

# LESSON 2 – ALGEBRA & FUNCTIONS

## A) SIMPLIFYING EXPRESSIONS

An expression does not have an equal sign with a left side and a right side.  
In an expression we can only simplify rather than solve.

Simplify each expression: (Combine similar terms.)

1)  $13x + 5x - 7 + 1$

2)  $8 - 5(6x - 2)$

3)  $4 - (2x + 7)$

4) Which of the following expressions is equivalent to the expression  $17 - 4x$  for all values of  $x$ ?

a)  $4 - (4x - 21)$

b)  $6 - (2x + 4)$

c)  $5 + (-6x - 17)$

d)  $5 - (4x + 22)$

e)  $5 - (4x - 12)$

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5) Which of the following is equivalent to  $14x^2$  ?

Choose all correct answers.

a)  $10x^2 + 9x^2 - 5x^2$

b)  $(2x)(7x)$

c)  $(2)(7x)$

d)  $\frac{42x^3}{3x}$

e)  $\frac{14x}{x}$

			A		
			6		
			9		
B	12	5	X	1	3
			Y		
			3		

6) If the sum of the numbers in column A is equal to the sum of the numbers in row B, then find the value of Y.

## B) MORE SOLVING EQUATIONS

*Remember*, when solving an equation, always do \_\_\_\_\_ & \_\_\_\_\_ first. To remove a fraction, multiply by the \_\_\_\_\_.

1) If  $\frac{1}{8}x - 5 = 3$ , then  $x =$

- a) 1                  b) 64                  c) 16                  d) 32                  e) 128

2) “Type” the number in the box. Give your answer as a fraction.  
If  $7(3x - 5) = 4(x - 4) - 9$ , what is the value of  $x$ ?

$$x = \frac{\boxed{\phantom{000000}}}{\boxed{\phantom{000000}}}$$

3) Which of the following sequence of steps, when completed, will solve the equation  $4 + 5y = 19$  for  $y$ ?

- a) Subtract 4 from both sides of the equation, then divide both sides of the new equation by 5.
- b) Subtract 5 from both sides of the equation, then divide both sides by 4.
- c) Add 4 to both sides of the equation, then divide both sides by 5.
- d) Add 5 to both sides, then subtract 4 from both sides.
- e) Divide both sides of the equation by 5, then subtract 19 from both sides.

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4) If  $k + m = 41$  and  $j + p = 20$ , what is the value of  $(4k + 4m)(3j + 3p)$ ?

- a) 9840      b) 9480      c) 984      d) 948      e) 732

5) If  $8a - 5b = 44$  and  $b = 2$ , find  $a$ .

- a)  $\frac{8}{11}$       b)  $\frac{7}{4}$       c)  $\frac{27}{4}$       d)  $\frac{4}{7}$       e)  $\frac{4}{17}$

6)  $30\left(\frac{1}{10}x + \frac{2}{3}x\right) = ?$

7) Solve for  $y$ :  $\sqrt{y + 3.7} + 18 = 30$

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8) Given the fraction  $\frac{x}{x+11}$ . If 7 is added to the numerator and the denominator, the resulting fraction is  $\frac{9}{20}$ . What is the value of  $\frac{x}{x+11}$ ?


9) Nishanka has twice as many coins as Paola. Brenda has 5 more coins than Nishanka. If the total number of coins is 50, how many coins does Brenda have?

- a) 7                  b) 9                  c) 18                  d) 21                  e) 23

Let P = # of coins Paola has

Equation:

Let \_\_\_\_\_ = # of coins Nishanka has

Let \_\_\_\_\_ = # of coins Brenda has

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x	f(x)
4	50
7	65
10	80
12	90
35	205

10) Which equation satisfies every entry in the above table?

- a)  $f(x) = 10x + 10$       b)  $f(x) = 12x + 2$       c)  $f(x) = 5x + 10$   
d)  $f(x) = 15x - 10$       e)  $f(x) = 5x + 30$

11) A repairperson charges \$70/hour plus a service charge of \$170. If the bill came to \$800, which of the following will find the number of hours she worked?

