

Algebra 1 AIR Questions for CH 3 & 4

Name _____

1 Given the equation $y = 5x$

- a. Describe the slope in context
- b. Describe how y will change if x is increased by 3

2 A cell phone plan includes 500 minutes of talk time. The monthly charge is calculated with the equation $y = 45 + .30x$ where x is the number of overage minutes (501 minutes used = 1 overage minute).

- a. Describe the monthly fee the user is charged if they use less than 500 minutes.
- b. Describe the cost for each overage minute.
- c. How much does the monthly charge rise when 10 overage minutes are used.

3 A taxi charges a 6 dollar fee plus 10 cents per mile driven.

- a. Write an equation that describes y , the cost of the taxi ride, based on x , the miles driven.
- b. Find the cost for a 23 mile car ride rounded to the nearest dollar
- c. Tim has \$10 and needs a ride to a location that is 30 miles away. Does Tim have enough money for the trip.

4. An aquarium has a hole in the side and the water is leaking out. The amount of water in milliliters remaining in the aquarium after t seconds is described by the equation $m = 400 - 8t$

- a. If the tank is full at time $t = 0$ seconds, then how much water does the tank hold?
- b. How much water is in the tank at time $t = 20$ seconds?
- c. At what time will the water remaining be 300 milliliters?
- d. At what time will there be no water remaining?
- e. Complete the sentence: For every 1 second that elapses, the water in the tank will _____.
- f. Describe the domain and range.

5. A hole is poked in a balloon holding 200 cubic cm of air (cc). Air is flowing out at a rate of 10 cubic cm per second.

- a. Write an equation that describes y , the amount of air in the balloon, after x seconds.
- b. How much air is in the balloon after 3 seconds?
- c. How long will it take for the balloon to be completely deflated?
- d. Describe the domain and range.
- e. Are these points part of the solution set? (5 sec, 150 cc) (7 sec, 110 cc) (30 sec, -100 cc)

Name _____

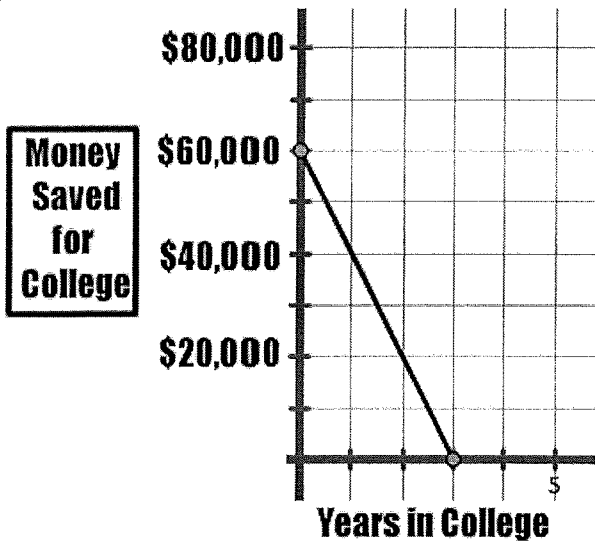
6. Jack knows that his family will be charged \$.47 per day for the water they use.

- a. Write an equation to describe the amount the family is charged, y , for x days.
- b. Find the amount the family is charged for a 30 day month.
- c. Find the amount the family is charged per year.
- d. Are these points part of the solution set? (5 days, \$2.25) (3 days, \$1.41) (11 days, \$5.15)

7. Jack now has friends from out of town staying with his family. He knows that the equation $y = $.47 + .15x$ will describe the amount per day for the water they use where x represents the number of friends staying.

- a. For every additional friend staying with Jack, the daily cost of water will _____
- b. How many friends can stay with Jack before the cost of water exceeds a dollar per day?
- e. Are these points part of the solution set? (8 fam, \$1.67) (10 fam, \$1.67) (40 fam, \$7.15)

8.



- a. What amount was saved at the start of college?
- b. What is the cost per year for college?
- c. How many years did the college savings last?
- d. Complete the order pair (2, _____)
- e. Explain the meaning of x and y in the ordered pair.
- f. If the line continues, then (4, -20,000) is on the line.
Explain the meaning of the point in context.
- g. State the equation of the line.

