

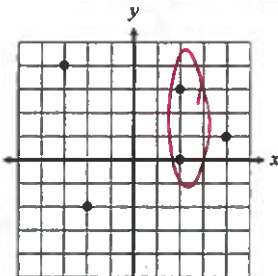
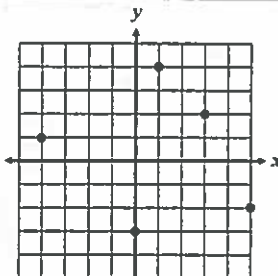
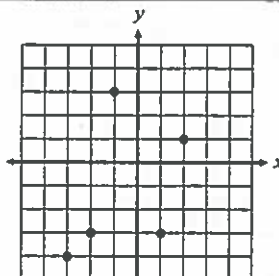
Part 1

Unit 5 Test Study Guide (Functions & Linear Relationships)

Name: Key
Date: _____ Per: _____

Topic 1: Relations & Functions

Directions: Identify the domain and range of each relation, then determine if the relation is a function.

<p>1. $\{(-2, 6), (-5, -1), (3, 7), (-5, 0)\}$</p> <p>Domain: <u>$\{-5, -2, 3\}$</u> Range: <u>$\{-1, 0, 6, 7\}$</u> Function? <u>No</u></p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>x</td><td>0</td><td>4</td><td>7</td><td>10</td><td>13</td></tr> <tr><td>y</td><td>-5</td><td>-5</td><td>-5</td><td>-5</td><td>-5</td></tr> </table> <p>Domain: <u>$\{0, 4, 7, 10, 13\}$</u> Range: <u>$\{-5\}$</u> Function? <u>Yes</u></p>	x	0	4	7	10	13	y	-5	-5	-5	-5	-5	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td></tr> <tr><td>y</td><td>-27</td><td>-8</td><td>-1</td><td>0</td><td>1</td></tr> </table> <p>Domain: <u>$\{-3, -2, -1, 0, 1\}$</u> Range: <u>$\{-27, -8, -1, 0, 1\}$</u> Function? <u>Yes</u></p>	x	-3	-2	-1	0	1	y	-27	-8	-1	0	1
x	0	4	7	10	13																					
y	-5	-5	-5	-5	-5																					
x	-3	-2	-1	0	1																					
y	-27	-8	-1	0	1																					
<p>4. </p> <p>Domain: <u>$\{-3, -2, 2, 4\}$</u> Range: <u>$\{-2, 0, 1, 3, 4\}$</u> Function? <u>No</u></p>	<p>5. </p> <p>Domain: <u>$\{-4, 0, 1, 3, 5\}$</u> Range: <u>$\{-3, -2, 1, 2, 4\}$</u> Function? <u>Yes</u></p>	<p>6. </p> <p>Domain: <u>$\{-3, -2, -1, 1, 2\}$</u> Range: <u>$\{-4, -3, 1, 3\}$</u> Function? <u>Yes</u></p>																								

Topic 2: Equations as Functions

Directions: Given the function and its domain, find the range.

7. $y = 5x + 11$; domain = $\{-4, -1, 0\}$

$y = 5(-4) + 11 = -20 + 11 = -9$
 $y = 5(-1) + 11 = -5 + 11 = 6$
 $y = 5(0) + 11 = 11$
 Range: $R = \{-9, 6, 11\}$

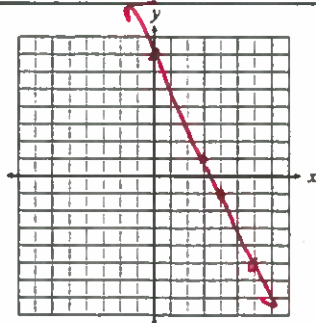
8. $y = 9 - \frac{1}{2}x$; domain = $\{-6, -2, 8\}$

$y = 9 - \frac{1}{2}(-6) = 9 + 3 = 12$
 $y = 9 - \frac{1}{2}(-2) = 9 + 1 = 10$
 $y = 9 - \frac{1}{2}(8) = 9 - 4 = 5$
 Range: $R = \{5, 10, 12\}$

Directions: Complete each function table, then graph.

