

Math 10 F&P

Linear Relations Extra Practice

Name: _____

Key

1. Determine the equation of the line, in slope-intercept form that passes through (6, 5) and (-9, -5).

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

$$= \frac{-5 - 5}{-9 - 6}$$

$$= \frac{-10}{-15} = \frac{2}{3}$$

$$y + 5 = \frac{2}{3}(x + 9)$$

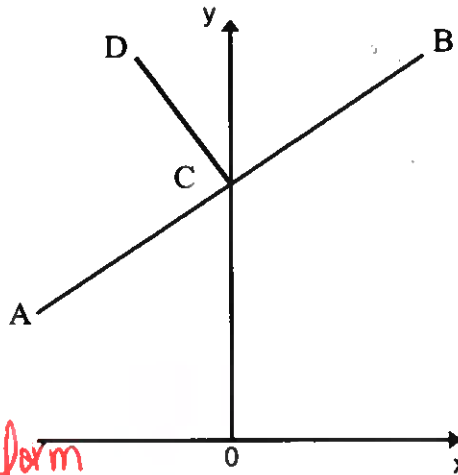
$$y + 5 = \frac{2x + 18}{3}$$

$$y + 5 = \frac{2x + 6}{3} - 5$$

$$y = \frac{2x + 1}{3}$$

2. The equation of AB is $x - 2y + 4 = 0$. AB intersects the y-axis at C. CD is perpendicular to AB. The equation of CD is:

- A. $x + 2y - 2 = 0$
- B. $2x + y - 2 = 0$**
- C. $2x - y + 2 = 0$
- D. $2x + y - 4 = 0$



$$x - 2y + 4 = 0$$

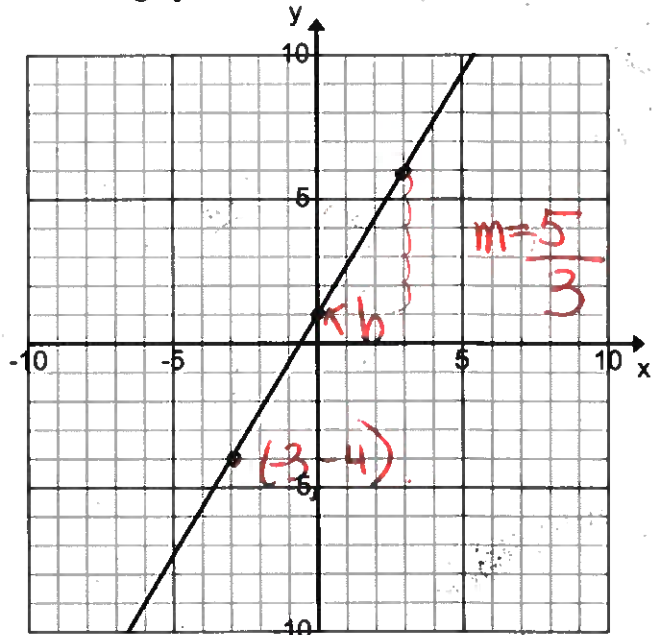
$$-2y = -x - 4$$

$$y = \frac{1}{2}x + 2$$

CD
 $m = -2$
 $b = 2$
 $\rightarrow y = -2x + 2$
 put into general form
 $2x + y - 2 = 0$

