NAME: Key PERIOD: _____

WINTER PACKET (DUE JANUARY 4, 2016)

ALGEBRA 1

SHOW ALL WORK OR NO CREDIT!!!

WORTH 5 GRADES!!!

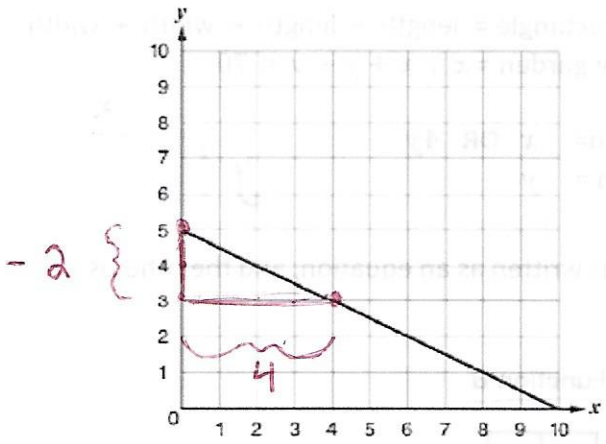
1. Sara lit a new candle and then recorded its height in inches every hour as (time, height). Her results were

   (0, 20), (1, 18.4), (2, 16.8), (3, 15.2), (4, 13.6), (5, 12), and (6, 10.4).

FILL IN THE BLANK TO COMPLETE THE STATEMENT:

The height of the candle **decreases** by 1.6 inches every hour, and its **original** height was 20 inches

2. The graph of a linear function $f(x)$ is shown below:



rate of change = slope

slope = $\frac{\text{rise}}{\text{run}}$

Slope-intercept form → $y = mx + b$ (m = slope, b = y-intercept)

The function of g is represented by the equation $g(x) = \frac{x}{2} + 5$ → $g(x) = \frac{x}{2} + 5$ → $g(x) = \frac{1}{2}x + 5$

m = slope = $\frac{1}{2}$

The **rate of change** of $f(x)$ is $\frac{\text{rise}}{\text{run}} = \frac{-2}{4} = -\frac{1}{2}$

The **rate of change of** $g(x)$ is $\frac{\text{rise}}{\text{run}} = \frac{1}{2}$

3. Write a linear function of the input-output table shown

   **** HINT → $y = mx + b$

   What is the slope? 3

   What is the y-intercept (when does $x = 0$)? 2

Slope means "unit rate of change"

x	$f(x)$
1	5
3	11
6	20
8	26

The equation of the linear function is $y = 3x + 2$

$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$

• Pick any two points to get slope. (1,5) and (3,11)

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{11 - 5}{3 - 1} = \frac{6}{2} = 3$

4. As part of a science experiment, Gary makes a small hole in the bottom of a bottle full of water. He records the amount of water left in the botte at the end of each minute. He repeats this experiment several times and uses the data to develop the linear model $w = -50m + 1200$, which describes the amount of water remaining in the water bottle, in *w* milliliters, after *m* minutes.

(m=slope) (b= y-intercept)

$y = mx + b$

$w = -50m + 1200$

FILL IN THE BLANK TO COMPLETE THE STATEMENT:

The water bottle holds a total of 1200 milliliters of water and loses 50 milliliters per minute.

5. The length, x, of a rectangular garden is 4 times the width, y. Cody estimates that the perimeter of the garden is 70 meters. Which system of equations models the dimensions of the garden.

a. $x = 4y$
$x + y = 35$

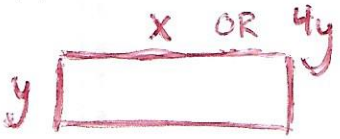
b. $4x = y$
$x + y = 35$

c. $x = 4y$
$x + y = 70$

d. $4x = y$
$x + y = 70$

****HINT → DRAW A RECTANGLE TO REPRESENT THE GARDEN!**

- **Perimeter of a rectangle =** length + length + width + width
- **Perimeter of the garden =** $x + x + y + y = 70$
- $x + y = ?$
- **Length of garden=** x **OR** $4y$
- **Width of garden =** y



6. Two different functions are shown below. One is written as an equation, and the other is given as a table of values.

y-intercept

When graph touches y-axis, $x = 0$

Function A

$f(x) = 2x$

$f(0) = -2(0)$

$f(0) = 0$

Function B

x	y
-2	6
-1	3
0	2
1	3
2	6

x y

(0, 2)

The y-intercept of Function A is 0

The y-intercept of Function B is 2

7. Jim borrowed $850 to purchase a stereo system for his car. He has been making payments each week for the last four weeks. The chart below shows the history of his loan balance.

Week	Balance of Loan
Original Price	$850
1	$775
2	$700
3	$625
4	$550

1 → −75

−75

−75

−75

What is the slope of this function? −75

8. The values in the table came from a recent survey on the number of hours students spend on social media.

Number of Hours Spent Using Social Media	Number of Students
x	f(x)
0	3
1	20
2	37
3	54
4	71
5	88
6	?

17 17 17 17 17 17

****HINT →**

- $y = mx + b$
- Look for the pattern (rate of change/slope)!