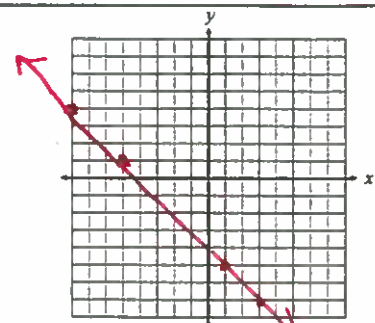
9. $y = -2x + 7$

x	y
0	7
3	1
4	-1
6	-5



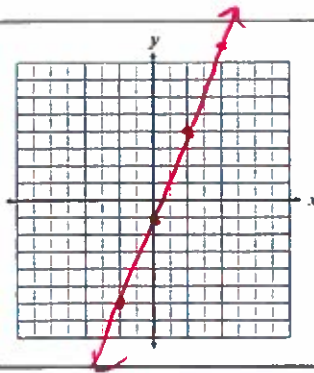
10. $y = -x - 4$

x	y
-8	4
-5	1
1	-5
3	-7



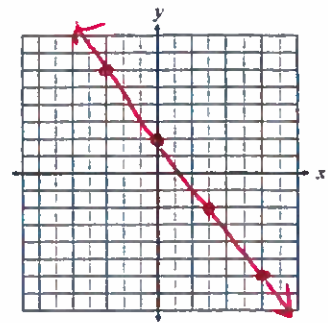
11. $y = \frac{5}{2}x - 1$

x	y
-2	-6
0	-1
2	4
4	9



12. $y = 2 - \frac{4}{3}x$

x	y
-3	6
0	2
3	-2
6	-6



Topic 3: Slope

13. Identify and draw pictures the four types of slope.

Positive

 Negative

 No Slope

 0 slope

Directions: Find the slope of the line given the graph.

14.
 $m = 3$

15.
0 slope

16.
 $m = \text{no slope}$

17.
 $m = -\frac{1}{2}$

Given any two points (x_1, y_1) and (x_2, y_2) , you can find the slope of the line that passes through the points using the **slope formula**.

SLOPE FORMULA

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Directions: Find the slope of the line that passes through the given points.

18. $(-2, 4)$ and $(-3, 9)$

$$m = \frac{9 - 4}{-3 - (-2)} = \frac{5}{-1} = -5$$

19. $(7, -5)$ and $(1, -13)$

$$m = \frac{-13 - (-5)}{1 - 7} = \frac{-8}{-6} = \frac{4}{3}$$

20. $(4, -9)$ and $(4, 1)$

$$m = \frac{1 - (-9)}{4 - 4} = \frac{10}{0} = \text{no slope}$$

21. $(7, -3)$ and $(-9, 5)$

$$m = \frac{5 - (-3)}{-9 - 7} = \frac{8}{-16} = -\frac{1}{2}$$

Topic 4: Slope Applications (Rate of Change)

22. The table below shows the balance of a checking account on certain dates during the month of February.

Date	1	7	15	24
Balance (\$)	443	872	610	1,050

a) Find the rate of change from February 1st to February 7th.

$$\frac{872 - 443}{7 - 1} = \frac{429}{6} = 71.50/\text{day}$$

b) Find the rate of change from February 7th to February 15th.

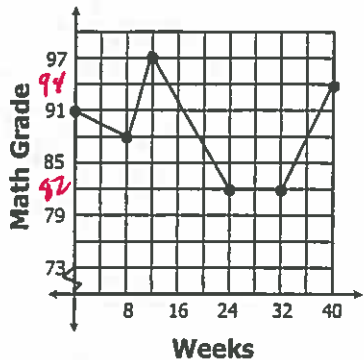
$$\frac{610 - 872}{15 - 7} = \frac{-262}{8} = -32.75/\text{day}$$

Name: _____

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23. The graph below shows Noah's math grade during certain weeks of the school year.



a) Find the rate of change in Noah's grade from week 12 to week 24.

$$\frac{82-97}{24-12} = \frac{-15}{12} = -1.25\%/week$$

b) Find the rate of change in Noah's grade from week 24 to week 32.

$$0\%/week$$

c) Find the rate of change in Noah's grade from week 32 to week 40.

$$\frac{94-82}{40-32} = \frac{12}{8} = 1.5\%/week$$

24. Mikayla went on a road trip. Two hours into the trip, she had 15 gallons of gas in her tank. Seven hours into her trip, she had 3 gallons of gas in her tank. Find the rate of change.

$$m = \frac{3-15}{7-2} = \frac{-12}{5} = -2.4\text{ gal/hour}$$

25. In 2006, the average NFL ticket price was \$62. If the average ticket price in 2015 was \$86, find the rate of change.

$$\frac{86-62}{2015-2006} = \frac{24}{9} = \$2.67/year$$

Topic 5: Linear vs. Nonlinear Functions

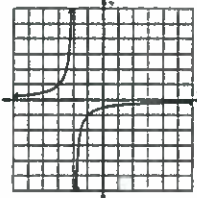
Slope-Intercept Form

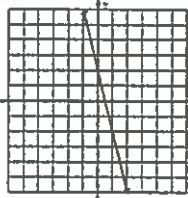
$$y = mx + b$$

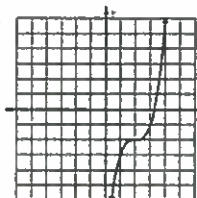
Standard Form

$$Ax + By = C$$

Directions: Determine if each graph, equation, or table represents a linear or nonlinear function.