3. Which of the following equations describes the linear relation graphed above?

I.	$y = -\frac{5}{3}x + 1$
II.	$y + 4 = \frac{5}{3}(x + 3)$
III.	$5x - 3y - 3 = 0$



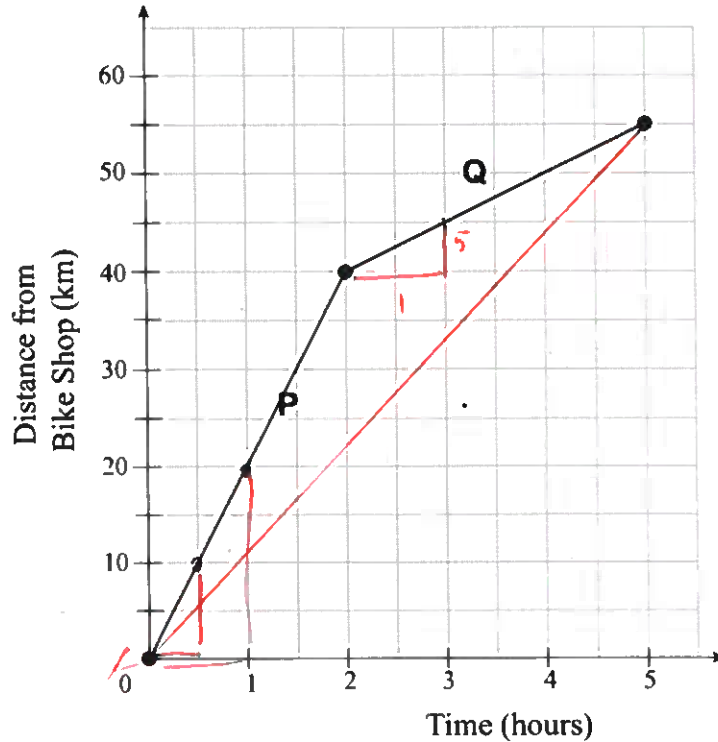
- A. II only**
- B. I and II only
- C. I and III only
- D. II and III only

$$y = \frac{5}{3}x + 1$$

$$y + 4 = \frac{5}{3}(x + 3)$$

$$-3(-\frac{5}{3}x + y - 1 = 0) = 5x - 3y + 3 = 0$$

4. The graph below models a bicycle's distance from a bike shop over time.



method #2:

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

$$= \frac{55 - 0}{5 - 0}$$

$$= \frac{55}{5}$$

$$= 11 \text{ km/hr}$$

Calculate the average speed of the bike over the first five hours.

method #1: $P_m = \frac{20 \text{ km}}{1 \text{ hr}}$

$Q_m = \frac{5 \text{ km}}{1 \text{ hr}}$

$$AV = \frac{20 + 5}{2}$$

$$= \frac{25}{2}$$

$$= 12.5 \text{ km/hr.}$$

5. Determine the slope of the graph $4x - 5y - 24 = 0$.

$$4x - 5y - 24 = 0$$

$$-4x \quad +5y + 24$$

$$-5y = -4x + 24$$

$$y = \frac{4x - 24}{5}$$

$$y = \frac{4}{5}x - \frac{24}{5}$$

$$m = \frac{4}{5}$$

6. Which of the following statements is false? There could be more than one false statement.

False	I. X	Two perpendicular lines have slopes that are reciprocals.
False	II. X	The product of the slopes of perpendicular lines is 1.
True	III. ✓	Vertical lines have an undefined slope.
False	IV. X	The x-intercept of $y = -3x + 6$ is 6.

negative reciprocal

b is y-intercept

$$(3) \left(-\frac{1}{3}\right) = -1$$

7. If the slope of a ski hill is $\frac{1}{3}$ and the coordinates of the bottom of the hill are (2, 5), what is the value of y if the coordinates at the top of the hill are (8, y)?