- a)  $\frac{800 - 170}{70}$       b)  $\frac{800 + 170}{70}$       c)  $\frac{800}{70} + 170$   
d)  $\frac{800 - 70}{170}$       e)  $\frac{800}{170 + 70}$

### C) SOLVING PROBLEMS WITH LOTS OF LETTERS

- 1) Sheryl deposits \$2,800 in her bank. It is all in twenties and fifties. If  $z$  represents the number of twenty dollar bills, which of the following represents the number of fifty dollar bills?

a)  $\frac{2800 + 20z}{50}$       b)  $\frac{50(20z)}{2800}$       c)  $\frac{2800 - 20z}{50}$       d)  $\frac{100z}{2800}$       e)  $\frac{10z}{2800}$

- 2) If  $x + 2 = 3y + 6$ , what is  $y$  in terms of  $x$ ?

a)  $\frac{x+2}{3} - 6$       b)  $\frac{x-8}{3}$       c)  $\frac{x+4}{3}$       d)  $\frac{x-4}{3}$       e)  $\frac{x-6}{2} - 2$

- 3) If  $8x + 113y = 501$ , find  $x$  in terms of  $y$ .

a)  $\frac{501 - 8x}{113}$       b)  $\frac{501 - 113y}{8}$       c)  $\frac{501}{8} - 113y$   
 d)  $\frac{113y}{501} - 8$       e)  $\frac{113y}{8} - 501$

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$$16x + 34y$$

- 4) The expression above represents the total amount, in dollars, earned by selling  $x$  tee shirts and  $y$  sweatshirts at a recent Back-To-School Night. A total of \$2,260 was collected in sales of tee shirts and sweatshirts. The amount earned by selling sweatshirts is what fraction of the total amount earned?

a)  $\frac{34y}{2260}$       b)  $\frac{16x}{2260}$       c)  $\frac{7}{2260}$       d)  $\frac{x}{2260}$       e)  $\frac{16x + 34y}{2260}$

- 5)  $H$  is 5 times  $M$ , and  $M$  is 3 less than 7 times  $W$ . Which of the following statements describes the relationship between  $H$  and  $W$ ?

- a)  $H$  is 21 less than 15 times  $W$ .                      b)  $H$  is 21 less than 12 times  $W$ .  
c)  $H$  is 15 less than 3 times  $W$ .                      d)  $H$  is 35 $W$  less than 15.  
e)  $H$  is 15 less than 35 times  $W$ .

- 6) If  $h = \frac{1}{3}j$  and  $j = \frac{1}{4}k$ , what is the relationship between  $h$  and  $k$ ?

a)  $h = \frac{1}{2}k$       b)  $k = 8h$       c)  $k = \frac{1}{7}h$       d)  $k = 12h$       e)  $h = 12k$

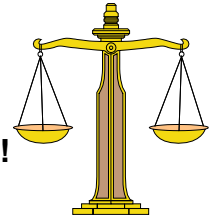


## D) INEQUALITIES

One important thing to remember about inequalities:

If I multiply or divide BOTH SIDES of an inequality by a

\_\_\_\_\_, then I must \_\_\_\_\_!



Always put the letter on the \_\_\_\_\_. Don't write  $2 < x$ . Write \_\_\_\_\_

Solve each inequality for x:

1)  $2x + 7 > -13$

2)  $-4x + 3 \leq x + 18$

3) Solve the inequality for x. Choose all that apply.

$$2x + 3 > 40$$

a) 17

b) 18.5

c) 19

d) 19.5

e) 21

4) Solve the inequality for x. Choose all that apply.

$$-3x - 5 \geq 34$$

a) -14.5

b) -14

c) -13.9

d) -13

e) -12

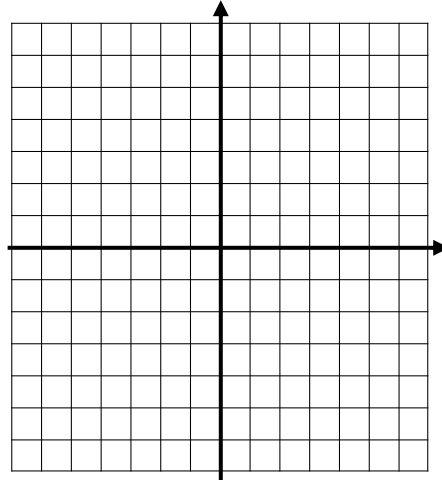
## E) ALGEBRAIC GRAPHS

To find the points where a graph will hit the x and y axes, use the “Intercept-Intercept” Method. Let  $x = 0$  and solve for  $y$ . Let  $y = 0$  and solve for  $x$ .