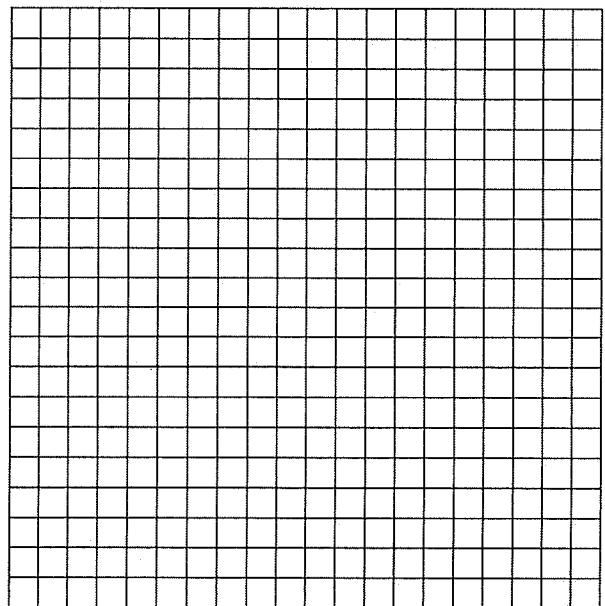
9. Dean sells cars for a living. Dean makes a salary of \$350 per week plus a commission of \$200 for each car that he sells during the week.

- Write an equation for Dean's total weekly income.
- What do x and y represent?
- How much will Dean make if he sells 3 cars?
- Create a table of Dean's weekly income for domain 0 to 10 cars sold.
- What is the minimum number of cars that Dean must sell before he makes \$1000?
- Graph Dean's weekly income for domain 0 to 10 cars sold.
- Mark on the graph to show your solutions to part c and e.

Table:

x	y
Units:	Units:
0	
1	
2	
3	
10	

Graph:



Name _____

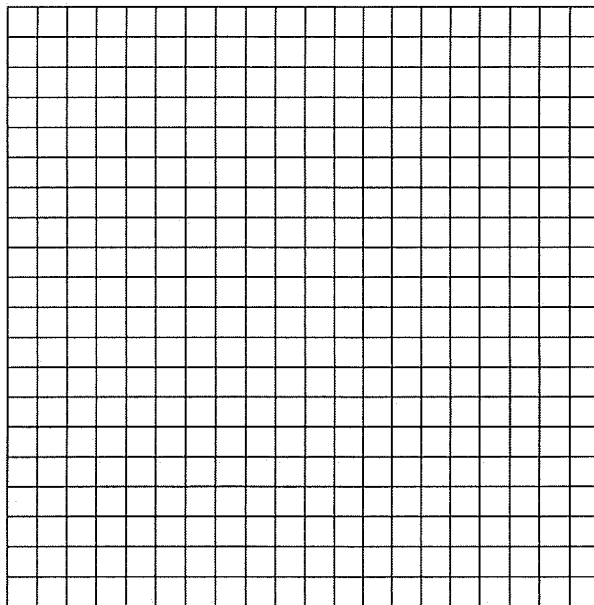
10. Dan sells cars for a living. Dan makes a salary of \$400 per week plus a commission of 5% of the sale price of each car that he sells during the week.

- a. Write an equation for Dan's total weekly income.
- b. What do x and y represent?
- c. How much will Dan make if the total sales price of the cars he sold is \$44,000?
- d. Create a table of Dan's weekly income for domain \$0 to \$100,000 in sales.
- e. What is the minimum sale price of cars that Dan must sell before he makes \$1000?
- f. Graph Dan's weekly income for domain \$0 to \$100,000 in sales.
- g. Mark on the graph to show your solutions to part c and e.

Table:

x	y
Units:	Units:
\$0	
\$100,000	

Graph:



11. Bill and Bertha are engaged to be married. Each has money invested and earns money through their job to add to their investments.

- Bill currently has \$50,00 in investments. He earns \$2400 per month at his job and plans to save half of this amount by adding it to his investments.
 - Bertha currently has \$35,000 in investments. She earns \$2800 per month at her job and plans to save a quarter of this amount by adding it to her investments
- a. Write an equation for the value of the money in Bill's investments.
 - b. Write an equation for the value of the money in Bertha's investments.
 - c. Describe the meaning of your variables in part a and b.
 - d. Bill and Bertha save in their investments for 6 months before they are married. Let T be the total value of their investments. Find the value of T when they are married.
 - e. Write a function $T(t)$ for the value of T if Bill and Bertha continue to add the same amounts into their investments after the marriage for t months.
 - f. Given that the marriage lasts 10 years, describe the domain and range for the function $T(t)$.
 - g. ****challenge**** After 10 years of marriage Bill and Bertha divorce and split the value of T equally. Who benefitted more by splitting it equally? Was the split fair? Suggest a better split.