$$m = \frac{1}{3}$$

$$y - y_1 = \frac{1}{3}(x - x_1)$$

$$y - 5 = \frac{1}{3}(x - 2)$$

$$y - 5 = \frac{1}{3}x - \frac{2}{3} + 5$$

$$y = \frac{1}{3}x + \frac{13}{3}$$

$$y = \frac{1}{3}(8) + \frac{13}{3}$$

$$y = \frac{8}{3} + \frac{13}{3}$$

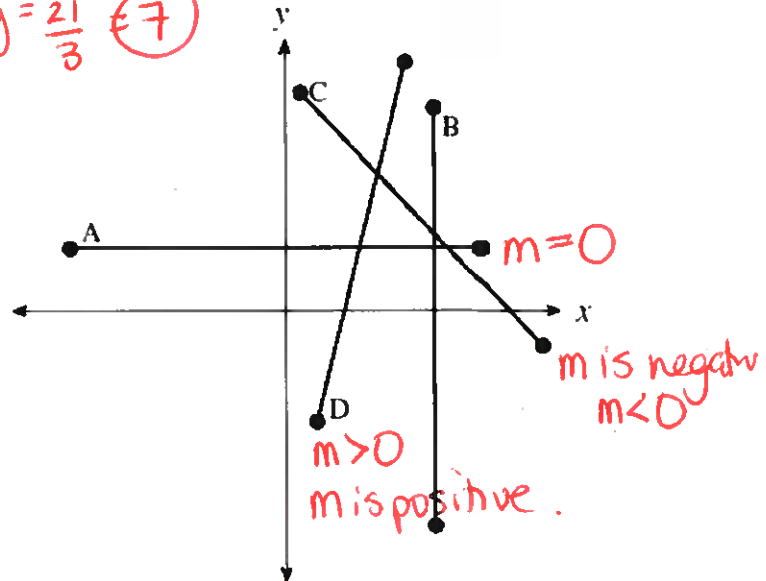
$$y = \frac{21}{3} = 7$$

$$-\frac{2}{3} + \frac{13}{3} = \frac{11}{3}$$

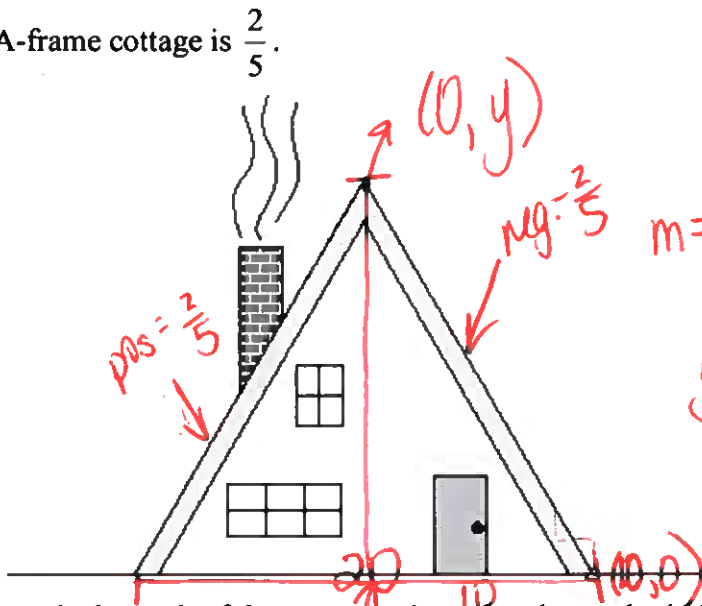
$$y = 7$$

8. Identify the line segment with $m < 0$, where m is slope.

*line segment C



10. The slope of an A-frame cottage is $\frac{2}{5}$.



$$m = \frac{2}{5}$$

$$y - 0 = \frac{2}{5}(x - 10)$$

$$y = \frac{2}{5}x + \frac{20}{5}$$

How high in meters is the peak of the cottage, given that the total width of the cottage is 20 m?

$$(0, 4)$$

$$0, 0$$

$$5, 2$$

$$(10, 0)$$

$$y = \frac{2}{5}x + 4$$

$$y = 4$$

11. A line segment joins A(6, 2) and B(14, 12). What are the slope and y-intercept of the line perpendicular to AB and passing through the point (10, 7)?

	Slope	y-intercept
A.	$-\frac{4}{5}$	-1
B.	$-\frac{4}{5}$	15
C.	$\frac{5}{4}$	5
D.	$\frac{5}{4}$	9

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{12 - 2}{14 - 6} = \frac{10}{8} = \frac{5}{4}$$

$$m_{\perp} = -\frac{4}{5}$$

$$y - 7 = -\frac{4}{5}(x - 10)$$

$$y - 7 = -\frac{4x}{5} + \frac{40}{5}$$

$$y - 7 = -\frac{4x}{5} + 8$$

$$y = -\frac{4x}{5} + 15$$

12. Lines A and B are perpendicular and have the same x-intercept. The equation of line A is $x + 2y - 6 = 0$. Determine the y-intercept of line B.

- A. -12
- B. -6
- C. 3
- D. 6

$$x + 2y - 6 = 0$$

$$-x + 2y = 6$$

$$2y = -x + 6$$

$$y = -\frac{1}{2}x + 3$$

x-int (y=0)

$$x - 6 = 0$$

$$x = 6$$

(6, 0)

m = a

point is (6, 0)

$$y - 0 = 2(x - 6)$$

$$y = 2x - 12$$

b = -12

13. A local drama production will make a profit of \$200 if they sell 100 tickets. They will take a loss of \$120 if they only sell 60 tickets. Which linear relation represents their profit?

