

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Notes

Algebra Section 4.6

Pages 253-259

**Goal:** “You will write and graph direct variation equations”

**Direct Variation:**



$$y = ax$$

**$a$  = the constant of variation**

Similar to:  $y = mx + b$

but: no  $b$

Since:  $b = 0$

Graph will always: cross the origin

**1. Decide whether the equation represents direct variation. If so, identify the constant of variation.**

**Ex:**  $2x - 3y = 0$

Can the equation be rewritten so it is in the form  $y = ax$  ?

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

Constant variation =  $\frac{2}{3}$

**Ex:**  $-x + y = 4$

$$y = x + 4$$

**Ex:**  $-x + y = 1$

$$y = x + 1$$

**Ex:**  $2x + y = 0$

$$y = -2x$$

Constant variation =  $-2$

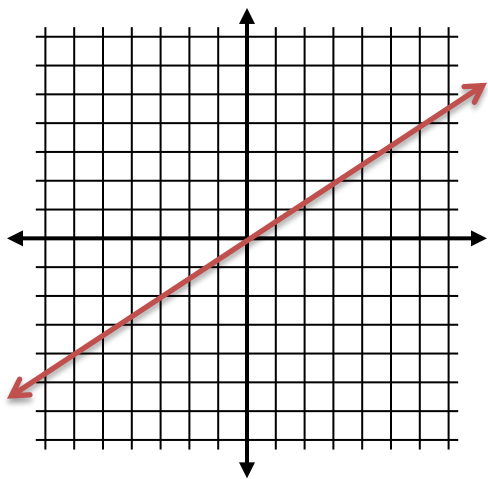
**Ex:**  $4x - 5y = 0$

$$y = \frac{4}{5}x$$

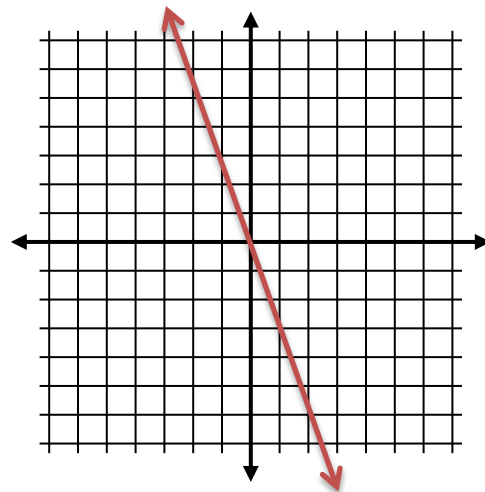
Constant variation =  $\frac{4}{5}$

2. Graph a direct variation equation. (Graph the same way as:  $y = mx + b$ )

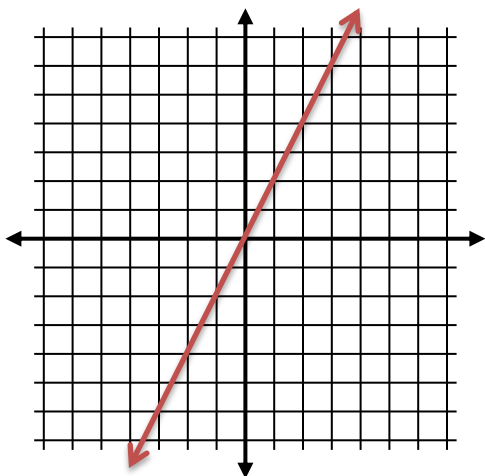
Ex:  $y = \frac{2}{3}x$



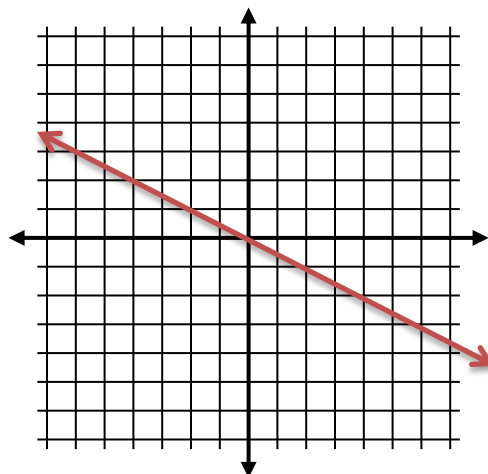
Ex:  $y = -3x$



Ex:  $y = 2x$

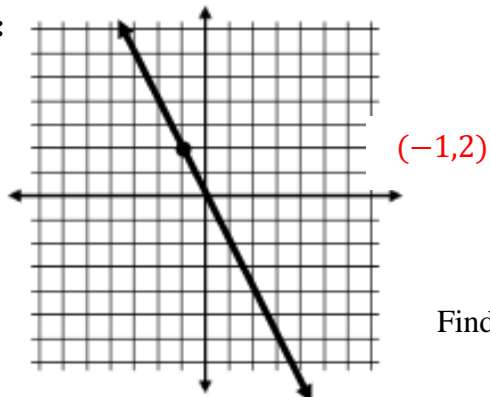


Ex:  $y = -\frac{1}{2}x$



3. Write a direct variation equation.

Ex:



$$y = ax$$

$$2 = a(-1)$$

$$a = -2$$

$$y = -2x$$

Find  $y$  when  $x = 60$ .

