n =$ $n =$	9) $\frac{n}{8} = -9$ $n =$
10) $\frac{-40}{5} = n$ $n =$	11) $(-8) = (-t)$ $t =$	12) $\frac{p}{15} = -5$ $p =$
13) $(-8n) = 96$ $n =$	14) $\frac{110}{n} = -11$ $n =$	15) $7d$ $d =$

Part 2

Calculate the area of a circle and a triangle using the formula below

The formula for calculating the area of a circle is: $A = \pi r^2$ $\pi \approx 3.14$

Calculate the area in the questions below using the values for radius and pi

	Radius	Area - Circle		Radius	Area - Circle		Radius	Area - Circle
1)	$r = 9\text{cm}$	$A =$	3)	$r = 12\text{cm}$	$A =$	5)	$r = 13\text{cm}$	$A =$
2)	$r = 6\text{cm}$	$A =$	4)	$r = 7\text{cm}$	$A =$	6)	$r = 11\text{cm}$	$A =$

The formula for calculating the area of a triangle is: $A = \frac{(b)(h)}{2}$

	b	h	Area - Triangle		b	h	Area - Triangle		b	h	Area - Triangle
1)	6	2	$A =$	3)	8	4	$A =$	5)	3	4	$A =$
2)	9	6	$A =$	4)	7	5	$A =$	6)	8	6	$A =$

Name: _____

79

Curriculum Connection
PR.2

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
			

Questions

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

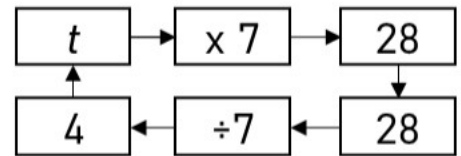
#	r				Equation	Answer
1	20	2	0	0	$t = 20f + 2c$	$t = 20 \times 1.33 + 2 \times 1.75$ $t = 26.6 + 3.50$ $t = \$30.1$
2	50	0	3	2		
3	0	2	1	0		
4	60	1	2	2		
5	0	2	0	0		
6	0	1	1	0		
7	25	2	1	2		
8	70	0	1	3		

Multiplying 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 blank in the flow chart

1) $7t = 28$		6) $-12t = (-84)$	
2) $3r = 15$		7) $11s = 55$	
3) $-9c = 36$		8) $-7c = 63$	
4) $-6b = -42$		9) $-12b = (-132)$	
5) $8p = -72$		10) $-9n = 63$	

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.



Questions

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

#	Investment (i)	# of People in the Club (n)	Formula	Answer
1		8	$\frac{i}{n} = t$	$\frac{-400}{8} = -50$
2	\$600 gain	10		
3	\$800 loss			
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		

Name: _____

87

Curriculum Connection
PR.2

Evaluating Equations

Questions

Evaluate the equations below

1)

$$x = 9 + 14 - 5$$

2)

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

3)

$$x = 3 + 6 - 5$$

4)

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

5)

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

6)

$$x = 14 + 3 - 23$$

7)

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

8)

$$x = (2 - 5)$$

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)

Example 1

$$x - 14 = 1$$

Example 2

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

Example 3

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

Questions Evaluate equations below

1)

$$x - 5 = 15$$

2)

$$x + 17 = 31$$

3)

$$x + 12 = 25$$

4)

$$x - 31 = 4$$

5)

$$9 = x + 13$$

6)

$$24 = x - 15$$

7)

$$x + 32 = 25$$

8)

$$48 = x + 56$$

Representing Problems with Linear Equations ($ax = b$)**Questions**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)

Scarlett drinks 9 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 one lap around her neighbourhood?

Linear equation:

 $x =$

4)

Mason just finished a video game he had bought. He played the game everyday 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?

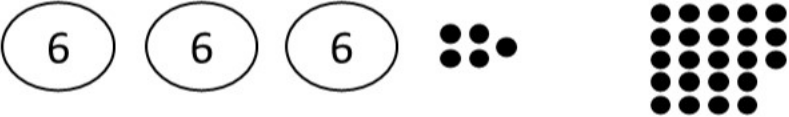
Linear equation:

 $x =$ 

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

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation
Ex)	$3x + 5 = 23$ $x = 6$	 3 groups of 6 + 5 = 23
1)		
2)	$8x + 9 = 57$ $x =$	
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 ($ax + b = c$)**Questions** 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 gets a flat fee of \$10, plus \$4 per hour. Ashley earned \$46 babysitting yesterday. 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:

 $x =$ 

Solving Linear Equations ($\alpha x = b$, $\alpha x + b = c$)

QuestionsSolve 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) $12x = 96$ $x =$	5) $4x + 17 = 45$ $x =$	6) $8x + 15 = 71$ $x =$
7) $11x = 55$ $x =$	8) $12x + 94 = 110$ $x =$	9) $9x = 108$ $x =$
10) $15x + 40 = 115$ $x =$	11) $7x + 31 = 94$ $x =$	12) $12x + 42 = 126$ $x =$
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 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)

Paid some money today cutting grass in her neighbourhood. She charges \$20 per yard she cuts and she cut 7 yards. How much money did she earn?