- A. $y = 0.125x + 187.5$
- B. $y = 0.5x + 150$
- C. $y = 2x$
- D. $y = 8x - 600$**

tickets	\$
100	\$200
60	-\$120

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{200 - (-120)}{100 - 60} = \frac{320}{40} = 8$$

$$y - 200 = 8(x - 100)$$

$$y - 200 = 8x - 800$$

$$y = 8x - 600$$

14. Rewrite $y = -\frac{2}{3}x + 5$ in general form.

- A. $\frac{2}{3}x + y - 5 = 0$
- B. $2x + 3y - 5 = 0$**
- C. $2x + 3y - 15 = 0$
- D. $6x + 3y - 15 = 0$

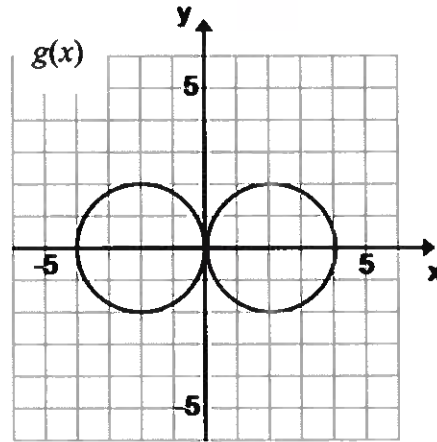
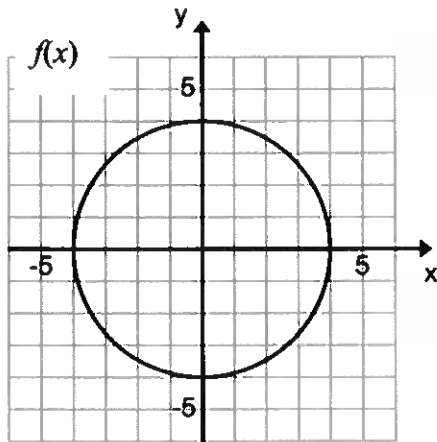
$$y = -\frac{2}{3}x + 5$$

$$+ \frac{2}{3}x - 5$$

$$\frac{2}{3}x + y - 5 = 0$$

$$2x + 3y - 15 = 0$$

Use the following graphs to answer question 15.



15. Which of the following statements is true about the domain of the graphs shown above?

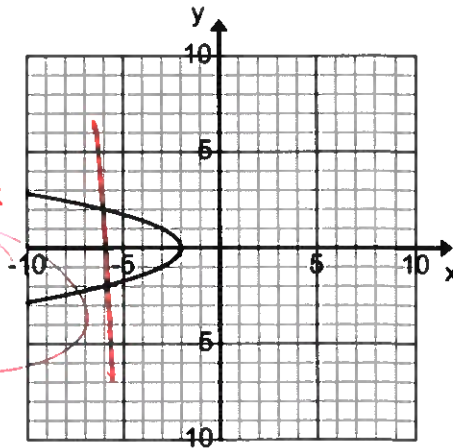
- A. The domain of $f(x)$ is greater. *False*
- B. The domain of $g(x)$ is greater. *False*
- C. The domain of both graphs is equal. *True*
- D. The relationship cannot be determined from the information given.

Domain is $[-4, 4]$ $D_{g(x)}$ is $[-4, 4]$

16. Which of the following statements about the graph is true?

- A. The graph represents a relation. *true x vs. y*
- B. The graph represents a function. *False $\rightarrow 2y$ for $1x$*
- C. The graph is linear.
- D. The domain is all real numbers. *X*

vertical line test

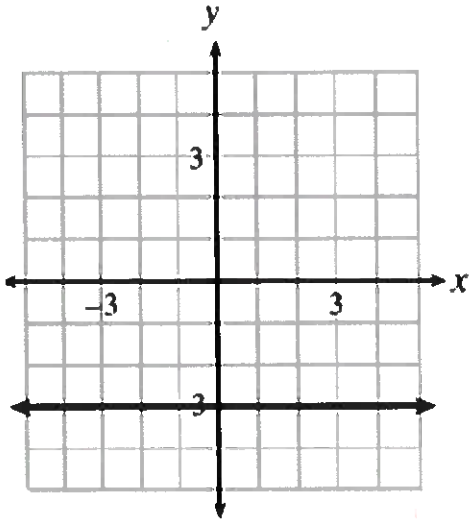


17. If $f(x) = -2x + 1$, which of the following expressions is equal to $f(x+1)$?

- A. $-2x - 1$
- B. $-2x + 1$
- C. $-2x + 2$
- D. $-2x^2 - x + 1$

$$\begin{aligned}
 f(x+1) &= -2(x+1) + 1 \\
 &= -2x - 2 + 1 \\
 &= -2x - 1
 \end{aligned}$$

