

## Chapter 6 – Linear Relations Problem Solving

Show all work. Place answers in the "Answer" box and remember units.

- 1) Determine the equation of the line that passes through  $A(6, 0)$  and is perpendicular to the line formed by  $B(-4, 9)$  and  $C(-7, 10)$ . Find equation in  $y = mx + b$  form.

$$m_{(BC)} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 9}{-7 - (-4)} = \frac{1}{-3} = -\frac{1}{3} \quad m_{\perp} = 3$$

new line:  $m = 3, (6, 0)$

$$y - y_1 = m(x - x_1)$$

$$y - 0 = 3(x - 6)$$

$$y = 3x - 18$$

ANSWER:

$$y = 3x - 18$$

- 2) The slope of a line segment joining  $M(-8, 3)$  and  $N(7, k)$  is  $\frac{2}{5}$ . Determine the value of  $k$ .

$$m_{(MN)} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{2}{5} = \frac{k - 3}{7 - (-8)} \rightarrow \frac{2}{5} = \frac{k - 3}{15}$$

$$2(15) = 5(k - 3)$$

$$30 = 5k - 15$$

$$30 + 15 = 5k - 15 + 15$$

$$45 = 5k$$

$$k = 9$$

ANSWER:

$$k = 9$$

- 3) What is the equation of the line passing through  $(-1, 10)$  and  $(2, -2)$ , in  $y = mx + b$  form?

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - (10)}{2 - (-1)} = \frac{-12}{3} = -4$$

$m = -4$ , use pt.  $(2, -2)$

$$y - y_1 = m(x - x_1)$$

$$y - (-2) = -4(x - 2)$$

$$y + 2 = -4(x - 2)$$

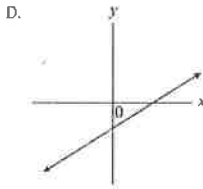
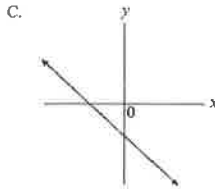
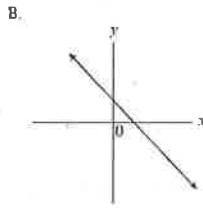
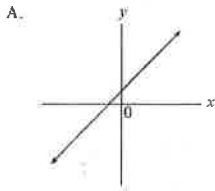
$$y + 2 = -4x + 8$$

$$y = -4x + 6$$

ANSWER:

$$y = -4x + 6$$

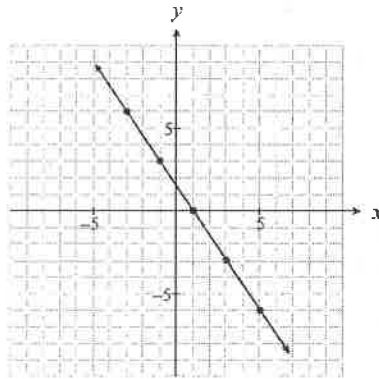
4) Which line has a positive slope and a negative **x-intercept**?



- A. Graph A
- B. Graph B
- C. Graph C
- D. Graph D

ANSWER:

A



5) Which of the following equations describes the graph above?

I	$y = -\frac{2}{3}x + 2$	X
II	$y + 6 = -\frac{3}{2}(x - 5)$	✓
III	$3x + 2y - 27 = 0$	X

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

ANSWER:

B

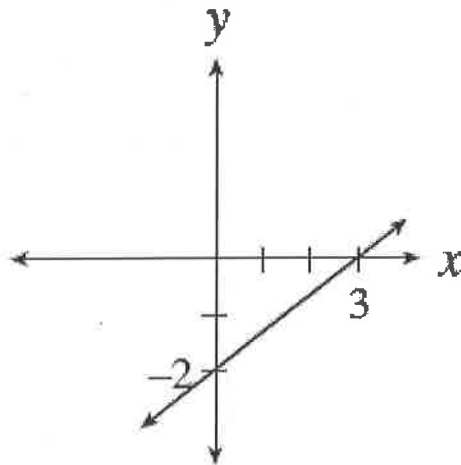
6) Which of the following describes the graph of  $3x - 4y + 4 = 0$ ?

I.	The $y$ -intercept is 1. ✓
II.	The slope is $\frac{3}{4}$ . ✓
III.	The domain is the set of all real numbers. ✓

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

ANSWER:

D



7) Which of the following equations is represented by the line shown **above**?