Algebra 1 AIR Questions for CH 3 & 4

Key

1 Given the equation $y = 5x$

a. Describe the slope in context

As x increases 1, y increases 5

b. Describe how y will change if x is increased by 3

As x increases 3, y increases 15

2 A cell phone plan includes 500 minutes of talk time. The monthly charge is calculated with the equation $y = 45 + .30x$ where x is the number of overage minutes (501 minutes used = 1 overage minute).

a. Describe the monthly fee the user is charged if they use less than 500 minutes.

\$45

b. Describe the cost for each overage minute.

\$.30 per overage minute

c. How much does the monthly charge rise when 10 overage minutes are used.

$$y = 45 + .3(10)$$

$$y = 48$$

\$48

3 A taxi charges a 6 dollar fee plus 10 cents per mile driven.

a. Write an equation that describes y , the cost of the taxi ride, based on x , the miles driven.

$$y = 6 + .1x$$

b. Find the cost for a 23 mile car ride rounded to the nearest dollar

$$y = 6 + .1(23)$$

$$y = \$8.30$$

c. Tim has \$10 and needs a ride to a location that is 30 miles away. Does Tim have enough money for the trip.

$$x = 30$$

$$y = 6 + .1(30)$$

$$y = 9$$

Yes, the trip will cost \$9

4. An aquarium has a hole in the side and the water is leaking out. The amount of water in milliliters remaining in the aquarium after t seconds is described by the equation $m = 400 - 8t$

- a. If the tank is full at time $t = 0$ seconds, then how much water does the tank hold?

$$400\text{mL}$$

- b. How much water is in the tank at time $t = 20$ seconds?

$$m = 400 - 8(20) = 400 - 160 = 240\text{mL}$$

- c. At what time will the water remaining be 300 milliliters?

$$300 = 400 - 8t \quad -100 = -8t$$

$$12.5\text{sec} = t$$

- d. At what time will there be no water remaining?

$$0 = 400 - 8t \quad t = 50\text{sec.}$$

$$-400 = -8t$$

- e. Complete the sentence: For every 1 second that elapses, the water in the tank will decrease 8 mL.

- f. Describe the domain and range.

$$D: \downarrow \text{time in seconds } [0, 50]$$

$$R: \text{mL of Water } [0, 400]$$

5. A hole is poked in a balloon holding 200 cubic cm of air (cc). Air is flowing out at a rate of 10 cubic cm per second.

- a. Write an equation that describes y , the amount of air in the balloon, after x seconds.

$$y = 200 - 10t$$

- b. How much air is in the balloon after 3 seconds?

$$y = 200 - 10(3) = 200 - 30 = 170\text{cc}$$

- c. How long will it take for the balloon to be completely deflated?

$$0 = 200 - 10t \quad t = 20\text{sec.}$$

- d. Describe the domain and range.

$$D: \text{time in sec } [0, 20]$$

$$R: \text{cc of air } [0, 200]$$

- e. Are these points part of the solution set?

(5 sec, 150 cc) (7 sec, 110 cc) (30 sec, -100 cc)

yes no } not possible
 [7sec, 130cc] } not in domain

6. Jack knows that his family will be charged \$.47 per day for the water they use.

a. Write an equation to describe the amount the family is charged, y , for x days.

$$y = .47x$$

b. Find the amount the family is charged for a 30 day month.

$$y = .47(30) \$14.10$$

c. Find the amount the family is charged per year.

$$y = .47(365) \$171.55$$

d. Are these points part of the solution set? (5 days, \$2.25) (3 days, \$1.41) (11 days, \$5.15)

NO	yes	NO
2.35		5.17

7. Jack now has friends from out of town staying with his family. He knows that the equation $y = $.47 + .15x$ will describe the amount per day for the water they use where x represents the number of friends staying.

a. Complete the sentence: for every additional friend staying with Jack, the cost of water will increase ^{daily} \$.15