Write an equation that best represents this data $y = 17x + 3$

What is $f(6)$? 105

9. Jessie deposited \$6,000 in a savings account. The amount in the account after 1, 2, and 3 years is shown below.

240 240

\$6,000 → \$6,240, \$6,480, \$6,720, ...

+240

Write an expression/equation that represents the total amount in her account at the end of *t* years $y = 240x + 6000$

(***Remember → $y = mx + b$)

10. A fitness center introduces two offers. The first offer charges \$27 per month plus \$34 enrollment fee. The second offer charges \$30 per month plus \$22 enrollment fee.

First offer

$27x + 34$

Second offer

$30x + 22$

Is the second offer always less expensive? If not, how many months will it take for the second offer to be more expensive?

NO! It will take 5 months for the second offer to be more expensive.

11. A function is given as $f(x) = 2x - 6$ and the function $g(x)$ is seen in the table below

$f(x) = 2x - 6$

Slope = 2

x	g(x)
1	6
0	3
1	0
2	-3
3	-6

-3 -3 -3 -3

g(x)

slope = rate of change

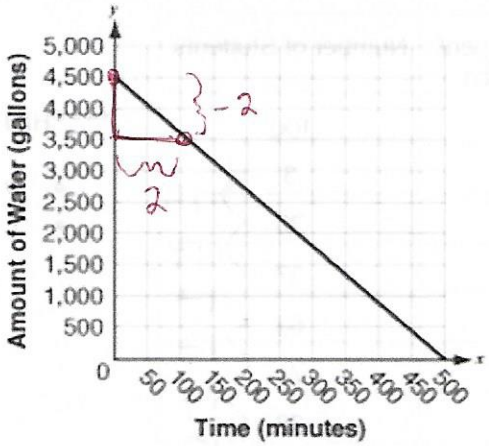
slope = -3

Which function has a greater rate of change (slope)? $f(x)$ OR $g(x)$

$2 > -3$

CIRCLE THE RIGHT ANSWER.

12. The water in a swimming pool is being drained. The function shown in the graph below represents the amount of water in gallons that remains in the pool after x minutes.



What is the rate of change (slope) of the graph? $\frac{-2}{2} = -1$

13. Carla invests \$3000 in a family fund that pays 5% interest every year, but only on her principal investment. The formula the fund uses to calculate the amount in her account, A, based on the number of years, t, since she invested the \$3000 is show below.

$$A = 3000(1 + 0.05t)$$

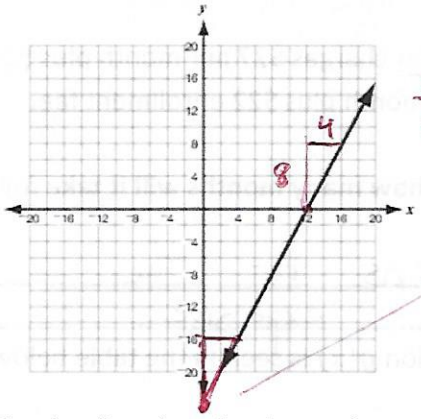
$$A = 3000 + 150t$$

The amount in Carla's account increases by 150 **dollars each year.**

****HINT →**

- Change the equation to $y = mx + b$ form.
- Distribute first!!!!

14. What is the y-intercept of the function shown on the coordinate plane below?



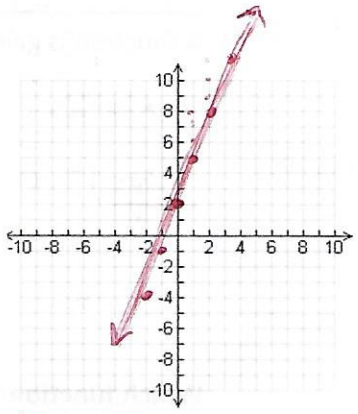
$\frac{\text{rise}}{\text{run}} = \frac{8}{4} = 2$

$y - intercept \rightarrow$ -22

(0, -22)

15. Graph a function that has a slope of 3 and $f(0) = 2$ on the graph to the right.

slope $= \frac{\text{rise}}{\text{run}} = \frac{3}{1}$ (0, 2)



16. What is the solution to the equation $2x + (x + 9) = 153$?

X = 48

$2x + x + 9 = 153$

$3x + 9 = 153$

$-9 \quad -9$

$3x = 144$

$\frac{3x}{3} = \frac{144}{3}$

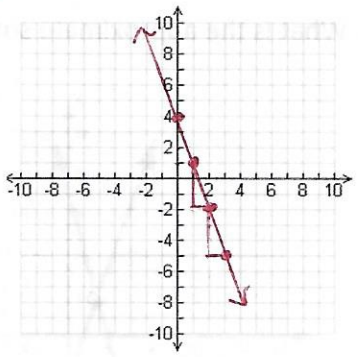
$x = 48$

17. Shane plans on finding a summer job so he can earn enough money to buy a new laptop that costs $595. He has already saved $150. If Shane finds a summer job that pays him $7.50 an hour after taxes are withheld, what is the minimum number of hours he will have to work in order to purchase the laptop?

