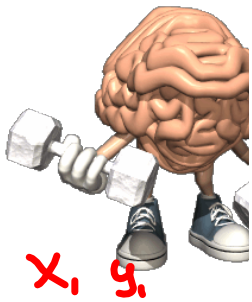
Slope-intercept
$y = mx + b$

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

Warm Up

Slope
$m = \frac{rise}{run}$

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



x_1 y_1

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

slope

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

$y - 5 = -5(x - -7)$

tidy sign

$y - 5 = -5(x + 7)$

distribute through bracket

point-slope

$y - 5 = -5x - 35$

$y - 5 + 5 = -5x - 35 + 5$

$y = -5x - 30$

Slope-intercept

x_1 y_1

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

b

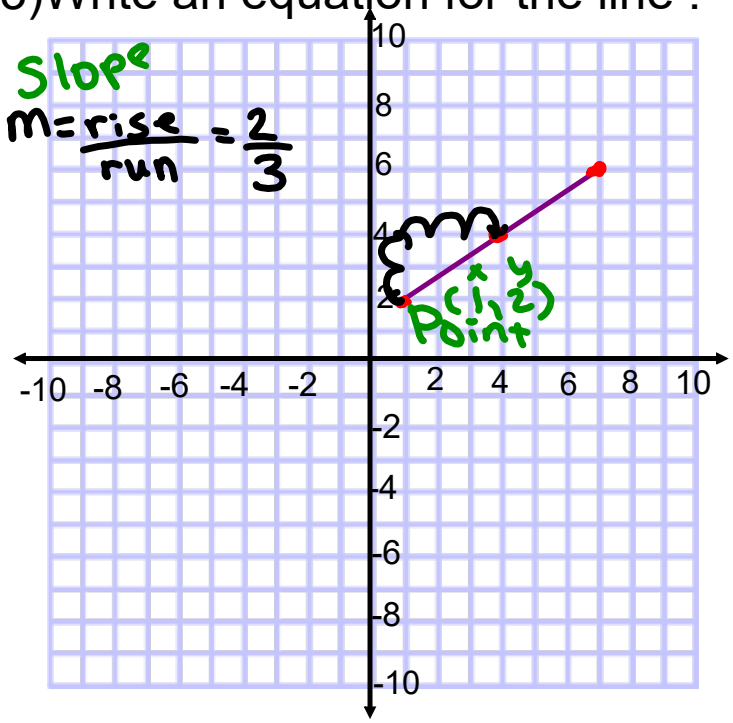
x_2 y_2

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 4}{-5 - -7} = \frac{10-4}{-5+7} = \frac{6}{2} = 3$

$y = mx + b$

$y = 3x - 5$

3)Write an equation for the line :



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

Slope-point equation

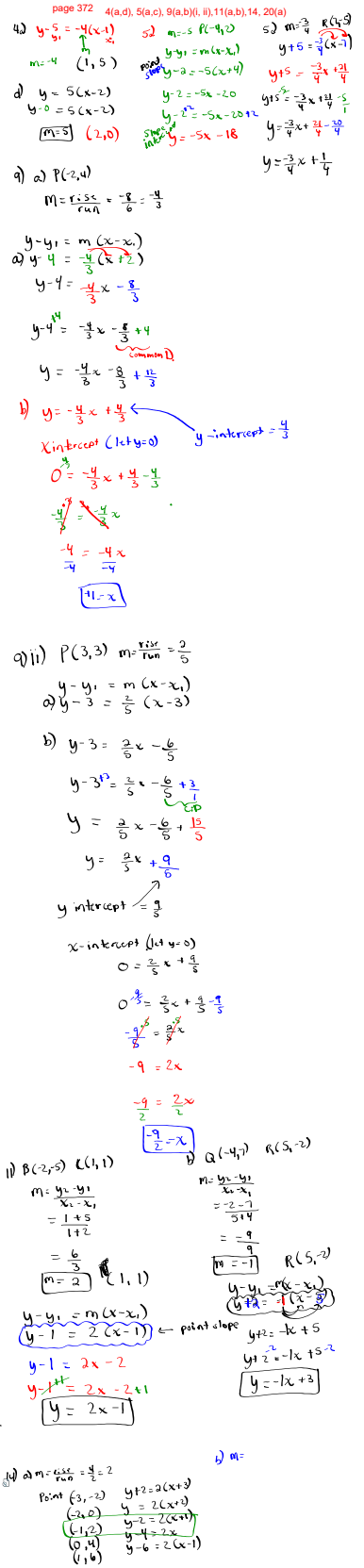
$y - y_1 = m(x - x_1)$

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

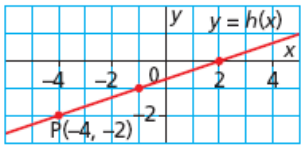
$y - y_1 = m(x - x_1)$

Homework QUESTIONS from last night

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



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

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

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

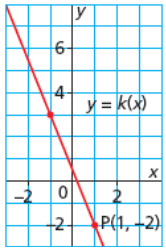
$$6 = 3x$$

$$x = 2$$

y intercept

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

iv)



