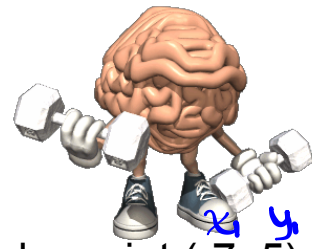


# Warm Up



1) Write an equation when given  $m = -5$  and a point  $(-7, 5)$

$$\begin{aligned}
 y - y_1 &= m(x - x_1) \\
 y - 5 &= -5(x - (-7)) \\
 y - 5 &= -5(x + 7) \\
 y - 5 &= -5x - 35 \\
 y - 5 + 5 &= -5x - 35 + 5 \\
 \boxed{y} &= \boxed{-5x - 30}
 \end{aligned}$$

2) Write an equation of a line that passes through  $(-7, 4)$  and  $(-5, 10)$  and has a  $y$  intercept of  $-5$ .

$$\begin{aligned}
 m &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{10 - 4}{-5 - (-7)} \\
 &= \frac{10 - 4}{-5 + 7} = \frac{6}{2} = \boxed{3}
 \end{aligned}$$

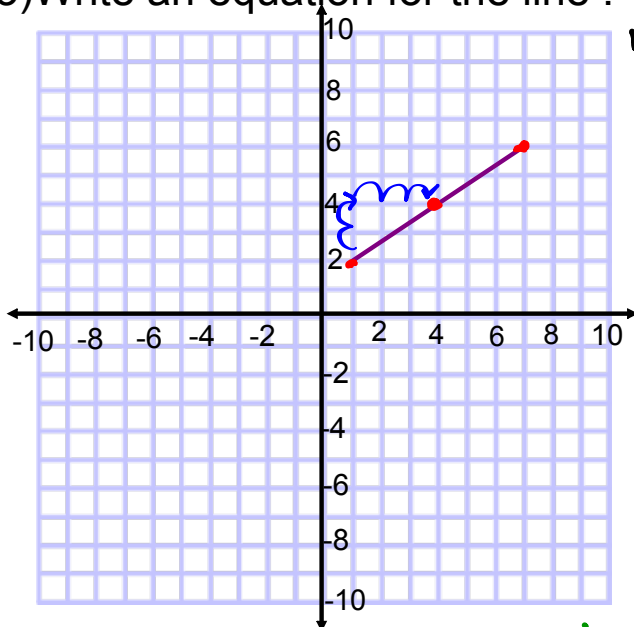
*watch sign*

$$y = mx + b$$

*slope* *y intercept*

$$\boxed{y = 3x - 5}$$

3) Write an equation for the line :



Step 1) Find Slope

$$m = \frac{\text{rise}}{\text{run}} = \frac{2}{3}$$

Step 2) pick point

$$(1, 2) \quad m = \frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = \frac{2}{3}(x - 1)$$

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

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

*need C.D.*

$$y = \frac{2}{3}x - \frac{2}{3} + \frac{4}{3}$$

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

$$y - y_1 = m(x - x_1)$$

Homework QUESTIONS from last night

page 372 4(a,d), 5(a,c), 9(a,b)(i, ii), 11(a,b), 14, 20(a)

4)  $y - 5 = -4(x - 1)$   $m = -4$   $P(1, 5)$   
 $y - y_1 = m(x - x_1)$   
 $y - 5 = -4(x - 1)$   
 $y - 5 = -4x + 4$   
 $y = -4x + 9$

5)  $m = -5$   $P(-4, 2)$   
 $y - 2 = -5(x + 4)$   
 $y - 2 = -5x - 20$   
 $y = -5x - 18$

9)  $m = \frac{3}{4}$   $P(5, 2)$   
 $y - 2 = \frac{3}{4}(x - 5)$   
 $y - 2 = \frac{3}{4}x - \frac{15}{4}$   
 $y = \frac{3}{4}x - \frac{15}{4} + 2$   
 $y = \frac{3}{4}x - \frac{15}{4} + \frac{8}{4}$   
 $y = \frac{3}{4}x - \frac{7}{4}$

a)  $P(-2, 4)$   
 $m = \frac{r_2 - r_1}{x_2 - x_1} = \frac{-8 - 4}{6 - 0} = -\frac{12}{6} = -2$