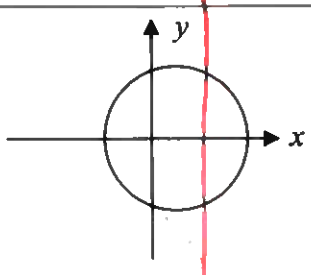
18. Determine the domain and range of the following graph:



$R: -3$
 $\{y \mid y = -3\}$

$D: (-\infty, \infty)$
 $\{x \mid -\infty < x < \infty\}$

19. Which of the following represent(s) a function? There could be more than 1 correct answer.

I.	$(-6, 2), (-4, 1), (-2, 0), (0, -1), (2, -2), (4, -3)$	✓ function
II.	$f(x) = x^2 + 2x + 1$	✓ function (quadratic equation. *makes a parabola)
III.		* fails the vertical line test.

20. Consider the following expressions:

Least → Greatest
II, I, IV, III

I.	$f(x) = x^2 - 4x - 2$	19
II.	$f(x) = \frac{1}{3}x + 14$	13
III.	$f(x) = 3x^2 + x$	24
IV.	$f(x) = 7 - 5x$	22

$f(-3) = (-3)^2 - 4(-3) - 2$
 $= 9 + 12 - 2$
 $= 19$

$f(-3) = 3(-3)^2 + (-3)$
 $= 3(9) + (-3)$
 $= 27 - 3$
 $= 24$

$f(-3) = \frac{1}{3}(-3) + 14$
 $= -\frac{3}{3} + 14$
 $= -1 + 14$
 $= 13$

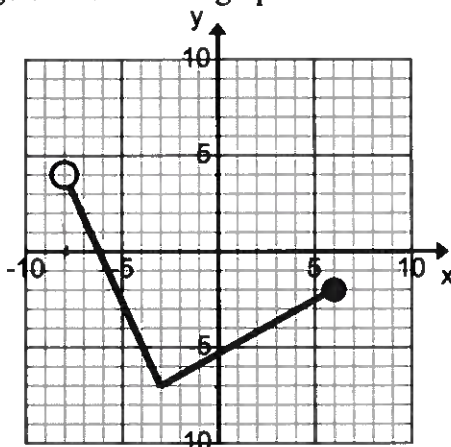
$f(-3) = 7 - 5(-3)$
 $= 7 + 15$
 $= 22$

Evaluate $f(-3)$ and put the expressions in order from least to greatest.

21. Jo wants to hold a spring dance. It costs \$500 to rent the school's gym and it will cost an additional \$5 per person who attends. Which of the following statements are true?

I.	The data representing this function is <u>discrete</u> . <i>✓</i>	$y = 5x + b = 500$	<i>*yes → can't have ½ a person</i>
II.	The data representing this function is continuous.	<i>no.</i>	
III.	The rate of change represents the cost per person who attends.	$\frac{\text{rise}}{\text{run}} = \frac{y}{x} = \frac{\$}{\text{person}}$	<i>✓ yes</i>
IV.	The equation representing total cost is the linear function $C = 5n + 500$, where C is the total cost and n is the total number of people.	<i>✓ yes</i>	

22. Determine the domain and range of the relation graphed below.



$D: (-8, 6]$
 $\{x \mid -8 < x \leq 6\}$
 $R: [-7, 4)$
 $\{y \mid -7 \leq y < 4\}$

23. The graph represents how the volume of water, in ml, being drunk from a glass changes with time, in seconds. What does the x -intercept represent in this situation?

- A. water capacity of the glass
- B. total volume of water in the glass
- C. total time until the glass is empty
- D. number of milliliters drunk from the glass per second.

