

WRITING EQUATIONS – STANDARD FORM & SLOPE-INTERCEPT FORM

1. Jolly Ranchers costs \$1.5 per pound at the candy store and Sour Patch Kids cost \$2 per pound. With \$20 to spend, what are the different amounts of the two candies that you can buy? Write an equation to represent the different amounts of the two candies. Graph your equation. What is the domain and range?

$j$  = pounds of jolly ranchers

$k$  = pounds of Sour patch kids

$$1.5j + 2k = 20$$

$(j, k)$

intercepts

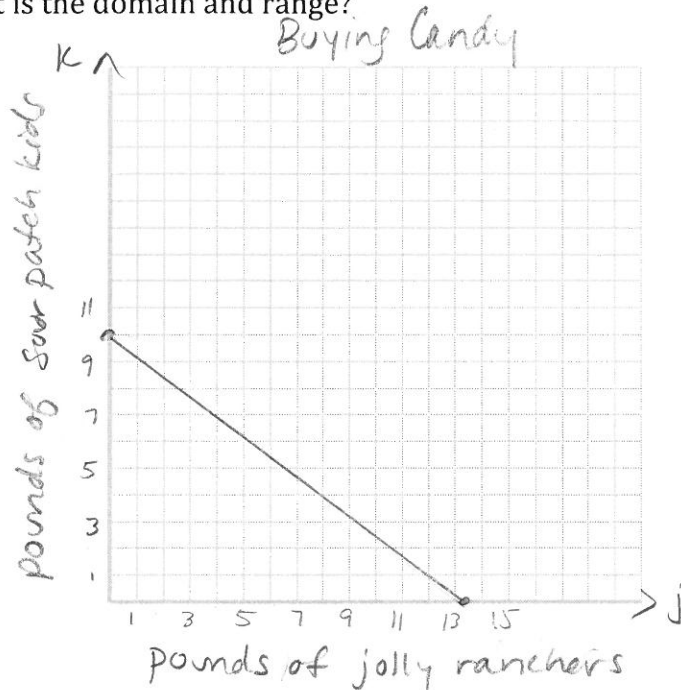
$(0, 10)$

$(13.\bar{3}, 0)$

$\frac{13}{1.5} = 20\bar{3}$

Domain  $0 \leq j \leq 13\frac{1}{3}$

Range  $0 \leq k \leq 10$



2. Suppose you had \$6.00 to buy bananas and apples. Bananas cost \$0.49 per pound and apples cost \$0.34 per pound. Write a linear equation that represents the different amounts of fruit you could buy. What is the domain and range?

$b$  = pounds of bananas

$a$  = pounds of apples

$$0.49b + 0.34a = 6.00$$

or

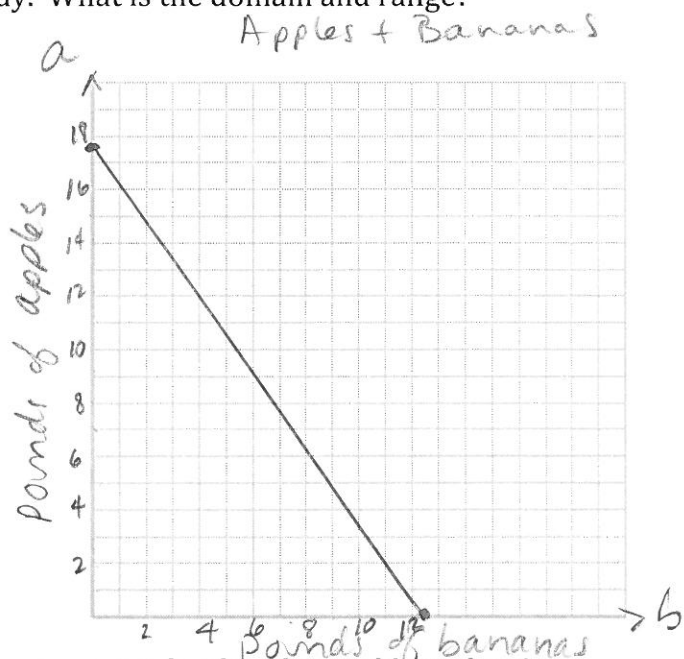
$$49b + 34a = 600$$

Intercepts  $(b, a)$

$(0, 17.6)$   $(12.2, 0)$

Domain  $0 \leq b \leq 12.2$

Range  $0 \leq a \leq 17.6$



If you buy 10 pounds of bananas, how many pounds of apples could you buy?

