

Chapter 6 Review

Part 1:

Find the slope of the line through each of the points.

a) (6,6), (6,-11) $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-11 - 6}{6 - 6} = \frac{-17}{0}$

b) (10, -14), (-2, 2) $m = \frac{2 - (-14)}{-2 - 10} = \frac{2 + 14}{-2 - 10} = \frac{16}{-12} = -\frac{4}{3}$

c) (-7,-6), (-20,-1) $m = \frac{-1 - (-6)}{-20 - (-7)} = \frac{-1 + 6}{-20 + 7} = \frac{5}{-13}$

d) (-20,14), (11, -18) $m = \frac{-18 - 14}{11 - (-20)} = \frac{-18 - 14}{11 + 20} = \frac{-32}{31}$

Part 2:

Write the following equations in slope-intercept form, and then state the slope, y-intercept and x-intercept.

a) $y = \frac{2x}{5} - 5$
 $b = -5$
 x-intercept (let $y=0$)
 $0 = \frac{2}{5}x - 5$
 $5 = \frac{2}{5}x$
 $\frac{25}{2} = \frac{2x}{2}$
 $\frac{25}{2} = x$

b) $y = -3x - 5$
 $b = -5$
 $0 = -3x - 5$
 $5 = -3x$
 $-\frac{5}{3} = x$

c) $y = 6x - 3$
 $b = -3$
 $0 = 6x - 3$
 $3 = 6x$
 $\frac{3}{6} = \frac{6x}{6}$
 $\frac{1}{2} = x$

d) $y = \frac{9x}{2} - 4$
 $b = -4$
 $0 = \frac{9x}{2} - 4$
 $4 = \frac{9x}{2}$
 $8 = 9x$
 $\frac{8}{9} = x$

Part 4:

Write the general form of the equation of each line given

a) Slope = $-\frac{3}{5}$, y-intercept = 5
 $y = -\frac{3}{5}x + 5$
 $5y = -3x + 25$
 $3x + 5y - 25 = 0$

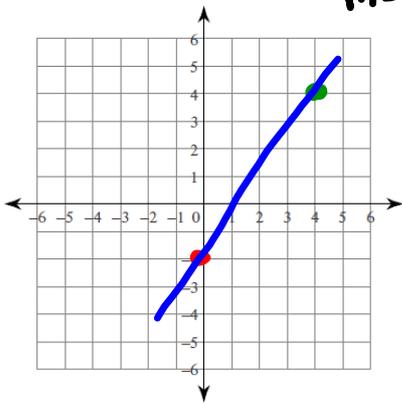
b) Slope = 9, y-intercept = 4
 $y = 9x + 4$
 $0 = 9x - y + 4$

c) slope = -2, x-intercept = -6
 $(-6, 0)$
 $y - y_1 = m(x - x_1)$
 $y - 0 = -2(x - (-6))$
 $y = -2(x + 6)$
 $y = -2x - 12$
 $2x + y + 12 = 0$

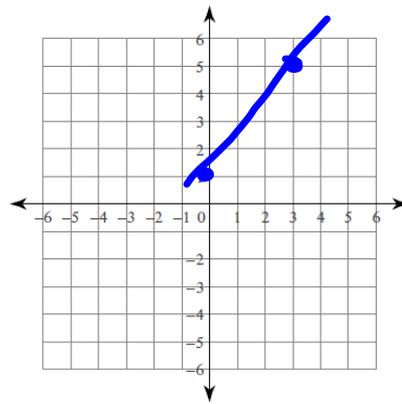
d) slope = $\frac{1}{2}$, x-intercept = -6
 $y - y_1 = m(x - x_1)$
 $y - 0 = \frac{1}{2}(x - (-6))$
 $y = \frac{1}{2}(x + 6)$
 $2[y] = \frac{1}{2}(x + 6)$
 $2y = \frac{1}{2}(x + 6)$
 $2y = x + 6$
 $0 = x - 2y + 6$

Part 3: Graph the following

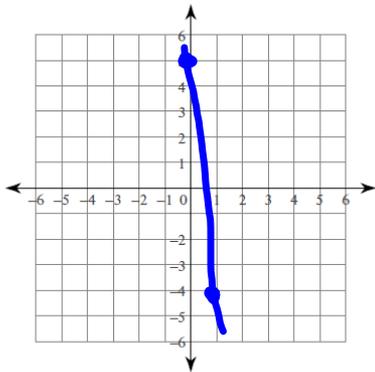
a) $y = \frac{6}{5}x - 2$

Plot $b = -2$ $m = \frac{6}{5}$ rise
5 run

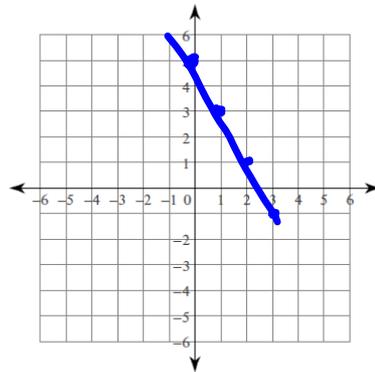
b) 2) $y = \frac{4}{3}x + 1$



c) $9x + y = 5$

 $y = -9x + 5$ 

d) $2x + y = 5$

 $y = -2x + 5$ 

Part 6:

Write the equation of a line in point slope form and in then slope intercept form for each of the following:

a) slope = -5
point = (-4, 9)

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

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

$$y - 9 = -5x - 20 + 9$$

$$y = -5x - 11$$

b) slope = -2/3
point = (5, -1)

$$y - (-1) = \frac{-2}{3}(x - 5)$$

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

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

$$3y + 3 = -2x - 5$$

$$3y = -2x - 5 - 3$$

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

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

c) point = (-6, -1) Point = (2, 5)

$$m = \frac{5 - (-1)}{2 - (-6)} = \frac{5 + 1}{2 + 6} = \frac{6}{8} = \frac{3}{4}$$

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

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

$$4(y + 1) = 3(x + 6)$$

$$4y + 4 = 3x + 18$$

$$4y = 3x + 18 - 4$$

$$4y = 3x + 14$$

$$y = \frac{3x + 14}{4}$$

Part 7:

Which of the following are perpendicular or parallel?

a) $y = 3x + 6$, $y = 3x - 3$ *same slope so par*

b) $y = \frac{-1}{2}x - 5$, $y = 2x + 5$ *opposite recip so perpen.*

c) (5, 4) (11, -2) with (7, 6) (3, 2)

$$m = \frac{-2 - 4}{11 - 5} = \frac{-6}{6} = -1$$

$$m = \frac{2 - 6}{3 - 7} = \frac{-4}{-4} = +1$$

opposite recip so perpendicular

d) (7, 6) (3, 2) with (7, -3) (11, 1)

$$m = \frac{2 - 6}{3 - 7} = \frac{-4}{-4} = +1$$

$$m = \frac{1 - (-3)}{11 - 7} = \frac{4}{4} = +1$$

Same so parallel

Part 10:

Determine the distance and midpoint for the following lines

a) (-4, 3) (5, 6)

b) (0, -9) (-7, 2)

Part 8:

Write the equation of a line, in point slope form for the following :

a) through: (2, 0), parallel to $y = \frac{2}{3}x$ $m = \frac{2}{3}$
 $y - 0 = \frac{2}{3}(x - 2)$

c) through: (2, 4), perp. to $y = -\frac{2}{7}x - 5$

$m = -\frac{2}{7}$
 $m_{\perp} = \frac{7}{2}$
 $y - 4 = \frac{7}{2}(x - 2)$

b) through: (-2, 4), parallel to $y = -\frac{3}{2}x + 3$

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

d) through: (5, 0), perp. to $y = -x + 5$

$y = 1(x - 5)$

$y = x - 5$

$m = -1$

$m_{\perp} = +1$

$m = m_{\parallel} = \frac{3}{2}$
 $m_{\perp} = -\frac{2}{3}$

Part 9:

Write the equation of a line for the following:

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

$$m = 2$$

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

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

- b) Find the equation of a line that passes through the points $(1, -3)$ and $(-5, 2)$

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

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

$$y + 3 = \frac{-5}{6}(x - 1) \quad \text{OR}$$

$$y - 2 = \frac{-5}{6}(x + 5)$$

- c) Find the equation of a line that passes through the points $(2, 5)$ and $(-11, -3)$

$$m = \frac{-3 - 5}{-11 - 2} = \frac{-8}{-13} = \frac{8}{13}$$

$$y - 5 = \frac{8}{13}(x - 2)$$

or

$$y + 3 = \frac{8}{13}(x + 11)$$

- d) Find the equation of a line that has the same x-intercept as this equation $6x + 12 = 3y$, and also passes through the point $(3, -5)$.