Ex.  $2y - 4x = 8$

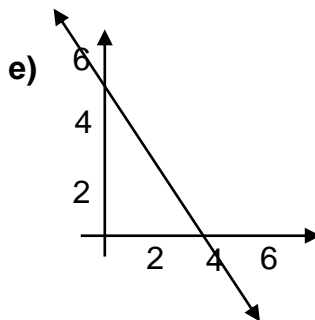
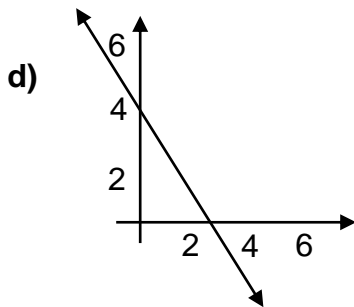
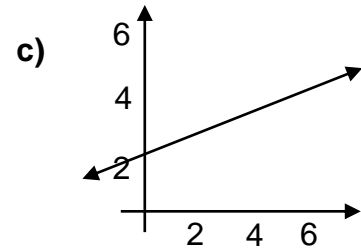
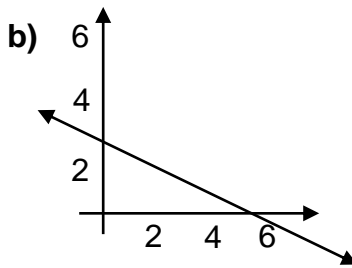
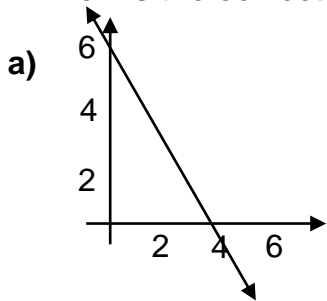
If  $x$  is 0, then

If  $y$  is 0, then



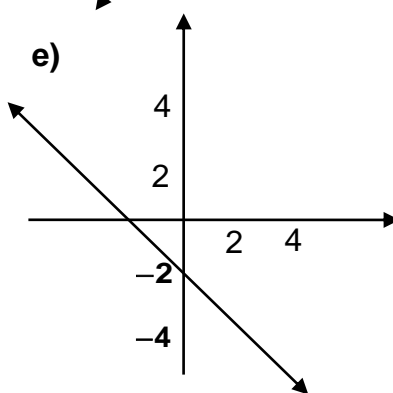
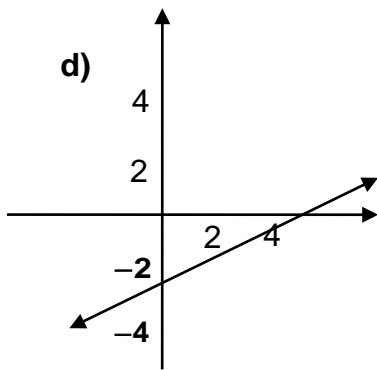
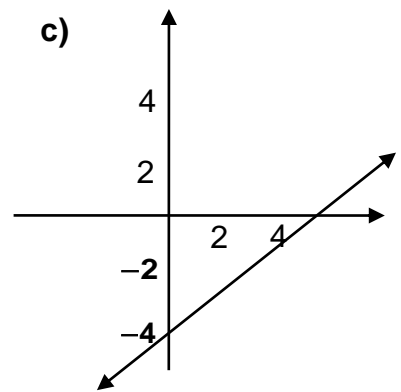
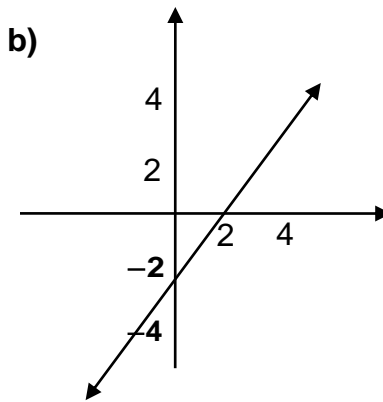
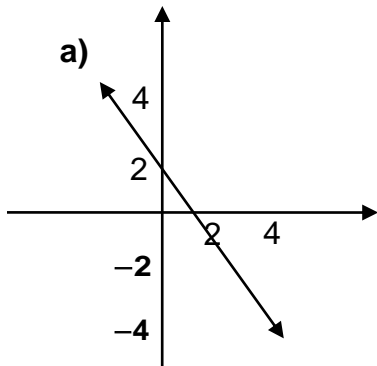
x	y
0	
	0

1) Which is the correct graph of the equation:  $4x + 3y = 12$ ?