$$y = -120$$

1. **Plug in the x and y values**

2. **Solve for  $a$**

3. **Rewrite Equation with -2 for  $a$**

4. **Plug in 60 for  $x$**

**Ex:** The graph of a direct variation equation passes through the point (4, 6).

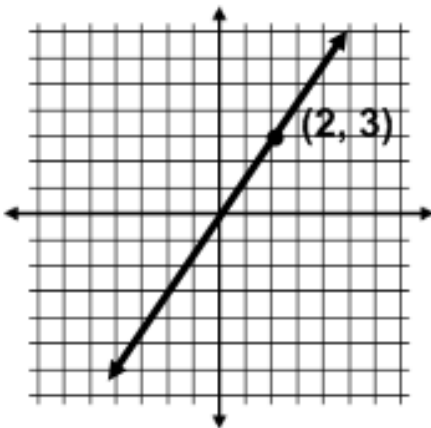
- a) Write a direct variation equation relating  $x$  and  $y$ .

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

- b) Find  $y$  when  $x = 24$ .

$$y = 36$$

**Ex:** Write a direct variation equation and find  $y$  when  $x = 14$ .



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

$$y = 21 \text{ when } x = 14$$

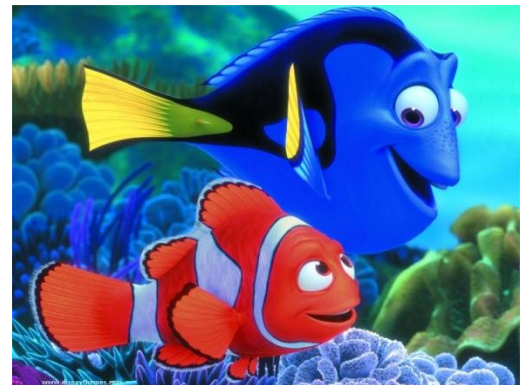
**Ex:** The number  $s$ , of tablespoons of sea salt needed in a saltwater fish tank varies directly with the number  $w$ , of gallons of water in the tank. A pet shop owner recommends adding 100 tablespoons of sea salt to a 20 gallon tank.

- a) Write a direct variation equation relating  $w$  and  $s$ .

$$s = 5w$$

- b) Find the number of tablespoons needed in a 30 gallon tank.

$$150 \text{ tablespoons}$$



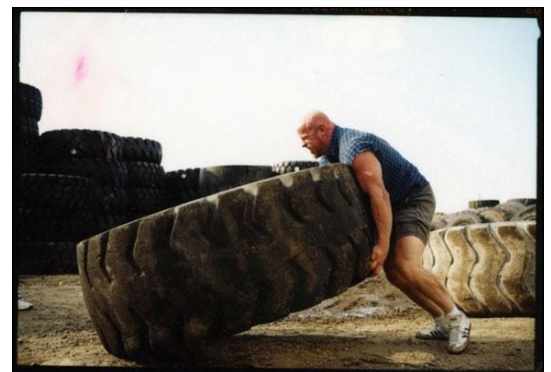
**Ex:** An object that weighs 100 pounds on Earth would weigh just 6 pounds on Pluto. Assume that weight  $p$ , on Pluto varies directly with weight  $e$ , on Earth.

- a) Write a direct variation equation relating  $e$  and  $p$ .

$$p = \frac{3}{50}e$$

- b) What would a 750 pound rock weigh on Pluto?

$$45 \text{ pounds}$$



**Ex:** The table shows the total cost  $c$ , of downloading  $s$  songs at an internet music site. Explain why  $c$  varies directly with  $s$ . Then write the direct variation equation.

$$\frac{c}{s} = \frac{2.97}{3} = \frac{4.95}{5} = \frac{6.93}{7} = 0.99$$

$$c = 0.99s$$

$s$	$c$ (\$)
3	2.97
5	4.95
7	6.93

**Ex:** The table shows the total cost  $c$ , of buying  $d$  used DVD's at a music store.

$d$	$c$ (\$)
3	25.77
6	51.54
9	77.31

a) Explain why  $c$  varies directly with  $d$ .

$$\frac{c}{d} = \frac{25.77}{3} = \frac{51.54}{6} = \frac{77.31}{9} = 8.59$$

b) Write the direct variation equation.

$$c = 8.59d$$