North Penn School District

Elementary Math Parent Letter

Grade 6

Unit 3 – Chapter 9: Algebra: Relationships Between Variable

Examples for each lesson:

Lesson 9.1

Independent and Dependent Variables

An equation with two variables shows a relationship between two quantities. The value of the **dependent variable** changes according to the value of the **independent variable.**

Sam rides the bus almost every day. He pays $2.50 for each bus ride.

Identify the dependent and independent variables in this situation. Then write an equation to represent the relationship between the total cost and the number of bus rides.

Step 1 Understand the relationship and identify variables.

Each bus ride costs $2.50. The total cost c for Sam's bus rides depends on the number of rides r he takes. The value of c will change when the value of r changes.

So, c is the dependent variable and r is the independent variable.

Step 2 Write an equation. The total cost will be $2.50 multiplied by the number of rides.

$c = 2.50 \times r$
(or $c = 2.50r$)

Use your equation to find out how much it would cost for Sam to take 4 bus rides.

Step 1 Think: 4 bus rides means $r = 4$.

Step 2 Substitute 4 for r in the equation.

$c = 2.50 \times r$
$c = 2.50 \times 4$
$c = 10.00$

So, Sam's total cost will be $10.00 for 4 rides.

Lesson 9.2

Equations and Tables

You can use tables and equations to represent the relationship between two quantities.

Use the equation to complete the table.

$y = x \div 4$

x	y
44	
36	
28	
20	

Step 1 Look at the equation to find the rule. The rule for finding y is $x \div 4$.

Step 2 Apply the rule and fill in the missing values. Divide each x-value by 4.

$44 \div 4 = 11$ $36 \div 4 = 9$ $28 \div 4 = 7$ $20 \div 4 = 5$

Write an equation for the relationship.

Input, x	30	35	40	45	50
Output, y	6	7	8	9	10

Find a pattern.
Think: "What can I do to each x-value to find its corresponding y-value?"
The y-values are less than the x-values, so try dividing or subtracting.

$x \downarrow \quad y \downarrow \quad x \downarrow \quad y \downarrow \quad x \downarrow \quad y \downarrow \quad x \downarrow \quad y \downarrow \quad x \downarrow \quad y \downarrow$

$30 \div 5 = 6$ $35 \div 5 = 7$ $40 \div 5 = 8$ $45 \div 5 = 9$ $50 \div 5 = 10$

The pattern is to divide x by 5 to get y. The equation is $y = x \div 5$.

More information on this strategy is available on Animated Math Model #28.

Lesson 9.3

Problem Solving • Analyze Relationships

The table shows the number of miles an overnight train travels. If the pattern in the table continues, how far will the train travel in 10 hours?

Overnight Train Travel Rate				
Time (hours)	1	2	3	4
Distance (miles)	60	120	180	240

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?	**What information do I need to use?**	**How will I use the information?**
I need to find the _____ the train will travel in _____ hours.	I need to find the relationship between _____ and _____ shown in the table.	I will find a _____ in the table and use the pattern to write an _____.

Solve the Problem

Look for a pattern between the number of hours and the number of miles.

Overnight Train Travel Rate				
Time in hours, *h*	1	2	3	4
Distance in miles, *m*	60	120	180	240

1×60 $2 \times$ ___ ___ $\times$ ___ ___ $\times$ ___

Then write an equation to show the pattern. **Equation:** $m =$ ___ $\times h$

To find the miles the train will travel in 10 hours, substitute 10 for h.

$m =$ ___ $\times$ ___

$m =$ ___

More information on this strategy is available on Animated Math Model #28.

Lesson 9.4

Graph Relationships

You can use a graph to represent a relationship.

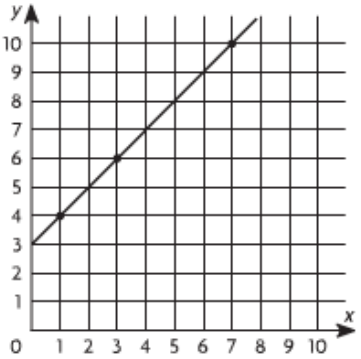
Graph the relationship represented by the table to find the unknown value of *y*.

x	1	3	5	7
y	4	6	■	10

Step 1 Write ordered pairs that you know.

(1, 4), (3, 6), (7, 10)

Step 2 Plot the points.



Step 3 Find the unknown *y*-value. Use a ruler to draw a line through the points. Find the *y*-value that corresponds to an *x*-value of 5.

So, when the *x*-value is 5, the *y*-value is 8.

More information on this strategy is available on Animated Math Model #29.

Lesson 9.5

Equations and Graphs

You can make a table of values for any equation. Use the table to write ordered pairs. Plot points to help you graph the equation. The graph of a **linear equation** is a straight line.

Graph the linear equation.

$y = x + 1$ $y = 3x - 2$

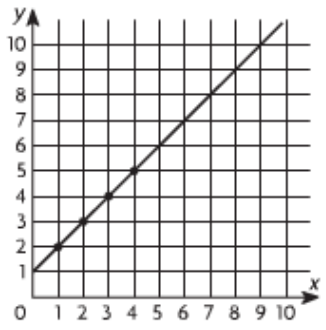
Step 1 Find ordered pairs that are solutions of the equation.

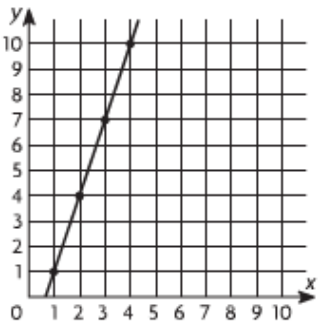
Choose four values for x. Substitute each value for x in the equation and find the corresponding value of y. Use easy values for x, such as 1, 2, 3, 4.

x	$x + 1$	y	Ordered Pair
1	1 + 1	2	(1, 2)
2	2 + 1	3	(2, 3)
3	3 + 1	4	(3, 4)
4	4 + 1	5	(4, 5)

x	$3x - 2$	y	Ordered Pair
1	$3 \cdot 1 - 2$	1	(1, 1)
2	$3 \cdot 2 - 2$	4	(2, 4)
3	$3 \cdot 3 - 2$	7	(3, 7)
4	$3 \cdot 4 - 2$	10	(4, 10)

Step 2 Graph the equation.





More information on this strategy is available on Animated Math Model #30.

<u>Vocabulary</u>

Dependent variable – a variable whose value is determined by the value of another quantity

Independent variable – a variable whose value determines the value of another quantity

Linear equation – an equation whose solutions form a straight line on a coordinate plane