26.  Nonlinear

27.  Linear

28.  Nonlinear

29. $y = 1 - 3x$
Linear

30. $y = \frac{-6}{x}$ Nonlinear

31. $2x - 3y = 15$
Linear

32. $x^2 + y^2 = 9$
Nonlinear

33. $y = \frac{x}{-2} - 7$ Linear

34. $y = x^3 + 4$
Nonlinear

35.

x	y
0	2
1	4
2	8
3	16

 Nonlinear

36.

x	y
-5	-8
-3	-9
-1	-10
1	-11

 Linear

37.

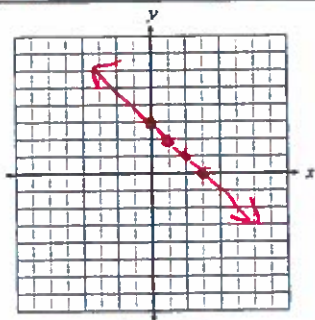
x	y
3	-5
8	-1
13	3
18	7

 Linear

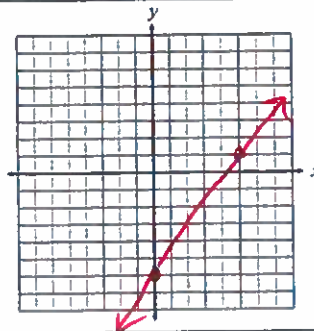
Topic 6: Graphing Linear Equations

Directions: Graph each equation. Show all work for converting standard form to slope-intercept form.

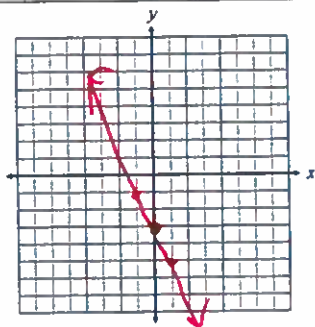
38. $y = -x + 3$



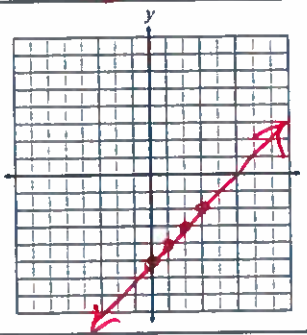
39. $y = \frac{7}{5}x - 6$



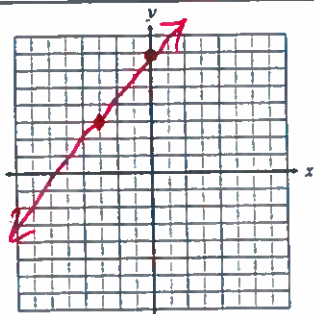
40. $2x + y = -3$
 $-2x \quad -2x$
 $y = -2x - 3$



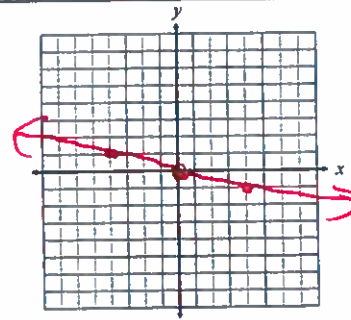
41. $x - y = 5$
 $-x \quad -x$
 $-1y = -1x + 5$
 $-1 \quad -1 \quad -1$
 $y = x - 5$



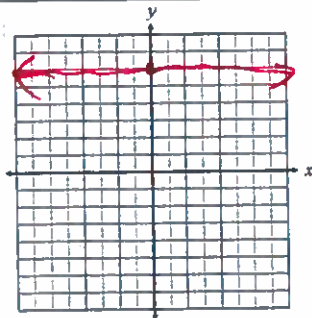
42. $4x - 3y = -21$
 $-4x \quad -4x$
 $-3y = -4x - 21$
 $-3 \quad -3 \quad -3$
 $y = \frac{4}{3}x + 7$



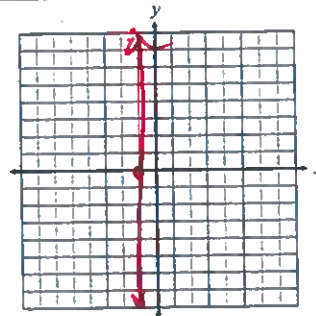
43. $-x - 4y = 0$
 $+x \quad +x$
 $-4y = x$
 $-4 \quad -4$
 $y = -\frac{1}{4}x$



44. $y = 6$

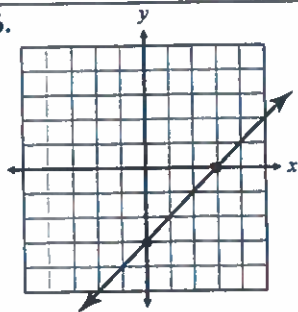


45. $x = -1$



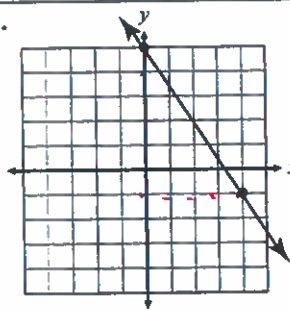
Directions: Write the equation of the line shown on the graph in slope-intercept form.