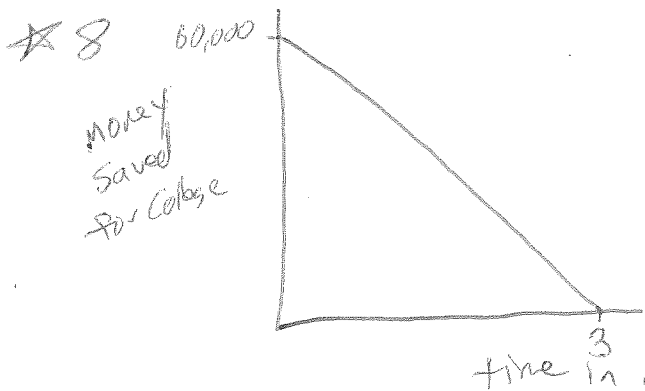
b. How many friends can stay with Jack before the cost of water exceeds a dollar per day?

$$1 = .47 + .15x \quad x = 3 \quad y = .92 \quad (3)$$

$$.53 = .15x \quad x = 4 \quad y = 1.07$$

e. Are these points part of the solution set? (8 fam, \$1.67) (10 fam, \$1.67) (40 fam, \$7.15)

yes	NO	NO
	1.97	6.47



a. amount saved when started college?

\$60,000

b. cost per year?

\$20,000

c. years until money runs out.

d. complete ordered pair
(2, 20,000)

explain the meaning of x & y
after 2 years, \$20,000 savings remain

e. if the line continues, then (4, -20,000) is on the line. explain what this means: 20,000 in debt.

f. equation of the line:

$$y = -20000x + 60000$$

9

8. Dean sells cars for a living. Dean makes a salary of \$350 per week plus a commission of \$200 for each car that he sells during the week.

a. Write an equation for Dean's total weekly income.

$$y = 350 + 200x$$

b. What do x and y represent?

$x = \text{cars sold}$

$y = \text{total income}$

c. How much will Dean make if he sells 3 cars?

$$y = 350 + 200(3) \quad y = \$950$$

d. Create a table of Dean's weekly income for domain 0 to 10 cars sold.

e. What is the minimum number of cars that Dean must sell before he makes \$1000?

4 cars

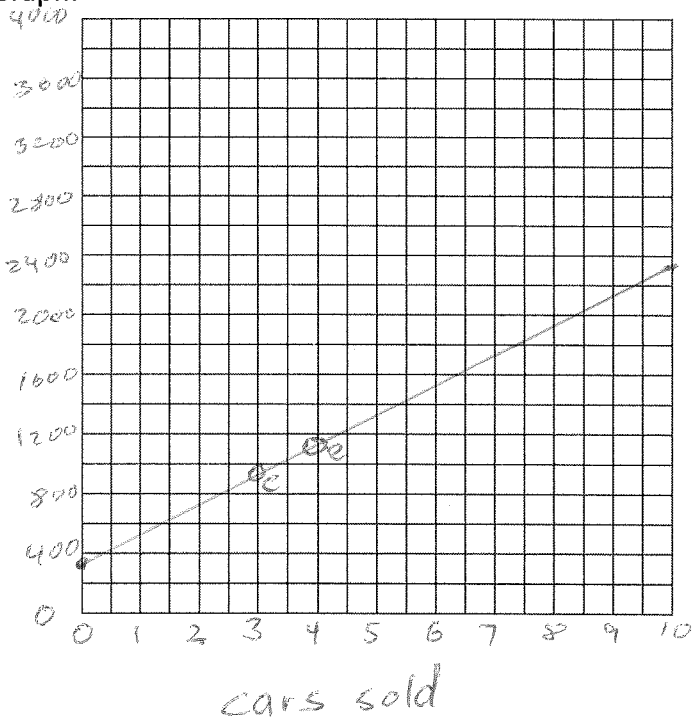
f. Graph Dean's weekly income for domain 0 to 10 cars sold.

g. Mark on the graph to show your solutions to part c and e.

Table:

x	y
Units: cars sold	Units: dollars
0	350
1	550
2	750
3	950
4	1150
5	1350
6	1550
7	1750
8	1950
9	2150
10	2350

Graph:



10

9. Dan sells cars for a living. Dan makes a salary of \$400 per week plus a commission of 5% of the sale price of each car that he sells during the week.

a. Write an equation for Dan's total weekly income.

$$y = 400 + .05x$$

b. What do x and y represent?

y = total income
x = total value of cars sold

c. How much will Dan make if the total sales price of the cars he sold is \$44,000?

$$y = 400 + 44000(.05) \quad y = 2600$$

d. Create a table of Dan's weekly income for domain \$0 to \$100,000 in sales.

$$\begin{aligned} 1000 &= 400 + .05x \\ 600 &= .05x & x &= 12,000 \end{aligned}$$

e. What is the minimum sale price of cars that Dan must sell before he makes \$1000?