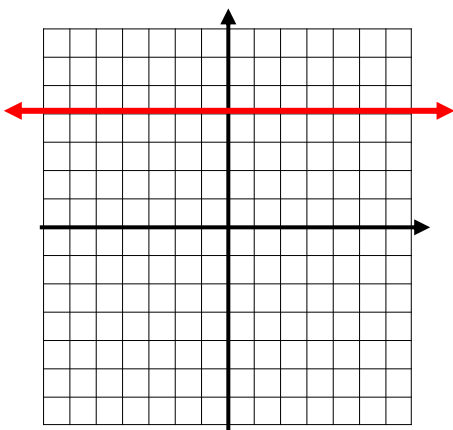


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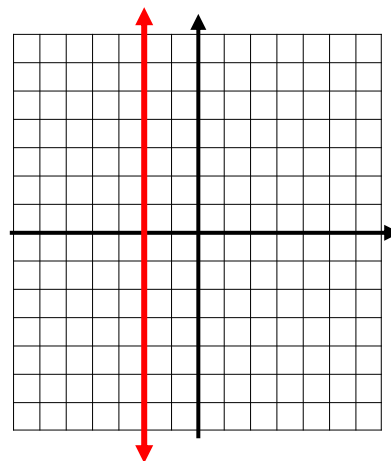
2) Which graph represents the equation:  $5x - 4y = 10$ ?



**NOTE:** The equation of all horizontal lines is  $y =$  the number where it hits the y-axis.  
The equation of all vertical lines is  $x =$  the number where it hits the x-axis.



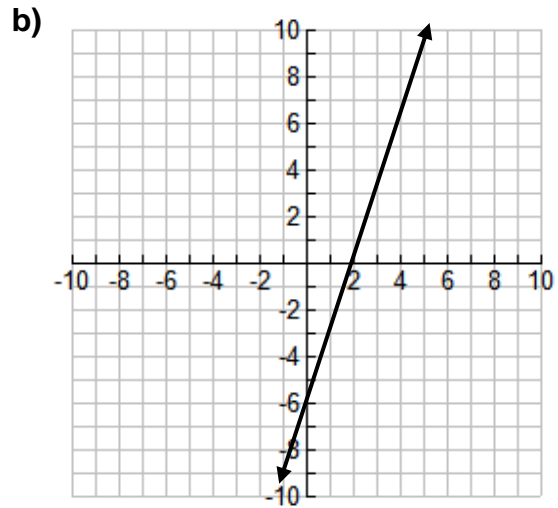
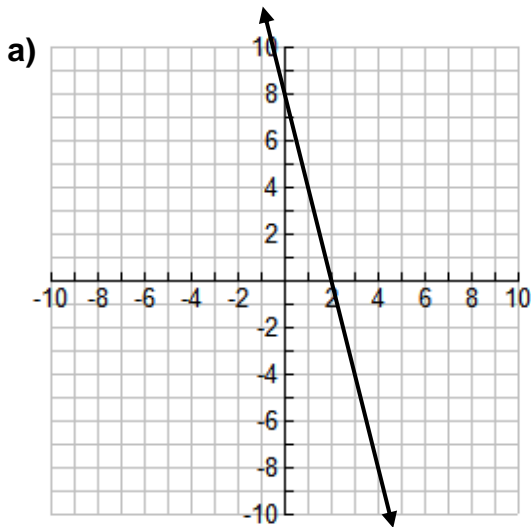
The equation of the line above is \_\_\_\_\_.



The equation of the line above is \_\_\_\_\_.

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3) Which of the following graphs shows that as y decreases by 4, x increases by 1?



**SLOPE-INTERCEPT FORM OF A LINE:**  $y = mx + b$  where  $m$  is the slope or rise/run and  $b$  is the y-intercept or place where the graph intersects the y-axis.