$$49(10) + 34a = 600$$

$$490 + 34a = 600$$

$$\begin{array}{r} -490 \\ 490 + 34a = 600 \\ \hline 34a = 110 \\ \hline \frac{34a}{34} = \frac{110}{34} \end{array}$$

$a = 3.2$  lbs of bananas

WRITING EQUATIONS - STANDARD FORM & SLOPE-INTERCEPT FORM

3. At the county fair, hot dogs sell for \$2.50 and hamburgers sell for \$4. If you have \$60 to spend on your friends, how many hamburgers and hot dogs could you buy?

a.) Identify the variables and write an equation for all the options.

$h = \# \text{ hot dogs}$

$b = \# \text{ hamburgers}$

$$2.5h + 4b = 60$$

$(24, 0)$

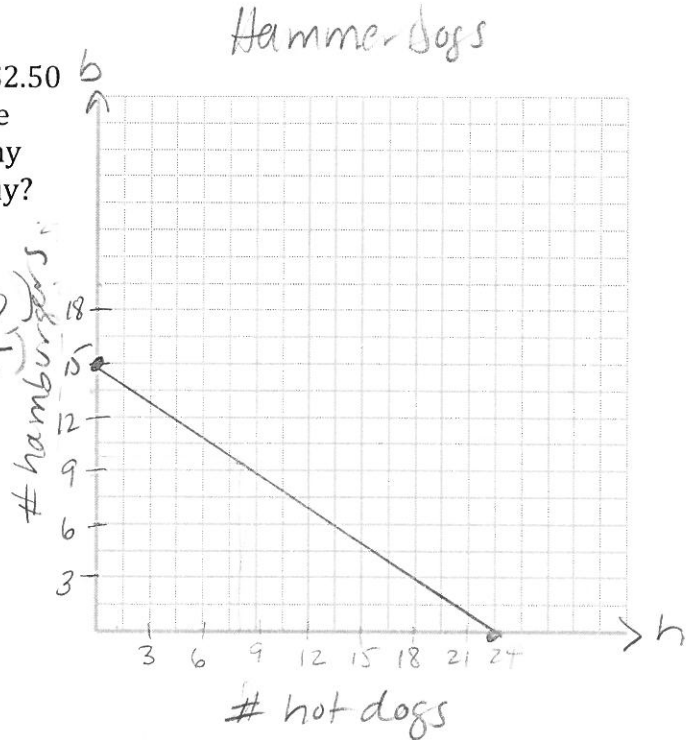
$(0, 15)$

b.) Graph your equation.

c.) What is the domain and range?

Domain  $0 \leq h \leq 24$

Range  $0 \leq b \leq 15$



d.) Can you buy an even amount of hamburgers and hot dogs?

Not same amount of each.

\* 8 hot dogs, 10 burgers

16 hot dogs, 5 burgers

$$2.5h + 4h = 60$$

$$6.5h = 60$$

**MORE EQUATIONS to MODEL.....**

4. A 100-point test has x questions worth 2 points apiece and y questions worth 4 points apiece.

a. Identify the variables and write an equation that describes all possible numbers of questions that may be on the test.

$$2x + 4y = 100$$

$x = \# \text{ 2 pt. questions}$

$y = \# \text{ 4 pt. questions}$

b. If you have 24 questions worth 4 points apiece, how many questions will be worth 2 points apiece?

$$2x + 4(24) = 100$$

$$2x + 96 = 100$$

$$2x = 4$$

$$x = 2$$

2 questions worth 2 pts. each

c.) What is the maximum 4 point questions? What is the maximum 2 point questions?

max 4 pt. questions = 25

max 2 pt. questions = 50

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5. Louise has \$36 in five-dollar bills and singles. How many of each type of bill does she have?

a. Identify your variables and write an equation.