$y - y_1 = m(x - x_1)$   
 $y - 4 = -2(x - 2)$

$y - 4 = -2x + 4$   
 $y = -2x + 4 + 4$   
 $y = -2x + 8$

$y = -2x + 8$

b)  $y = -\frac{4}{3}x + \frac{4}{3}$

x-intercept (let  $y = 0$ )  
 $0 = -\frac{4}{3}x + \frac{4}{3}$

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

$x = 1$

a) ii)  $P(3, 3)$   $m = \frac{r_2 - r_1}{x_2 - x_1} = \frac{2}{5}$

$y - y_1 = m(x - x_1)$   
 $y - 3 = \frac{2}{5}(x - 3)$

b)  $y - 3 = \frac{2}{5}x - \frac{6}{5}$

$y - 3 = \frac{2}{5}x - \frac{6}{5} + \frac{3}{1}$

$y = \frac{2}{5}x - \frac{6}{5} + \frac{3}{1}$

$y = \frac{2}{5}x + \frac{9}{5}$

y intercept =  $\frac{9}{5}$

x-intercept (let  $y = 0$ )  
 $0 = \frac{2}{5}x + \frac{9}{5}$

$-\frac{9}{5} = \frac{2}{5}x$

$-9 = 2x$

$x = -\frac{9}{2}$

$\frac{-9}{2} = x$

ii)  $P(-2, 5)$   $C(1, 1)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 5}{1 - (-2)} = \frac{-4}{3} = -\frac{4}{3}$

$y - y_1 = m(x - x_1)$   
 $y - 1 = -\frac{4}{3}(x - 1)$

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

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

$y = -\frac{4}{3}x + \frac{7}{3}$

Q  $(-4, 7)$  R  $(5, -2)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 7}{5 - (-4)} = \frac{-9}{9} = -1$

$m = -1$

$y - y_1 = m(x - x_1)$   
 $y - 7 = -1(x + 4)$

$y - 7 = -x - 4$

$y = -x + 3$

ii) a)  $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4}{2} = 2$

Point  $(3, -2)$   $y + 2 = 2(x + 3)$

$(-2, 2)$   $y - 2 = 2(x + 1)$

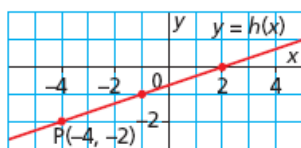
$(1, 2)$   $y - 2 = 2(x - 1)$

$(0, 4)$   $y - 4 = 2(x - 1)$

$(1, 6)$   $y - 6 = 2(x - 1)$

9. a) For each line, write an equation in slope-point form.

iii)



$$y - y_1 = m (x - x_1)$$

$$y + 2 = \frac{1}{3} (x + 4)$$

b) Write each equation in part a in slope-intercept form, then determine the x- and y-intercepts of each graph.

$$y + 2 = \frac{1}{3} (x + 4)$$

$$y + 2 = \frac{1}{3} x + \frac{4}{3}$$

$$y = \frac{1}{3} x + \frac{4}{3} - 2$$

$$y = \frac{1}{3} x + \frac{4}{3} - \frac{6}{3}$$

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

x intercept

$$0 = \frac{1}{3} x - \frac{2}{3}$$

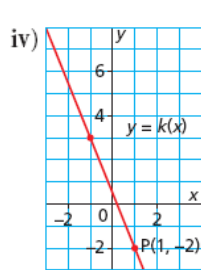
$$\frac{2}{3} = \frac{1}{3} x$$

$$6 = 3x$$

$$x = 2$$

y intercept

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



$$y - y_1 = m(x - x_1)$$

$$y + 2 = -\frac{5}{2}(x - 1)$$

b) Write each equation in part a in slope-intercept form, then determine the  $x$ - and  $y$ -intercepts of each graph.

$$y + 2 = -\frac{5}{2}(x - 1)$$

$$y + 2 = -\frac{5}{2}x + \frac{5}{2}$$

$$y = -\frac{5}{2}x + \frac{5}{2} - 2$$

$$y = -\frac{5}{2}x + \frac{5}{2} - \frac{4}{2}$$

$$y = -\frac{5}{2}x + \frac{1}{2}$$

x intercept

$$0 = -\frac{5}{2}x + \frac{1}{2}$$

$$-\frac{1}{2} = -\frac{5}{2}x$$

$$-2 = -10x$$

$$x = \frac{2}{10}$$

$$x = \frac{1}{5}$$

y intercept

$$-\frac{5}{2}$$



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

Write each equation in slope-point form and in slope-intercept form.

a) B(-2, -5) and C(1, 1)

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

$$m = \frac{1 + 5}{1 + 2}$$

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

$$m = 2$$

Slope: 2 Point: (1, 1)

$$y - y_1 = m(x - x_2)$$

$$y - 1 = 2(x - 1)$$

Point slope form

$$y = 2x - 2 + 1$$

$$y = 2x - 1$$

Slope Intercept form

b) Q(-4, 7) and R(5, -2)