Linear equation: _____

 $x =$ _____

3)

Neill collected a bunch of candy from going 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: _____

 $x =$ _____

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 km 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?

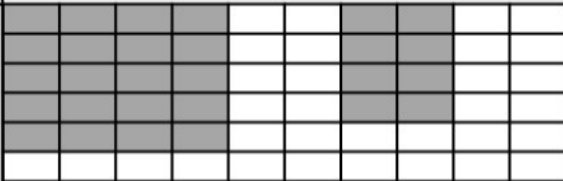
Linear equation: _____

 $x =$ _____

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

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation	Verification
Ex)	$\frac{x}{4} + 8 = 13$ $x = 20$	 20 divided by 4 + 8 = 13	$\frac{20}{4} + 8 = 13 \checkmark$
1)	$\frac{x}{6} + 1 = 1$ $x =$		
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)	$\frac{x}{4} + 12 = 19$ $x =$		

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

Questions 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)

Leah earned some money today selling bracelets. Leah took home \$95 and added it to the \$95 she already had, which means she now has \$135. How much did Leah 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. Her friend had 3 extra meatballs from home. That friend now has 10 meatballs. How many meatballs did Hailey make?

Linear equation: _____

 $x =$ _____

4)

A group of 6 friends drove to Ottawa to see the Parliament Building. One friend drove 120km. After everyone drove 120km, one friend finished driving an extra 55km. That friend drove 175km in total. How far was the distance 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: _____

 $x =$ _____

Solving Linear Equations ($x/a=b$, $x/a+b=c$)**Questions**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) $\frac{x}{6} = 2$

 $x =$

5) $\frac{x}{4} = 9$

 $x =$

6) $\frac{x}{8} + 4 = 12$

 $x =$

7) $\frac{x}{11} + 13 = 21$

 $x =$

9) $\frac{x}{12} + 8 = 13$

 $x =$

10) $\frac{x}{7} = 7$

 $x =$

11) $\frac{x}{15} + 5 = 9$

 $x =$

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 - $a(x + b) = c$

Questions

Write a pictorial representation of the linear equations provided

#	Linear Equation	Pictorial Representation	Verification
Ex)	$6(x + 4) = 42$ $x = 3$	$\begin{array}{cc} 3 & 4 \\ 6 \end{array}$ = 42	$6(3 + 4) =$ $6 \times 7 = 42$ ✓
1)	$4(x + 5) =$ $x =$		
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 - $a(x + b) = c$ **Questions** Represent the problems with linear equations $a(x + b) = c$ and solve for x

1)

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?

Linear equation:

 $x =$ 

2)

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 \$585. How much did each pair of shorts cost?

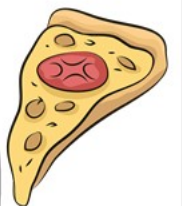
Linear equation:

 $x =$ 

3)

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?

Linear equation:

 $x =$ 

Solving Linear Equations - $a(x + b) = c$ **Questions**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) $5(x + 2) = 35$

 $x =$

5) $11(x + 9) = 121$

 $x =$

6) $12(x + 6) = 96$

 $x =$

7) $6(x + 3) = 88$

 $x =$

8) $5(x + 10) = 70$

 $x =$

9) $4(x + 6) = 52$

 $x =$

10) $7(x + 11) = 105$

 $x =$

11) $4(x + 12) = 90$

 $x =$

12) $6(x + 8) = 90$

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) $25(x + 3) = 375$

 $x =$

Representing Problems with Linear Equations

Questions

Represent the problems with linear equations

1)

A plumber charges \$35 for a service call plus an additional hourly rate. The plumber just earned \$195 for a 4-hour call. How much does the plumber earn per hour?

Linear equation: _____

 $x =$ _____

2)

Jody works this week for 9 hours at each job. She is a hair-dresser and works as a cashier as well. As a cashier, she earns \$15 an hour. For the week, Jody made \$333. How much does Jody earn as a hair-dresser per hour?

Linear equation: _____

 $x =$ _____

3)

A group of 9 friends earned some money from performing in a band. Rachel is the singer, and she went home with \$60. She had \$210 when she went home and now she has \$210. How much did the band earn?

Linear equation: _____

 $x =$ _____

4)

Jace performed 15 sets of pullups. At the end of the 15 sets, he had done 150 pullups. How many pullups did he do each set?

Linear equation: _____

 $x =$ _____

5)

An athlete earns millions of dollars per season. They signed a 1-time signing bonus of \$500,000 and played 6 seasons. In total, they earned \$18,500,000. How much do they earn per season?

Linear equation: _____

 $x =$ _____

Unit Test - Variables and Equations

Part 1

Evaluate the following expressions for $x = 5$ and $p = -7$

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

Part 2

Put a star in the box if the equation is not balanced (≠) if it is not balanced

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

Part 3

Simplify the equations below. Make sure the variable is on the left.

1) $x = 9 + 14 - 5$

2) $x = 24 \div 6$

3) $48 = x + 56$

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