$f = \#$  five \$ bills  
 $s = \#$  single \$ bills

$$5f + s = 36$$

b. If Louise has 2 five-dollar bills, how many singles does she have?

$$5(2) + s = 36$$

$$10 + s = 36$$

$$s = 26$$

26 single bills

6. The Ramy family bought 4 sandwiches and 3 salads. They spent \$24.

a. Identify the variables and write an equation to model all the options for cost of salads and sandwiches.

$a =$  cost of sandwiches  
 $d =$  cost of salads

$$4a + 3d = 24$$

b. If each sandwich costs \$3.75, how much did each salad cost?

$$4(3.75) + 3d = 24$$

$$15.00 + 3d = 24$$

$$3d = 9$$

$$d = 3.00$$

Each salad

cost \$3.00

$$\begin{array}{r} 24.00 \\ 13.00 \\ \hline 10.40 \end{array}$$

7. At age 12 Patrick weighed 43 kg; at age 14 he weighed 50 kg. Patrick's age and weight are related. (age, wt) (12, 43) (14, 50)

a. Find a linear equation relating Patrick's weight to his age.

$$m = \frac{50 - 43}{14 - 12} = \frac{7}{2}$$

$$y = \frac{7}{2}x + 1$$

$$y = mx + b$$

$$50 = \frac{7}{2}(14) + b$$

$$50 = 49 + b \quad b = 1$$

$x =$  age  
 $y =$  weight

b. Use your equation to find out Patrick's age when he weighed 38 kg.

$$y = 38$$

$$38 = \frac{7}{2}x + 1$$

$$37 = \frac{7}{2}x$$

$$\frac{74}{7} = \frac{7x}{7}$$

$$x = 10\frac{4}{7} \text{ years old}$$

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8. The store at which Andy usually shops is having a sale. Roast beef costs \$4 a pound and shrimp costs \$10 a pound.

a.) Write an equation to describe different possible combinations of Roast beef and shrimp that he can buy for \$96.

$$4r + 10s = 96$$

$r$  = pounds of roast beef  
 $s$  = pounds of shrimp

b) What is the greatest amount of shrimp he can buy? What is the greatest amount of roast beef he can buy?

max. shrimp = 9.6 lbs  
 max roast beef = 24 lbs

c.) What is the domain and range?  $(r, s)$

Domain  $0 \leq r \leq 24$   
 Range  $0 \leq s \leq 9.6$

9. The size of shoe a person needs has a linear relationship to the length of his or her foot. An adult shoe that is Size 5 fits a 9-inch long foot. An 11-inch foot requires a size 11 shoe. (foot length, size)  $(9, 5)$   $(11, 11)$

a. Write the equation that describes shoe size as a function of foot length.

$$m = \frac{11-5}{11-9} = \frac{6}{2} = 3$$

$x$  = foot length  
 $y$  = size

$$y = mx + b$$

$$5 = (3)(9) + b$$

$$5 = 27 + b \quad b = -22$$

$$y = 3x - 22$$

b. Bob Lanier of the Detroit Pistons wore a Size 22 shoe. How long is his foot?

$$y = 22$$

$$22 = 3x - 22$$

$$44 = 3x$$

$$x = 14.6 \text{ inches}$$

10. In 1990, Billy had 65 stamps in his collection. In 1995, he had 80 stamps in his collection. (time, stamps)  $(10, 65)$   $(15, 80)$

a.) Using  $t = 0$  in 1980, write an equation to model Billy's stamp collecting.

$t$  = time (years since 1980)

$$m = \frac{80-65}{15-10} = \frac{15}{5} = 3$$

$$y = mx + b$$

$$80 = (3)(15) + b$$

$$80 = 45 + b \quad b = 35$$

$$y = 3t + 35$$

$y$  = size

b.) If Billy continues to collect stamps at the same rate, how many stamps would you expect him to have in 2020?  $t = 40$

$$y = 3(40) + 35$$

$$y = 120 + 35$$

$$y = 155$$

155 stamps in 2020

## 2-4 Skills Practice

### Writing Linear Equations

Write an equation in slope-intercept form for the line described.