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

$$m = \frac{-2 - 7}{5 + 4}$$

$$m = \frac{-9}{9}$$

$$m = -1$$

Slope: -1 Point: (5, -2)

$$y - y_1 = m(x - x_2)$$

$$y - 5 = -1(x + 2)$$

Point slope form

$$y = -1x - 2 + 5$$

$$y = -x + 3$$

Slope Intercept form

c) U(-3, -7) and V(2, 8)

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

$$m = \frac{8 + 7}{2 + 3}$$

$$m = \frac{15}{5}$$

$$m = 3$$

Slope: 3 Point: (2, 8)

$$y - y_1 = m(x - x_2)$$

$$y - 8 = 3(x - 2)$$

Point slope form

$$y = 3x - 6 + 8$$

$$y = 3x + 2$$

Slope Intercept form

$$\rightarrow y + 7 = 3(x + 3)$$

d) H(-7, -1) and J(-5, -5)

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

$$m = \frac{-5 + 1}{-5 + 7}$$

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

$$m = -2$$

Slope: -2 Point: (-5, -5)

$$y - y_1 = m(x - x_2)$$

$$y + 5 = -2(x + 5)$$

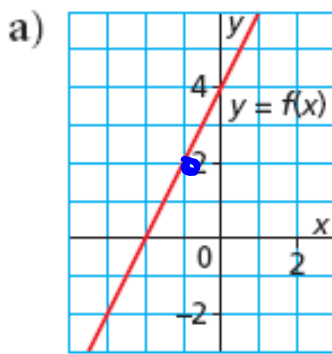
Point slope form

$$y = -2x - 10 - 5$$

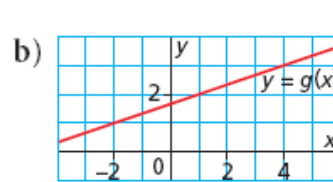
$$y = -2x - 15$$

Slope Intercept form

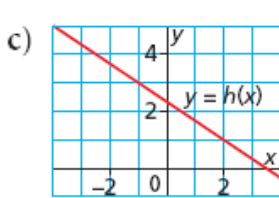
14. Match each graph with its equation. Justify your choice.



~~$y + 1 = 2(x - 2)$~~   $\rightarrow (2, -1)$   
 ~~$y + 2 = 2(x - 1)$~~   $\rightarrow (1, -2)$   
 $y - 2 = 2(x + 1)$   $\rightarrow (-1, 2)$   
 ~~$y + 1 = -2(x - 2)$~~



$y - 1 = \frac{1}{3}(x - 2)$   
 $y + 2 = \frac{1}{3}(x + 1)$   
 $y - 1 = 3(x - 2)$   
 $y - 2 = \frac{1}{3}(x - 1)$



$y - 1 = \frac{2}{3}(x - 2)$   
 $y - 1 = \frac{3}{2}(x - 2)$   
 $y - 1 = -\frac{2}{3}(x - 2)$   
 $y - 2 = -\frac{2}{3}(x - 1)$



20. a) Write an equation for the line that passes through D(-5, -3) and is:

i) parallel to the line  $y = -\frac{4}{3}x + 1$

Point : (-5,-3)  $m = -\frac{4}{3}$

$$y - y_1 = m(x - x_1)$$

$$y - (-3) = -\frac{4}{3}(x - (-5))$$

Point slope form  

$$y + 3 = -\frac{4}{3}(x + 5)$$

ii) perpendicular to the line  $y = -\frac{4}{3}x + 1$

Point : (-5,-3)  $m = \frac{3}{4}$

$$y - y_1 = m(x - x_1)$$

$$y - (-3) = \frac{3}{4}(x - (-5))$$

Point slope form  

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

b) Compare the equations in part a. How are they alike?  
How are they different?

The both have the same point but opposite reciprocal slopes

$$3y + 9 = -4(x + 5)$$

$$3y = -4(x + 5) - 9$$

$$3y = -4x - 20 - 9$$

$$3y = -4x - 29$$

slope intercept form  

$$y = -\frac{4x}{3} - \frac{29}{3}$$

$$4y + 12 = 3(x + 5)$$

$$4y = 3(x + 5) - 12$$

$$4y = 3x + 15 - 12$$

$$4y = 3x + 3$$

slope intercept form  

$$y = \frac{3x}{4} + \frac{3}{4}$$

## *Point - Slope Form*

You can also find the equation of a line if you are given a point and the slope of the line. In order to do this you use the formula:

You need a  
-Point & a Slope

$$y - y_1 = m(x - x_1)$$

The  $x$  and  $y$  values from the given point

This equation can be rearranged

to  $y = mx + b$

(slope intercept)