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

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

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

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)

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

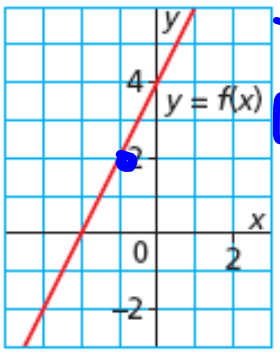
$y + 5 = -2(x + 5)$ Point slope fc

$y = -2x - 10 - 5$

$y = -2x - 15$ Slope Interce form

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

a)



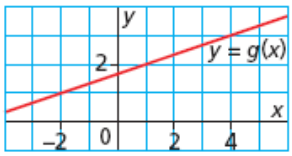
~~$y + 1 = 2(x - 2)$~~ → (2, -1)

$y + 2 = 2(x - 1)$ → (1, -2)

$y - 2 = 2(x + 1)$ → (-1, 2)

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

b)



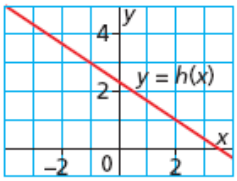
$y - 1 = \frac{1}{3}(x - 2)$

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

$y - 1 = 3(x - 2)$

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

c)



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

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

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

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

6.5 Slope-Point Form of the Equation for a Linear Function

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

point

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

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

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

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

$4y = 3x + 15 - 12$

$4y = 3x + 3$

slope intercept form

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

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

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 a has a slope perpendicular to y= 2x-7

Write what you know:

What do we need:

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

have need have

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

Write what you know:

Point A	Point B
(0,5)	(-2,1)

What do we need:

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

have need have

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) 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) m= 2

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

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

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

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

$$y=2x+5$$

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)

x_1, y_1 x_2, y_2

b

$m = -2$

$b = -7$

$y = mx + b$

$y = -2x - 7$

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

$$= \frac{1 - -3}{6 - 8}$$

$$= \frac{1+3}{6-8} = \frac{4}{-2} = -2$$

$y - 3 = \frac{-2}{5}(x + 4)$

-3 $\quad -4$

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

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

point $= (-4, 3)$

(x, y)

$y - 3 = \frac{-2}{5}\left(\frac{x}{1} + \frac{4}{1}\right)$

Recall multiply fraction: top x top / bottom x bottom

$y - 3 = \frac{-2x}{5} - \frac{8}{5}$

$y - \frac{3}{1} + \frac{3}{1} = -\frac{2}{5}x - \frac{8}{5} + \frac{3}{1} \times \frac{5}{5}$

add fraction need Common Denominator

$y = -\frac{2x}{5} - \frac{8}{5} + \frac{15}{5}$

$y = -\frac{2}{5}x + \frac{7}{5}$

LHS RHS

$y-7=\frac{2}{5}(x+3)$

$5\cdot[y-7]=5\cdot\left[\frac{2}{5}(x+3)\right]$

$5(y-7)=2(x+3)$

Distribute through bracket

$5y-35=2x+6$

$5y-35+35=2x+6+35$

$5y=2x+41$

$\frac{5y}{5}=\frac{2x+41}{5}$

$y=\frac{2}{5}x+\frac{41}{5}$

$4x-5y=40$

Can you see the intercepts?

Let y = 0 for the x-intercept.

$4x - 5y = 40$

$4x - 5(0) = 40$

$4x - 0 = 40$

$4x = 40$

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

$x = 10$

Let x = 0 for the y-intercept.

$4x - 5y = 40$

$4(0) - 5y = 40$

$0 - 5y = 40$

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

$y = -8$

Example 3:
Find the equation of a line that passes through the points (-3,-3) and has a slope of ¾.

Write what you know:

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

Write an equation of a line (in slope -intercept form) given the following information, $y = mx + b$

1) x-intercept = 2, slope = 3/2

point

$(2, 0)$ $m = \frac{3}{2}$

x_1 y_1

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

$y - 0 = \frac{3}{2}(x - 2)$

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

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

reduce

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

2) points (3, 1) & (-2, 3) lie on the line.

$x_1 y_1$ $x_2 y_2$

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

$\frac{3 - 1}{-2 - 3} = \boxed{\frac{2}{-5} m}$

point (3, 1)

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

$5 \times [y - 1] = \left[\frac{-2}{5}(x - 3)\right] \times 5$

$5(y - 1) = -2(x - 3)$

$5y - 5 = -2x + 6$

$5y - 5 + 5 = -2x + 6 + 5$

$\frac{5y}{5} = \frac{-2x + 11}{5}$

$y = \frac{-2}{5}x + \frac{11}{5}$

$7 \times [y - 4] = \left[\frac{3}{7}(x + 9)\right] \times 7$

$7(y - 4) = 3(x + 9)$

$7y - 28 \overset{+28}{} = 3x + 27 \overset{+28}{}$

$\frac{7y}{7} = \frac{3x + 55}{7}$

$y = \frac{3}{7}x + \frac{55}{7}$

Attachments

Point slope form.docx