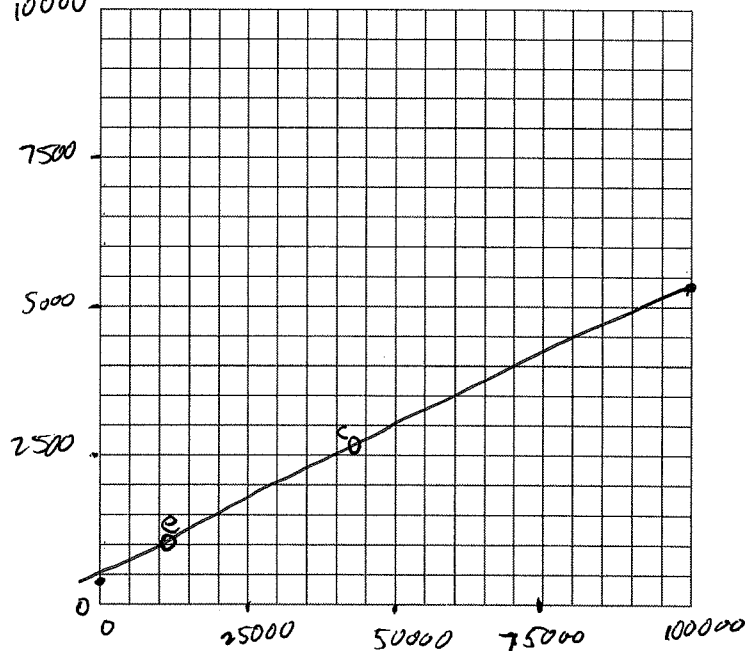
f. Graph Dan's weekly income for domain \$0 to \$100,000 in sales.

g. Mark on the graph to show your solutions to part c and e.

Table:

x	y
Units: dollars	Units: dollars
\$0	400
10000	900
20000	1400
30	1900
40	2400
50	2900
60	3400
70	3900
80	4400
90	4900
\$100,000	5400

Graph:



11
 Bill and Bertha are engaged to be married. Each has money invested and earns money through their job to add to their investments.

- Bill currently has \$50,000 in investments. He earns \$2400 per month at his job and plans to save half of this amount by adding it to his investments.
- Bertha currently has \$35,000 in investments. She earns \$2800 per month at her job and plans to save a quarter of this amount by adding it to her investments

a. Write an equation for the value of the money in Bill's investments.

$$2400 \div 2 = 1200 \quad y_1 = 50000 + 1200x$$

b. Write an equation for the value of the money in Bertha's investments.

$$2800 \div 4 = 700 \quad y_2 = 35000 + 700x$$

c. Describe the meaning of your variables in part a and b.

$$x = \text{month} \quad y_1 = \text{Bill's account value} \\ y_2 = \text{Bertha's account value}$$

d. Bill and Bertha save in their investments for 6 months before they are married. Let T be the total value of their investments. Find the value of T when they are married.

$$x = 6 \text{ months} \quad y_1 = 50000 + 1200(6) = 57200 \\ y_2 = 35000 + 700(6) = 39200 \\ T = 96400$$

e. Write a function T(t) for the value of T if Bill and Bertha continue to add the same amounts into their investments after the marriage for t months.

$$1200 + 700 \quad t = \text{months after wedding} \quad T(t) = 96400 + 1900t \\ 1900 \quad T(t) = \text{value of account}$$

→ * f. Describe the domain and range for the function T(t).
 Marriage lasted 10 years.

10 years

$$0 \leq t \leq 10 \text{ years} \rightarrow 0 \leq t \leq 120 \text{ months}$$

$$96400 \leq T \leq 324,400 \text{ dollars} \quad T(120) = 324,400$$

g. **challenge** After 10 years of marriage Bill and Bertha divorce and split the value of T equally. Who benefitted more by splitting it equally? Was the split fair? Suggest a better split.

Bill equation at Marriage

$$y_1 = 57200 + 1200x$$

$$x = 120$$

$$y_1 = 201,200$$

Bertha equation at Marriage

$$y_2 = 39200 + 700x$$

$$x = 120$$

$$y_2 = 123,200$$

Bertha Benefitted more by equal split

Better Split: 201,200 to Bill 123,200 to Bertha

Fair? Maybe, Divorce is ugly