**Example 1:**

Find the equation of a line that passes through the points  $(-4,3)$  and has a slope perpendicular to  $y = 2x - 7$

$$m = 2$$

$$m_{\perp} = -\frac{1}{2}$$

$\perp \Rightarrow$  opposite sign  
reciprocally flip

Write what you know:

$$m = -\frac{1}{2} \quad \text{point } (-4, 3)$$

What do we need:

$$y - y_1 = m(x - x_1)$$

↑
↑
↑  
have
need
have

$$y - 3 = -\frac{1}{2}(x - -4)$$

$$y - 3 = -\frac{1}{2}\left(\frac{x}{1} + \frac{4}{1}\right)$$

$$y - 3 = -\frac{1}{2}x - \frac{4}{2}$$

divides out

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

$$y - 3 + 3 = -\frac{1}{2}x - 2 + 3$$

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

**Example 2:**

Find the equation of a line that passes through the points (0,5) and (-2,1)

Step 1) Find Slope

Write what you know:

Point A (0,5) $x_1 y_1$	Point B (-2,1) $x_2 y_2$
-------------------------------	--------------------------------

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

$$\frac{(1) - (5)}{(-2) - (0)}$$

$$= \frac{-4}{-2}$$

$$m = 2$$

What do we need:

$m = 2$

Point A (0,5)

$$y - y_1 = m(x - x_1)$$

have

need

have

$$y - 5 = 2(x - 0)$$

$$y - 5 = 2x - 0$$

$$y - \cancel{5} + 5 = 2x + 5$$

$$y = 2x + 5$$

See next page "if you use other point)

## What if you use the other point????

### Example 2:

Find the equation of a line that passes through the points (0,5) and (-2,1)

Write what you know:

Fill in what you know:

$$(0,5) \quad m = ?$$

$$y - y_1 = m (x - x_1)$$

$$y = 2x + 5$$

We need slope:

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

$$m = \frac{(1 - 5)}{((-2) - 0)}$$

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

$$m = 2$$

Fill in what you know:

$$(-2, 1) \quad m = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = 2(x - (-2))$$

$2(x + 2)$

$$y - 1 = 2x + 4$$

$$y - 1 + 1 = 2x + 4 + 1$$

$$y = 2x + 5$$

Example 3:

Find the equation of a line that passes through the points (8,-3) and (6,1), and has a y intercept of (0,-7)

$$b = -7$$

$$y = mx + b$$
$$y = -2x - 7$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{1 - (-3)}{6 - 8}$$
$$= \frac{1 + 3}{6 - 8} = \frac{4}{-2}$$
$$m = -2$$

3

When looking for the x-intercept  
in an equation,  
let  
y equal zero.



# INTERCEPTS

When looking for the y-intercept  
in an equation,  
let  
x equal zero.



$$4x - 5y = 40$$

x-intercept

Let  $y = 0$  for the x-intercept.

$$4x - 5y = 40$$

$$4x - 5(0) = 40$$

$$4x = 40$$

$$\frac{4x}{4} = \frac{40}{4}$$

$$x = 10$$



Can you see  
the intercepts?

y-intercept

Let  $x = 0$  for the y-intercept.

$$4x - 5y = 40$$

$$4(0) - 5y = 40$$

$$-5y = 40$$

$$\frac{-5y}{-5} = \frac{40}{-5}$$

$$y = -8$$

**CHECK YOUR UNDERSTANDING**

4. Write an equation for the line that passes through  $S(2, -3)$  and is:

a) parallel to the line  $y = 3x + 5$

b) perpendicular to the line  $y = 3x + 5$





Test Tuesday Dec. 13

## Homework:

### Worksheet on Point-Slope form

Worksheet  
Point Slope Form  $y = mx + b$

General  
1, 2, 4, 6

Please put final answer in Slope-Intercept Form

Academic  
1, 3, 4, 6

- 1) Find the equation of a line that passes through the points  $(-1, 8)$  and has a slope of 2.
- 2) Find the equation of a line that passes through the points  $(6, -3)$  and has a slope of  $m=4$ .
- 3) Find the equation of the straight line that has slope  $m = \frac{3}{4}$  and passes through the point  $(-1, -6)$ .
- 4) Find the equation of a line that passes through  $(-1, 1)$  and has the same slope as  $y = -3x + 4$ .
- 5) Find the equation of a line that passes through  $(-7, 3)$  and has the same slope as  $y = 2x + 1$ .
- 6) Find the equation of a line that passes through the points  $(3, -2)$  and  $(-4, 1)$ .
- 7) ~~Find the equation of a line that passes through the points  $(3, -2)$  and  $(-4, 1)$ .~~
- 8) Find the equation of a line that has the same x-intercept as this equation  $2x + 6 = 3y$ , and also passes through the point  $(4, 5)$ .

New

## Attachments

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Point slope form.docx