

What do you do if you are not given the slope?!

Your Name

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12/3/20

Notes

## Writing Linear Functions given Two Points

# Day 3

If given two points only

Goal:  
 $y = mx + b$

1. Find M: Use points in slope formula to find slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

2. Find B: Substitute in one point's x and y and the slope into  $y = mx + b$  and then solve for b.

3. Write the m and b in  $y = mx + b$

$$\begin{matrix} (2, -10) & (5, -4) \\ x_1 & y_1 & x_2 & y_2 \end{matrix}$$

Goal:  $y = 2x + -14$

Step 1 Find m

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-10)}{5 - 2} = \frac{-4 + 10}{5 - 2} = \frac{6}{3} = 2$$

$$m = 2$$

Step 2 Find b

$$y = mx + b$$

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

$$-10 = 4 + b$$

$$-4$$

$$-14 = b$$

Choose a point  
(2, -10)

$(-2, -3), (4, 5)$

step 1: Find M

$$m = \frac{-3 - 5}{-2 - 4} = \frac{-8}{-6} = \frac{4}{3}$$

Step 2: Find b

$$y = mx + b$$

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

$$5 = \frac{16}{3} + b$$

$$5 = 5.\bar{3} + b$$

$$-5.\bar{3} - 5.\bar{3}$$

$$-0.\bar{3} = b$$

Step 3: Write equation

$$y = \frac{4}{3}x - 0.\bar{3}$$

or

$$y = \frac{4}{3}x - \frac{1}{3}$$

$(4, 2)$  and  $(-2, -4)$

step 1: Find M

$$m = \frac{2 - (-4)}{4 - (-2)} = \frac{2+4}{4+2} = \frac{6}{6} = 1$$

Step 2: Find b

$$y = mx + b$$

$$2 = 1(4) + b$$

$$2 = 4 + b$$

$$-4 -4$$

$$-2 = b$$

Step 3: Write equation

$$y = 1x + -2$$

$$y = x - 2$$

Let's Practice Using the Slope Formula Again and Writing equations to model situations!

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The amount of money made y, over x hours worked

$(3, 70), (6, 95)$

for 3 hrs of work, I made \$70  
for 6 hrs of work, I made \$95

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{70 - 95}{3 - 6} = \frac{-25}{-3} = 8.33$$

I make \$8.33 per hour

$$m = 8.33$$

step 2  $y = mx + b$

$$95 = 8.33(6) + b$$

$$95 = 49.98 + b$$

$$-49.98 - 49.98$$

$$45.05 = b$$

starting bonus money

step 3

$$y = 8.33x + 45.05$$

The height of a person y, when they are x years old

$(12, 4.5), (15, 6)$

$$m = \frac{4.5 - 6}{12 - 15} = \frac{-1.5}{-3} = 0.5$$

$m = 0.5$  ft per yr

step 2

$$y = mx + b$$

$$6 = 0.5(15) + b$$

$$6 = 7.5 + b$$

$$-7.5 - 7.5$$

$$-1.5 = b$$

starting height?

step 3

$$y = 0.5x - 1.5$$

\*\*Linear functions are not always the best choices for representing data because situations are not always linear (having the same rate of change all the time)

Now let's write the equation to model the situation!

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The population of a town in thousands  $y$ , over  $x$  years since 1950.  
 1950  
 + 45  
 1995

(45, 140) (50, 200)  
 In 1995 there were 140,000 people in this town

Step 1: Find slope  $M$

$$m = \frac{140 - 200}{45 - 50} = \frac{-60}{-5} = 12$$

growing by 12,000 ppl per year

Step 2: Find  $B$ , use  $y = mx + b$

(50, 200)

$$y = mx + b$$

$$200 = 12(50) + b$$

$$200 = 600 + b$$

$$-600 \quad -600$$

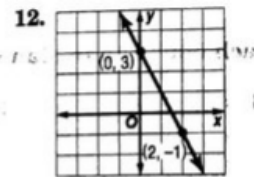
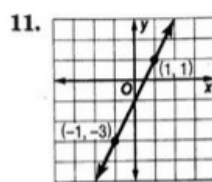
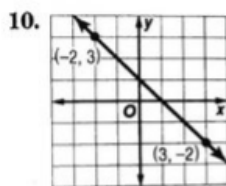
$$-400 = b$$

Step 3  
 Write the equation

$$y = 12x - 400$$

### Homework: Write equations given two points

Write an equation of the line that passes through each pair of points.



13. (1, 3), (-3, -5)

14. (1, 4), (6, -1)

15. (1, -1), (3, 5)

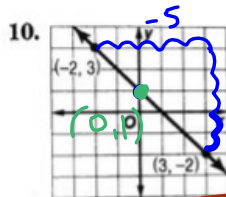
16. (-2, 4), (0, 6)

17. (3, 3), (1, -3)

18. (-1, 6), (3, -2)

Homework **Key**: Write equations given two points

Write an equation of the line that passes through each pair of points.



$$y = -x + 1$$

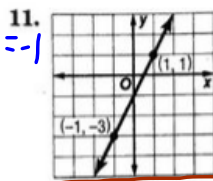
~~(2, 1)~~

13. (1, 3), (-3, -5)

$$y = 2x + 1$$

16. (-2, 4), (0, 6)

$$y = x + 6$$



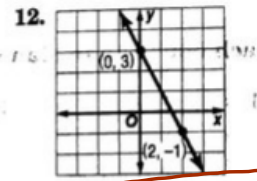
$$y = 2x - 1$$

14. (1, 4), (6, -1)

$$y = -x + 5$$

17. (3, 3), (1, -3)

$$y = 3x - 6$$



$$y = -2x + 3$$

15. (1, -1), (3, 5)

$$y = 3x - 4$$

18. (-1, 6), (3, -2)

$$y = -2x + 4$$