1. slope 3, y-intercept at -4

$$Y = 3x - 4$$

3. parallel to  $y = \frac{2}{3}x + 6$ , passes through (6, 7)

$$Y = \frac{2}{3}x - 3$$

5. perpendicular to  $y = -4x + 1$ , passes through (-8, -1)  $m = \frac{1}{4}$

$$Y = \frac{1}{4}x + 1$$

7. parallel to  $y = 9x + 3$ , y-intercept at -2

$$Y = 9x - 2$$

2. perpendicular to  $y = \frac{1}{2}x - 1$ ,  $m = -2$

$$Y = -2x + 8$$

4. parallel to  $y = -\frac{1}{4}x - 2$ , x-intercept at 4

$$Y = -\frac{1}{4}x + 1$$

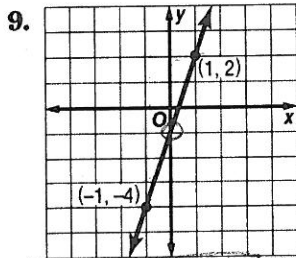
6. slope  $\frac{3}{5}$ , x-intercept at -10

$$Y = \frac{3}{5}x + 6$$

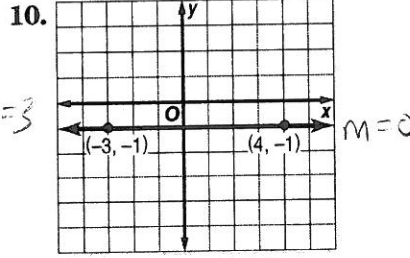
8. slope  $\frac{5}{6}$ , passes through (12, 4)  $m = \frac{5}{6}$

$$Y = \frac{5}{6}x - 6$$

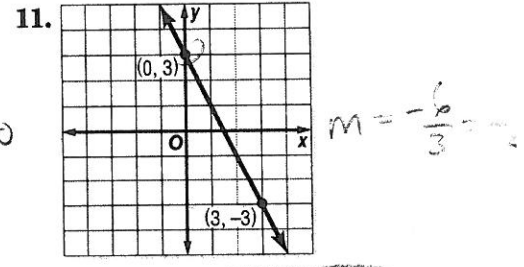
Write an equation in slope-intercept form for each graph.



$$Y = 3x - 1$$



$$Y = -1$$



$$Y = -2x + 3$$

Write an equation in slope-intercept form for the line that satisfies each set of conditions.

12. slope 3, passes through (1, -3)

$$Y = 3x - 6$$

13. slope -1, passes through (0, 0) ← y-intercept

$$Y = -x$$

14. slope -2, passes through (0, -5) ← y-intercept

$$Y = -2x - 5$$

15. slope 3, passes through (2, 0) ← x-intercept

$$Y = 3x - 6$$

16. passes through (-1, -2) and (-3, 1)

$$Y = -\frac{3}{2}x - \frac{1}{2}$$

17. passes through (-2, -4) and (1, 8)

$$Y = 4x + 4$$

18. passes through (2, 0) and (0, -6)

$$Y = 3x - 6$$

19. passes through (2.5, 0) and (0, 5)

$$Y = -2x + 5$$

20. passes through (3, -1), perpendicular to the graph of  $y = -\frac{1}{3}x - 4$

$$Y = 3x - 10$$

$$-1 = (3)(3) + b$$

$$-1 = 9 + b$$

$$-10 = b$$

$$Y = 3x - 10$$

# 2-4 Practice

## Writing Linear Equations

Write an equation in slope-intercept form for the line described.

1. slope 2, y-intercept at 0

$$Y = 2X$$

3. perpendicular to  $y = \frac{1}{4}x + 2$ , passes through (0, 0)

$$Y = -4X$$

5. perpendicular to  $y = -\frac{1}{2}x + \frac{2}{3}$ , passes through (2, 3)  $m = 2$

$$y = mx + b$$

$$3 = (2)(2) + b$$

$$3 = 4 + b \quad b = -1$$

$$Y = 2X - 1$$

2. parallel to  $y = 4x + 2$ , y-intercept at 4  $m = 4$

$$Y = 4X + 4$$

4. parallel to  $y = -3x + 4$ , x-intercept at 4 (4, 0)  $m = -3$

$$Y = mx + b$$

$$0 = (-3)(4) + b$$

$$0 = -12 + b \quad b = 12$$

$$Y = -3X + 12$$

6. slope  $-\frac{2}{3}$ , x-intercept at 3 (3, 0)