First, create an equation for the situation $595 = 7.50x + 150$

Now, solve the equation: $7.50x + 150 = 595$, $-150 \quad -150$, $\frac{7.50x}{7.50} = \frac{445}{7.50}$, $x = 59.3$ months or 60 months

18. Create a graph for the function $f(x) = -3x + 4$



19. Solve the following system of equations using **substitution**.

$$\begin{bmatrix} 4x + 3y = 4500 \\ x + y = 1200 \end{bmatrix}$$

① $x + y = 1200$, $-x \quad -x$, $y = 1200 - x$

② $4x + 3(1200 - x) = 4500$

$4x + 3600 - 3x = 4500$

$x + 3600 = 4500$, $-3600 \quad -3600$

$x = 900$

③ $y = 1200 - x$

$y = 1200 - (900)$

$y = 300$

$x =$ 900

$y =$ 300

What is the ordered pair? $(x, y) \rightarrow (900, 300)$

20. Solve the following equation for H

$$I = \frac{W}{H^2} 703$$

$H^2 \cdot I = \frac{W \cdot 703}{H^2} \cdot H^2$

$\frac{H^2 I}{I} = \frac{703w}{I} \rightarrow \sqrt{H^2} = \sqrt{\frac{703w}{I}}$

$H = \sqrt{\frac{703w}{I}}$

21. Solve the following system of equations using **elimination**.

$$\begin{bmatrix} 2x + y = 9 \\ 3x - 2y = 10 \end{bmatrix}$$

$\times 2 \rightarrow 4x + 2y = 18$

$+ \quad 3x - 2y = 10$

$\frac{7x}{7} = \frac{28}{7}$

$x = 4$

$(4, 1)$ (x, y)

$2x + y = 9$, $-2x \quad -2x$, $y = 9 - 2x$

$y = 9 - 2(4)$

$y = 9 - 8 = 1 = y$

$y = -0.83x + 8$

22. If the points $(2, m)$ and $(n, 3)$ are solutions of the equation $2.5x + 3y = 24$, what are the approximate values of *m* and *n*?

A. -2.4 and -2.5

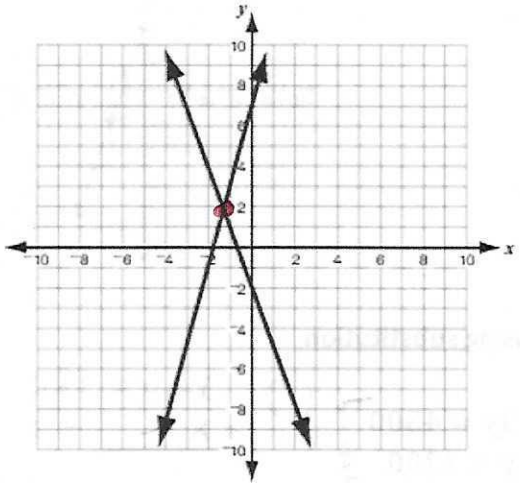
B. -1.7 and -3.6

C. 6.3 and 6

D. 7.2 and 5.5

- **CHANGE THE EQUATION INTO SLOPE-INTERCEPT FORM** $y = mx + b$
- **FIND THE SLOPE**
- **BASED ON THE ANSWER CHOICES, WHAT WOULD GIVE YOU THE CORRECT SLOPE FOR *m* AND *n***
  - **Remember** $\frac{y_2 - y_1}{x_2 - x_1}$
  - **(plug in the numbers!)**

23. What is the approximate solution to the system of equations graphed below?



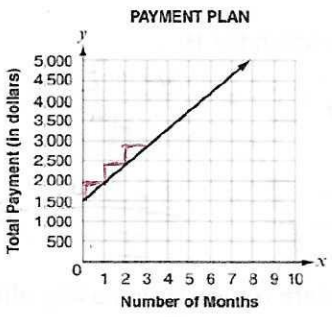
(in other words, at what coordinate point do the lines touch?)

The solution of the system of equations (represented as an ordered pair) is $(-1, 2)$

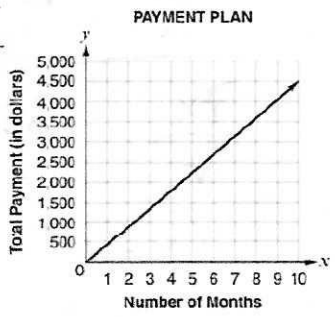
24. Michael buys a car and agrees to pay $1,500 up front and $450 each month for the next 2 years. Which graph shows the total amount, *y*, in dollars that will be paid at the end of *x* months?

A.

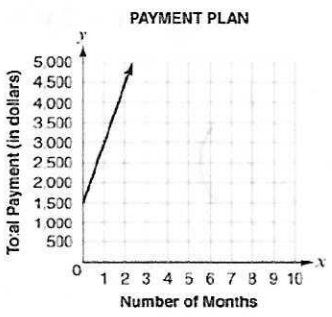
B.



C.



D.



****HINT**

What is the y-intercept (b)?
1500

What is the slope (m)?
450

$y = 450x + 1500$

Has a slope = 450

y-intercept = 1500