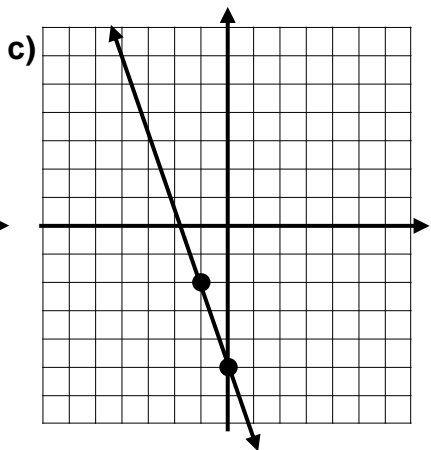
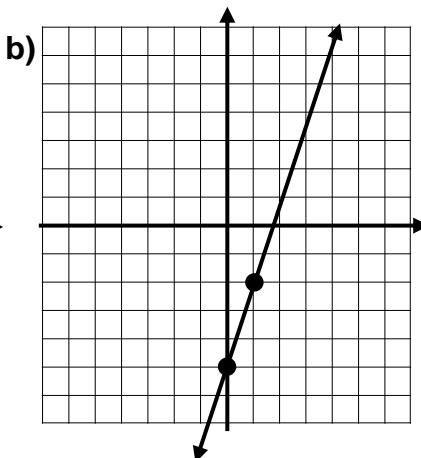
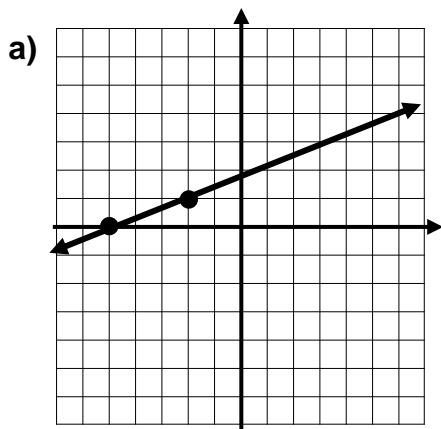
A **positive** slope rises to the right.



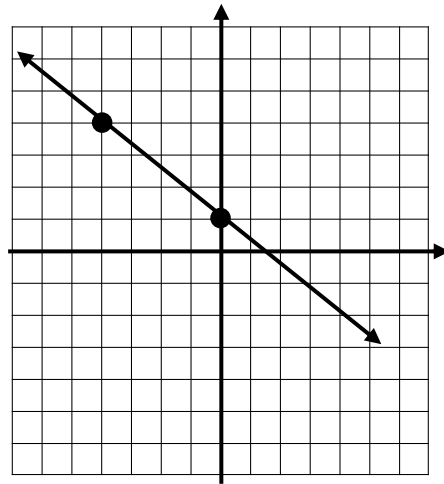
A **negative** slope rises to the left.



4) Which graph below shows the line  $y = 3x - 5$ ?

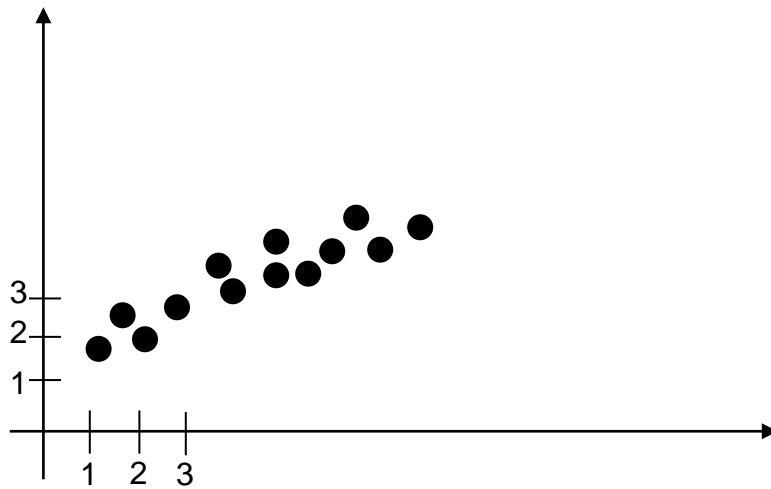


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5) What is the equation of the line shown in the graph above?

- a)  $y = \frac{4}{3}x + 1$     b)  $y = \frac{3}{4}x + 1.5$     c)  $y = -\frac{3}{4}x + 1$     d)  $y = -\frac{4}{3}x - 1$     e)  $y = -\frac{3}{4}x - 1$



6) Which of the following linear models best fits the data shown in the scatterplot above?