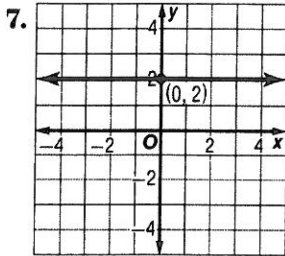
$$Y = mx + b$$

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

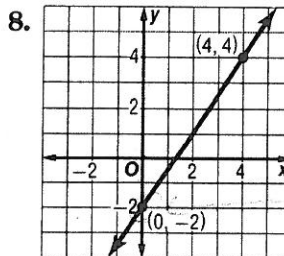
$$0 = -2 + b \quad b = 2$$

$$Y = -\frac{2}{3}X + 2$$

Write an equation in slope-intercept form for each graph.



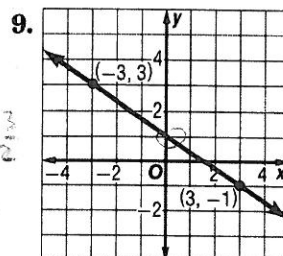
$$Y = 2$$



$$m = \frac{6}{4} = \frac{3}{2}$$

$$y\text{-int} = -2$$

$$Y = \frac{3}{2}X - 2$$



$$m = -\frac{4}{6} = -\frac{2}{3}$$

$$y\text{-int} = 1$$

$$Y = -\frac{2}{3}X + 1$$

Write an equation in slope-intercept form for the line that satisfies each set of conditions.

10. slope -5, passes through (-3, -8)

$$Y = mx + b$$

$$-8 = (-5)(-3) + b$$

$$-8 = 15 + b \quad b = -23$$

$$Y = -5X - 23$$

11. slope  $\frac{4}{5}$ , passes through (10, -3)

$$Y = mx + b$$

$$-3 = (\frac{4}{5})(10) + b$$

$$-3 = 8 + b \quad b = -11$$

$$Y = \frac{4}{5}X - 11$$

12. slope 0, passes through (0, -10)

$$m = 0$$

$$y\text{-int} = -10$$

$$Y = -10$$

13. slope  $-\frac{2}{3}$ , passes through (6, -8)

$$Y = mx + b$$

$$-8 = (-\frac{2}{3})(6) + b$$

$$-8 = -4 + b \quad b = -4$$

$$Y = -\frac{2}{3}X - 4$$

14. parallel to  $y = 4x - 5$ , y-intercept at -6

$$m = 4$$

$$Y = 4X - 6$$

15. slope  $\frac{1}{6}$ , x-intercept at -1 (-1, 0)

$$Y = mx + b$$

$$0 = (\frac{1}{6})(-1) + b$$

$$0 = -\frac{1}{6} + b \quad b = \frac{1}{6}$$

$$Y = \frac{1}{6}X + \frac{1}{6}$$

16. perpendicular to  $y = 3x - 2$ , passes through (6, -1)  $m = -\frac{1}{3}$

$$Y = mx + b$$

$$-1 = (-\frac{1}{3})(6) + b$$

$$-1 = -2 + b \quad b = 1$$

$$Y = -\frac{1}{3}X + 1$$

17. parallel to  $y = \frac{2}{3}x - 10$ , x-intercept at 9 (9, 0)

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

$$Y = mx + b$$

$$0 = (\frac{2}{3})(9) + b$$

$$0 = 6 + b \quad b = -6$$

$$Y = \frac{2}{3}X - 6$$

18. passes through (-8, -7), perpendicular to the graph of  $y = 4x - 3$

$$m = -\frac{1}{4}$$

$$Y = mx + b$$

$$-7 = (-\frac{1}{4})(-8) + b$$

$$-7 = 2 + b$$

$$-9 = b$$

$$Y = -\frac{1}{4}X - 9$$

19. **RESERVOIRS** The surface of Grand Lake is at an elevation of 648 feet. During the current drought, the water level is dropping at a rate of 3 inches per day. If this trend continues, write an equation that gives the elevation in feet of the surface of Grand Lake after  $x$  days.

$$m = -3$$

$$Y = mx + b$$

$$648 = (-3)(0) + b$$

$$648 = b$$

$$Y = -3X + 648$$