46.



$m = \frac{3}{3} = 1$
 $b = -3$
 $y = 1x - 3$

47.



$y = mx + b$
 $m = -\frac{6}{4} = -\frac{3}{2}$
 $b = 5$
 $y = -\frac{3}{2}x + 5$

Topic 6: Slope-Intercept Form Applications

48. Brynn has \$1,200 in her savings account and plans to save an additional \$350 each month in order to purchase a car. Write an equation to represent the total amount she has saved each month. Identify your variables.

$y = 350x + 1200$

a) What is the rate of change?
350

b) What is the initial value?
1200

c) What is the independent variable?
Months

d) What is the dependent variable?
Total savings

49. A long distance phone call costs \$1.75 plus \$0.30 for each minute of the call. Write and solve a linear equation to find the length of a phone call that cost \$7.45.

$y = 0.30x + 1.75$
 $7.45 = 0.30x + 1.75$
 $-1.75 \quad -1.75$
 $\hline 5.70 = 0.30x$
 $\frac{5.70}{0.30} = \frac{0.30x}{0.30}$
 $x = 19 \text{ minutes}$

50. On October 1st, the high temperature was 72° F. Each day after that, the high temperature decreased by 0.4° F. Write and solve an equation to find the high temperature on October 20th.

$y = -0.4x + 72$
 $y = -0.4(19) + 72$
 $y = -7.6 + 72$
 $y = 64.4^\circ\text{F}$

Topic 7: Direct Variation

A **direct variation** is a special type of linear function in which there is a constant rate of change between the variables (____) and the y-intercept is always ____.

DIRECT VARIATION

Directions: Determine if the values in table represents a direct variation. If yes, identify the constant of variation and write an equation to represent the relationship.

51.

x	y
-3	9
0	0
2	-6
4	-12

52.

x	y
1	2
2	6
3	10
4	14

53.

Miles	Toll (\$)
20	1.80
28	\$2.45
45	\$3.85
72	\$5.76

54.

Gallons	Miles
1	21
2	42
3	63
4	84

Directions: Determine if the equation represents a direct variation. If yes, identify the constant of variation.

55. $y = 7x$

56. $y = \frac{9}{x}$

57. $\frac{y}{x} = \frac{1}{3}$

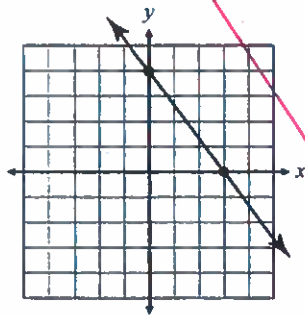
58. $x + 3y = 0$

59. $5x + 2y = 10$

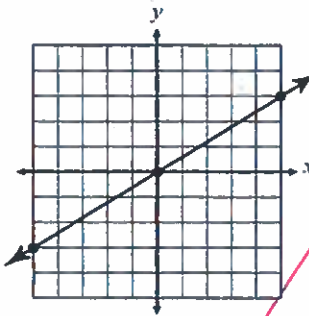
60. $4y = -5x$

Directions: Determine if the graph represents a direct variation. If yes, identify the constant of variation and write an equation to represent the relationship.

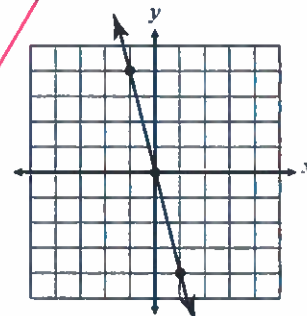
61.



62.



63.



64. The amount of interest earned on a savings account varies directly with the amount of money saved. If \$34 is earned on a balance of \$850, identify the constant of variation and write an equation to represent the relationship.

65. The distance traveled by a bus is directly proportional to the length of time it travels. If it took the bus 3 hours to drive 156 miles, identify the constant of variation and write an equation to represent the relationship.

66. The number of gallons needed to paint a house varies directly to the square feet the paint will cover. If two gallons of paint covers 700 square feet, find the number of gallons needed to cover 2,000 square feet.

67. The depth of a diver is directly proportional to the time since the diver entered the water. If it took the diver 45 minutes to reach a depth of 80 feet, find the time it will take to reach a depth of 200 feet.