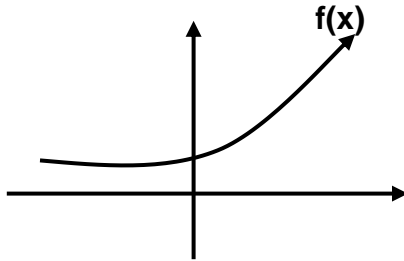
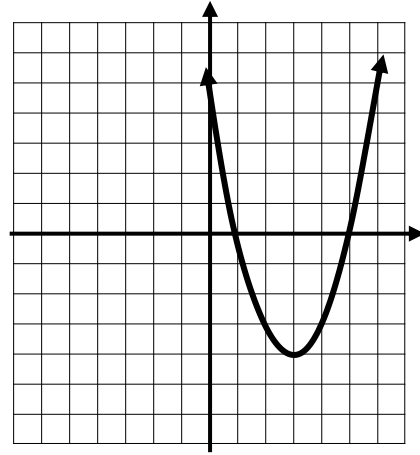
- a)  $y = -\frac{1}{2}x + \frac{1}{2}$     b)  $y = -\frac{1}{2}x - \frac{3}{2}$     c)  $y = x$   
 d)  $y = \frac{1}{2}x + \frac{3}{2}$     e)  $y = \frac{1}{2}x - \frac{3}{2}$

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7) The graph shows  $f(x) = (x - 3)^2 - 4$ .

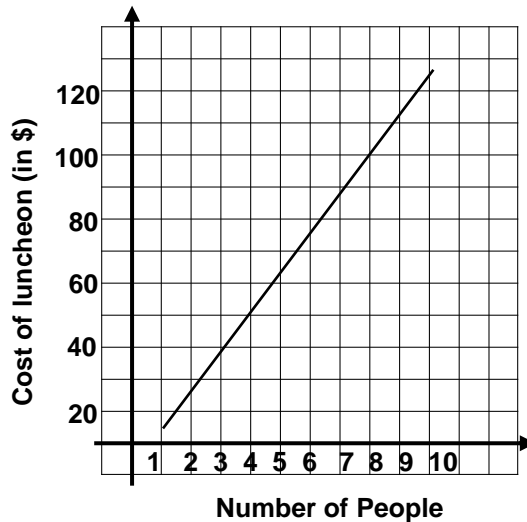
Which of the following is a point on  $f(x)$ ?

- a) (3, -4)      b) (0, 1)      c) (0, -5)  
 d) (4, -1)      e) (5, 6)



8) Which of the following describes the graph of  $f(x)$  shown above?

- a) It is linear and as  $x$  increases,  $y$  decreases.  
 b) It is linear and as  $x$  increases,  $y$  increases.  
 c) It is nonlinear and as  $x$  increases,  $y$  decreases.  
 d) It is nonlinear and as  $x$  increases,  $y$  increases.  
 e) It is nonlinear and as  $x$  increases,  $y$  remains the same.

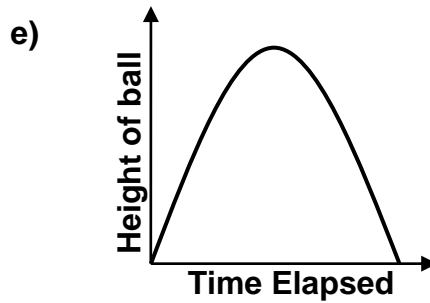
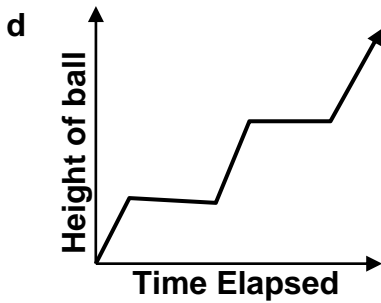
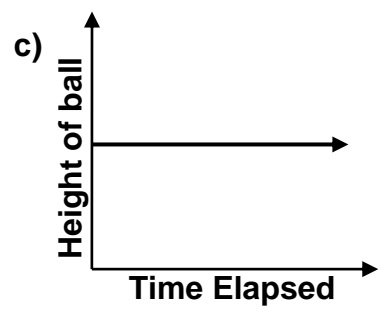
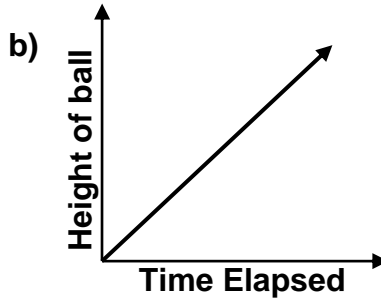
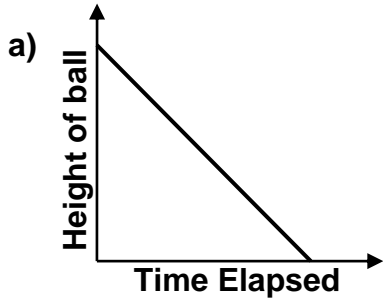


9) The graph above shows the relationship between the cost of a luncheon and the number of people attending the luncheon. According to the graph, what is the cost per person?

