

Key

IA QUIZ REVIEW - Writing Linear Equations

A function is linear if it has a constant rate of change.

The slope intercept form of a linear equation is

$Y = y = mx + b$


A. Determine if the data set represents a linear function or not. If it does represent a linear function, write a linear model that represents the data set.

1.

x	2	4	6	8
y	3	6	9	2

Δx : $+2$ $+2$ $+2$
 Δy : $+3$ $+3$ -7

no



Linear? no If yes, equation? _____

2.

x	7	14	21	28
y	-5	0	5	10

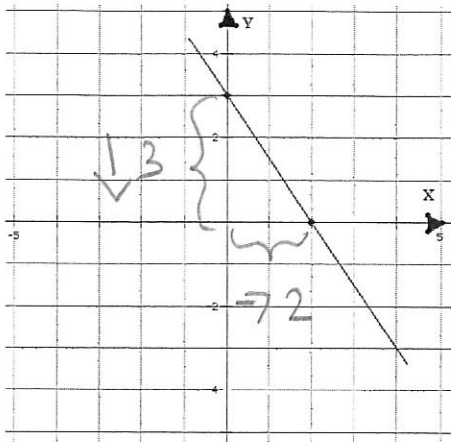
Δx : $+7$ $+7$ $+7$
 Δy : $+5$ $+5$ $+5$

$m = \frac{\Delta y}{\Delta x} = \frac{5}{7}$

Linear? yes If yes, equation? $y = \frac{5}{7}x + 10$

B. Write the equation of the lines below.

3.

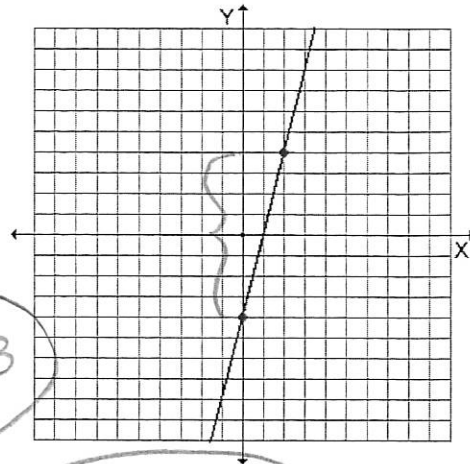


$$b = 3$$

$$m = -\frac{3}{2}$$

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

4.



$$b = -4$$

$$m = \frac{8}{2}$$

$$= 4$$

$$m = 4$$

$$y = 4x - 4$$

A **horizontal line** will be an equation in the form: $y = \#$ Recall Slope
(m) = 0

A **vertical line** will be an equation in the form: $x = \#$ Recall Slope
(m) = undef.

Mnemonic Device to Help Remember: **HOY VUX**

5. Write the equation of a horizontal line that goes through the point (2, 3).

$$\text{HOY}$$

$$y = 3$$

6. Write the equation of the vertical line that passes through (2, 3)

$$\text{VUX } x = 2$$

7. Write the equation of the line that passes through points (2, 5) and (2, 7).

$$x = 2$$

8. Write the equation of the line that passes through (3, 5) and (-1, 5).

$$y = 5$$

C. Steps to writing the equation given TWO POINTS:

(x_1, y_1) and (x_2, y_2)

1. Find the slope: $m = \frac{y_1 - y_2}{x_1 - x_2}$
2. Substitute the slope (m) and one point (x, y) into slope-intercept form: $y = mx + b$
3. Solve for the y-intercept (b)
4. Substitute only the slope (m) and the y-intercept (b) into slope-intercept form: $y = mx + b$

Write the equation of the line given the two points.

9. $(-5, 7)$ and $(2, -7)$

$$m = \frac{-7 - 7}{2 - (-5)} = \frac{-14}{7} = -2 = m$$

$$y = mx + b$$

$$-7 = -2(2) + b$$

$$-7 = -4 + b$$

$$b = -3$$

$$y = -2x - 3$$

one pt.

$$x = 2$$

$$y = -7$$

$$m = -2$$

$$b = ?$$

10. $(2, 0)$ and $(-2, 6)$

$$\frac{\Delta y}{\Delta x} = \frac{6 - 0}{-2 - 2} = \frac{6}{-4} = -\frac{3}{2} = m$$

$$y = mx + b$$

$$0 = -\frac{3}{2}(2) + b$$

$$0 = -3 + b$$

$$b = 3$$

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

one pt

$$x = 2$$

$$y = 0$$

$$m = -\frac{3}{2}$$

$$b = ?$$

D. Writing Linear Models

Strategy:

1. Highlight key information
2. Define variables
3. What do I know?
4. What must I find first?

11. A school booster club is having a raffle for a graphing calculator that they purchased for \$80. Their profit or loss is a linear function in which the profit or loss depends upon the number of tickets sold. The booster club figures that if they sell 10 tickets, they will lose \$60. If they sell 30 tickets, they will lose \$20.

$$x = \# \text{ tickets}$$

$$y = \$ (\text{profit})$$

$$(10, -60)$$

$$(30, -20)$$

$$m = \frac{-20 - (-60)}{30 - 10} = \frac{40}{20} = 2 = m$$

$$y = mx + b$$

$$-60 = 2(10) + b$$

PICK one

$$x = 10$$

$$y = -60$$

$$m = 2$$

$$y = 2x - 80$$

$$b = -80$$

12. Biologists have found that the number of chirps some types of crickets make per minute depends upon the temperature. This relationship can be represented by a linear function. When the temperature is 60°F, crickets chirp 92 times per minute. If it is 75°F, they will chirp 152 times per minute.

$$(60, 92) \quad (75, 152) \quad x = \text{temp}$$

① find slope

$$\frac{152 - 92}{75 - 60} = \frac{60}{15} = 4$$

$$y = \# \text{ chirps per min}$$

$$m = 4$$

$$x = 60$$

$$y = 92$$

② pick one pt

③ sub in

$$y = mx + b$$

$$92 = 4(60) + b$$

$$92 = 240 + b$$

$$-148 = b$$

$$y = 4x - 148$$

E. Cost, Revenue, Profit

$$\text{Profit} = \text{Revenue} - \text{Costs}$$

Break Even Point: Profit = 0 or Revenue = Costs

13a. Caitlynne decides to open up a cupcake shop! She is trying to decide how much to charge per cupcake. If she sells each cupcake for \$3, what would her revenue function be?

Let x = # cupcakes sold in a month

$$R(x) = \underline{3x}$$

Many costs go into making cupcakes. Caitlynne lists all her costs and determines that it will cost her 50 cents per cupcake to make the cupcakes, plus, she also has negotiated to share a kitchen and shop with a deli, so her monthly rental costs will be \$200.

13b. What would the Cost Function be? $C(x) = \underline{.50x + 200}$

$$\text{Profit} = \text{Revenue} - (\text{Costs}).$$

13.c Write a function to represent profit, $P(x) = \underline{3x - (.50x + 200)}$

Can you simplify this? Do it! $P(x) = \underline{2.50x - 200}$

13.d How many cupcakes must she sell per month to break even?

$$0 = 2.50x - 200$$

$$200 = 2.50x \quad x = 80 \text{ cupcakes}$$

13.e How much must she sell each month to make a profit of \$800?

$$800 = 2.50x - 200$$

$$1000 = 2.50x$$

$$x = 400 \text{ cupcakes}$$

13.f. She sells 600 cupcakes in October. What is her profit?

$$P = 2.50(600) - 200$$

$$P = 1500 - 200$$

$$P = \underline{\$1300} \quad \text{☺}$$

F. Parallel and Perpendicular Lines

Parallel Lines:

- The slope (m) of parallel lines are the same

Perpendicular Lines:

- The slope (m) of perpendicular lines are
- opposite signed reciprocals

14. Write the equation of any line that is parallel to $y = x + 3$.

$$y = x \quad y = x + 5$$
$$y = x - 2$$

15. Write the equation of any line that is perpendicular to the line $y = 2x - 5$.

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

Determine if the lines are parallel, perpendicular, or neither.

Strategy: Solve each equation for y . Determine the slope. Same? Opposite signed reciprocals? Neither?

16. $y = -2x - 4$
 $2x + y = 5 \Rightarrow y = -2x + 5$

$$m = -2$$

$$m = -2$$

||

17. $y = \frac{1}{2}x + 10$
 $4x + 2y = 7$

$$2y = -4x + 7$$

$$y = -2x + \frac{7}{2}$$

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

$$m = -2$$

⊥