- A.  $2x - 3y - 6 = 0$  ✓
- B.  $2x - 3y - 2 = 0$
- C.  $2x - 3y + 9 = 0$
- D.  $3x - 2y - 4 = 0$

ANSWER:

A

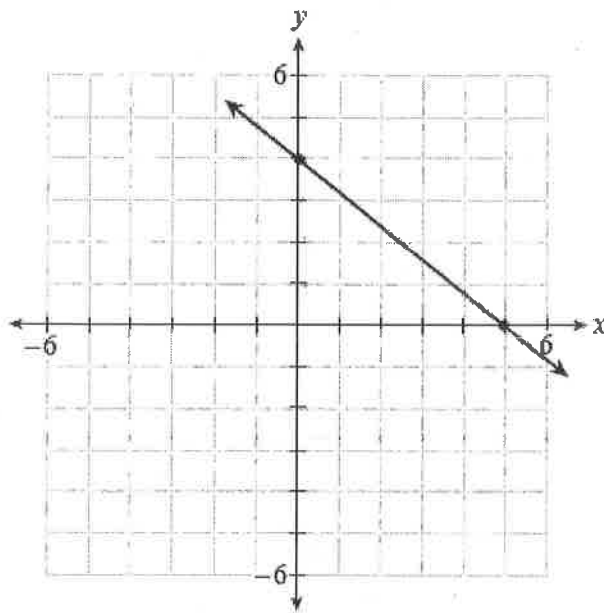
8) The cost of a pizza varies with the number of toppings. The basic pizza costs \$12.95 plus \$1.25 for each topping. What is the formula?

- A.  $C = 12.95t$
- B.  $C = 14.20t$
- C.  $C = 1.25t + 12.95$
- D.  $C = 12.95t + 1.25$

ANSWER:

C

9) Determine an equation of the following line:



- A.  $y = -\frac{4}{5}x + 4$
- B.  $y = -\frac{4}{5}x + 5$
- C.  $y = -\frac{5}{4}x + 4$
- D.  $y = \frac{4}{5}x + 4$

ANSWER:

A

10) Determine the  $y$ -intercept of the graph of  $9x + 6y - 72 = 0$

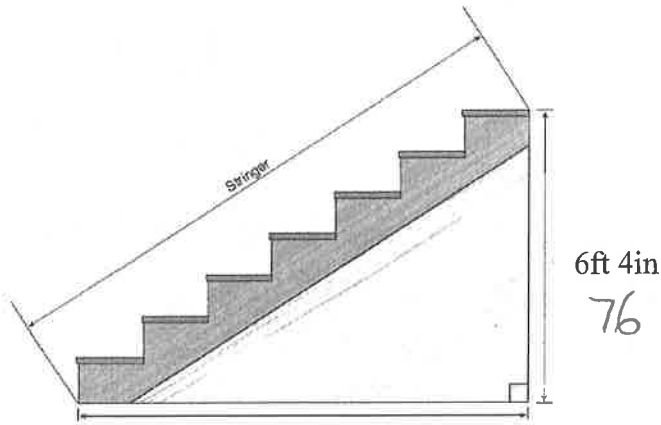
$$6y = 72$$

- A. -72
- B. 6
- C. 8
- D. 12

ANSWER:

D

11) What is the slope of the staircase below?



$$\frac{76}{114} = \frac{38 \div 19}{57 \div 19} = \frac{2}{3}$$

- A.  $\frac{1}{2}$
- B.  $\frac{2}{3}$
- C.  $\frac{47}{48}$
- D.  $\frac{63}{95}$

ANSWER:

B

- 12) Determine an equation of the line passing through the point  $(-4, 3)$  and parallel to the line segment joining  $A(5, -2)$  and  $B(3, 4)$ .

- A.  $y = 3x + 15$   
 B.  $y = 3x - 9$   
 C.  $y = -3x + 15$   
 D.  $y = -3x - 9$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-2)}{3 - 5} = \frac{6}{-2} = -3$$

ANSWER:

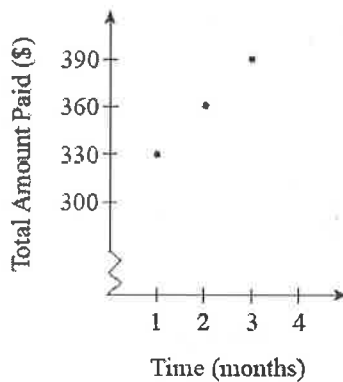
D

$$m = -3, (-4, 3)$$

$$y - 3 = -3(x + 4)$$

$$y - 3 = -3x - 12 \rightarrow y = -3x - 9$$

- 13) A fitness club charges a fee to join as well as a monthly fee, as represented by the graph below



$$C = 30m + 300$$

$$C = 30(6) + 300$$

$$= 180 + 300$$

$$C = \$480$$

What is the cost to be a member for 6 months?

- A. \$270  
 B. \$480  
 C. \$540  
 D. \$780

ANSWER:

B

- 14) What is the equation of the line that has a slope of  $-2$  and passes through the point  $(-3, 4)$ ?

- A.  $y - 4 = -2(x - 3)$   
 B.  $y + 4 = -2(x - 3)$   
 C.  $y + 4 = -2(x + 3)$   
 D.  $y - 4 = -2(x + 3)$

Answer:

D