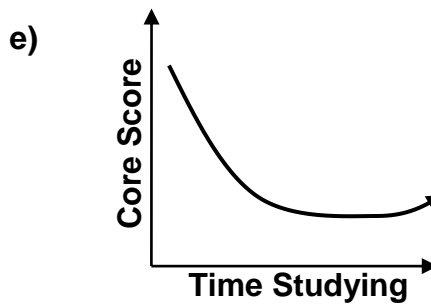
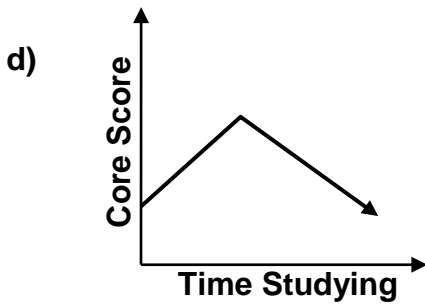
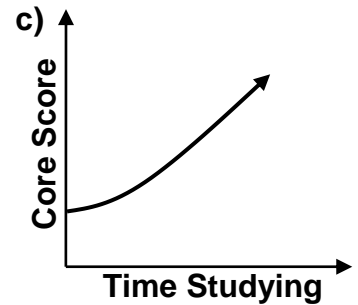
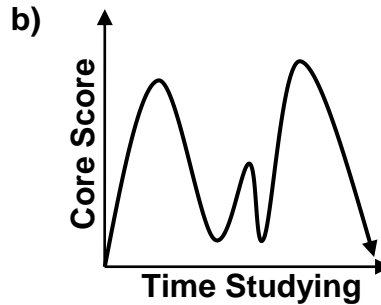
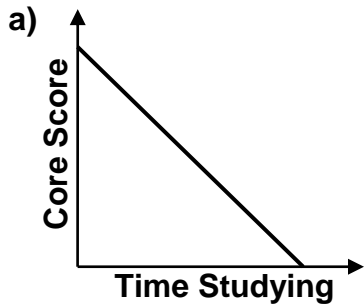
- a) \$11.50      b) \$12      c) \$12.50      d) \$13      e) \$13.50

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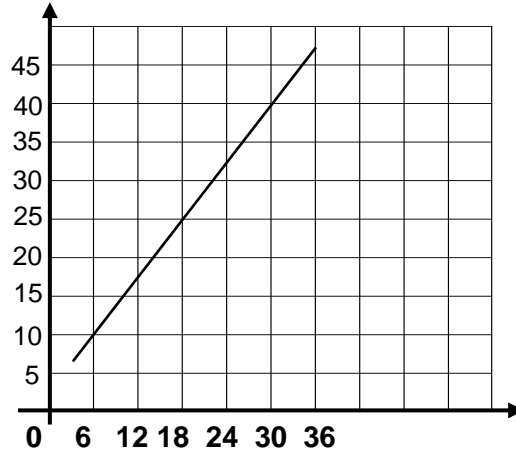
10) Which of the following graphs most accurately shows the relationship between the time after a golf ball is struck and the height of the ball in feet?



11) We all know that the more time we spend studying for a test the higher our test score will be. Which of the following graphs could be the graph of the relationship between time studying and score on the CORE test?



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12) The graph of a linear equation is shown above. Which of the following tables corresponds to the graph?

a) 

x	y
5	10
12	22
18	34
24	46

b) 

x	y
6	10
12	17.5
24	32.5
30	40

c) 

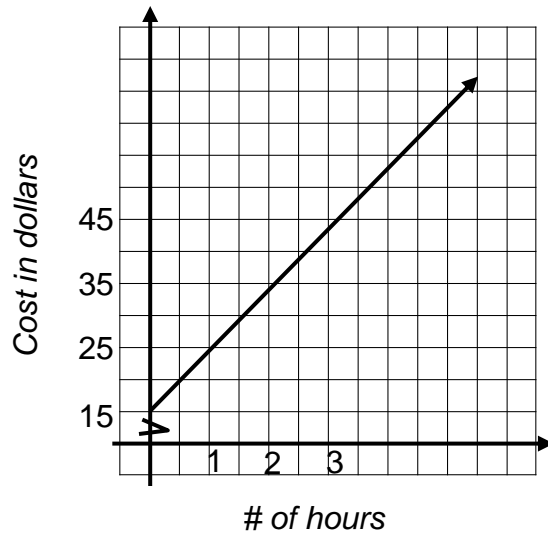
x	y
12	18
18	28
30	45
36	50

d) 

x	y
0	5
6	10
12	28
18	40

e) 

x	y
12	18
28	25
24	43
30	45



13) The graph above represents the cost of renting a bike. What is the flat rate and what is the hourly charge?

- a) Flat rate \$15      Hourly rate \$5
- b) Flat rate \$15      Hourly rate \$10
- c) Flat rate \$15      Hourly rate \$15
- d) Flat rate \$25      Hourly rate \$10
- e) Flat rate \$25      Hourly rate \$15

*Hint: "Flat" rate means the amount you pay before you even start!*



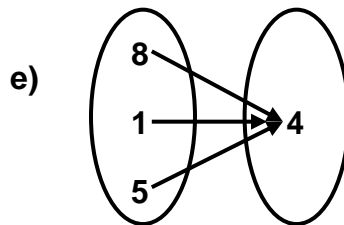
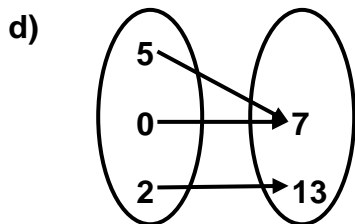
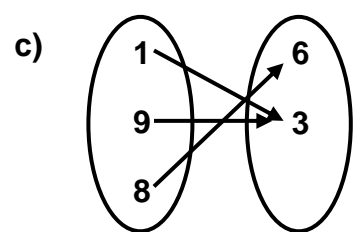
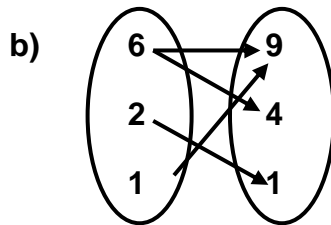
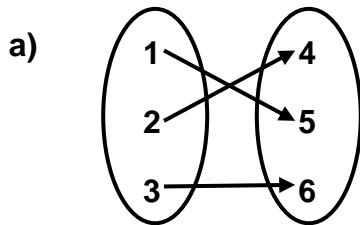
## F) FUNCTIONS

In order to be a function, no x value can be repeated.

1) Which of the following is not a function?

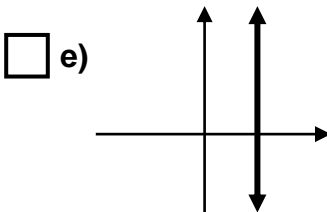
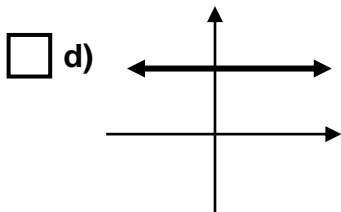
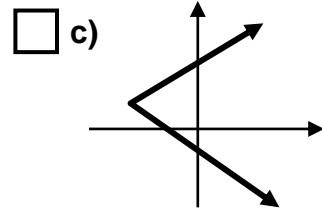
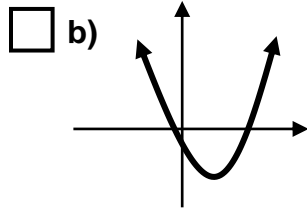
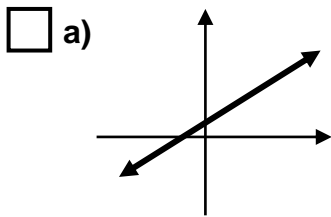
- a)  $\{(3,4)(5,4)(2,7)(9,7)\}$
- b)  $\{(-2,7)(-3,-4)(2,9)(5,-1)\}$
- c)  $\{(4,11)(6,-3)(0,9)(8,3)\}$
- d)  $\{(2,8)(-2,13)(1,5)(2,3)\}$
- e)  $\{(-7,0)(1,8)(4,1)(3,9)\}$

2) Which of the following does not represent a function?



**If you draw a vertical line anywhere on the graph and it intersects the graph more than once, then it is not a function.**

3) Which of the following represents a function? Choose all correct answers.



4) Which of the following does not represent a function? Choose all correct answers.