$$\downarrow$$

$$\text{let } y = 0$$

$$6x + 12 = 0$$

$$\downarrow$$

$$\frac{6x}{6} = \frac{-12}{6}$$

$$(x = -2)$$

$$(-2, 0)$$

$$m = \frac{0 - (-5)}{-2 - 3}$$

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

$$= -1$$

$$y - 0 = -1(x + 2)$$

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

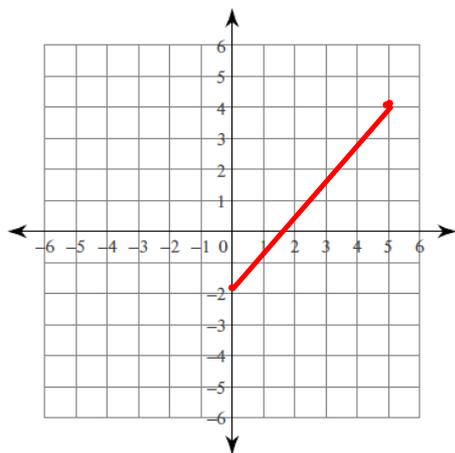
OR

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

Part 3:
Sketch the graph of the following lines

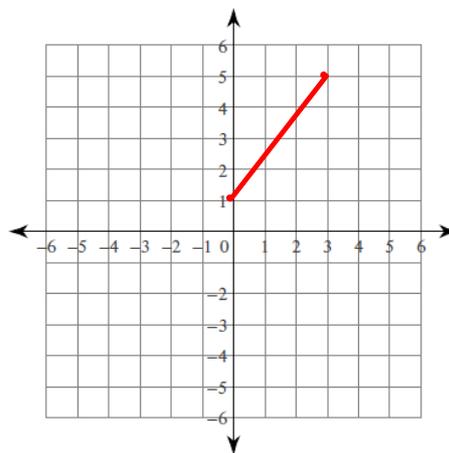
a)

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



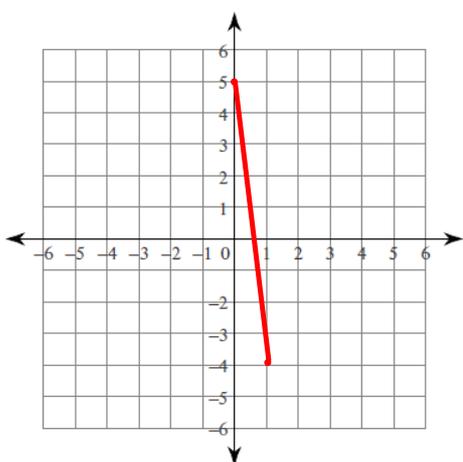
b)

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



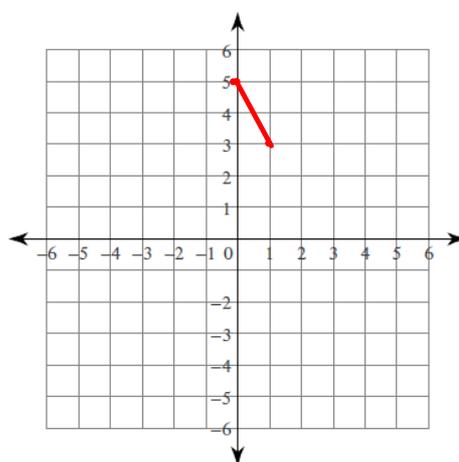
$$y = -9x + 5$$

c) $9x + y = 5$



d) $2x + y = 5$

$$y = -2x + 5$$



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

Slope intercept form

$$y = mx + b$$

Point slope form

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

General form

$$Ax + By + c = 0$$

$$MP(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

SLOPE

$$\text{Slope} = m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Types of questions:

1) What is the slope between (2,3) and (7,-4)?

$$m = \frac{-4 - 3}{7 - 2} = \frac{-7}{5}$$

2) Using the points below, find the slope of each line (3,5) (-3,-5)

$$\frac{-5 - 5}{-3 - 3} = \frac{-10}{-6} = \frac{5}{3}$$

Finding Intercepts

X - Intercept - is where the graph crosses the x-axis ($y = 0$)

Y - Intercept - is where the graph crosses the y-axis ($x = 0$)

Example: What are the x and y intercepts for

a) $2x + 3y = 12$

x int
 $2x + 3(0) = 12$

$$\frac{2x}{2} = \frac{12}{2}$$

$$\boxed{x = 6}$$

y int $x = 0$

$$2x + 3y = 12$$

$$2(0) + 3y = 12$$

$$\frac{3y}{3} = \frac{12}{3}$$

$$\boxed{y = 4}$$

b) $x - 3y = 9$

x int

$$x - 3y = 9$$

$$x - 3(0) = 9$$

$$x = 9$$

y int

$$x - 3y = 9$$

$$0 - 3y = 9$$

$$\frac{-3y}{-3} = \frac{9}{-3}$$

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

Finding the Equation of a Line

Using slope y-intercept form to find the equation of a line

Slope y - intercept form \longrightarrow $y = mx + b$

\uparrow \uparrow
 Slope Y-Intercept

Slope - the steepness of a line

y - intercept - the point where a graph crosses the y-axis; the point where $x = 0$

Example:

Given that a line has a slope of 3 and a y intercept of -2, what is the equation of the line?

$$y = 3x - 2$$

2) A line passes through the points (4, 5) and (1, 3). The same line has a y intercept of 4. What is the equation of the line?

$$m = \frac{3-5}{1-4}$$

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

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

$$b = 4$$

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

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:

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

slope
↓

↙ ↘

The x and y values from the given point

1) Find the equation of a line that passes through (-3,4) and has the same slope as $y = 3x + 2$.

$$m = 3$$

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

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

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

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

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

$$m = 2$$

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

$$y - 5 = 2x$$

Parallel Lines

More on Slope...

Lines that are **parallel** will have the same slope.

Remember $y = mx + b$ $m = \text{slope}$

The lines $y = 3x + 1$ and $y = 3x - 2$ are parallel

You can see this when you graph it...

Rearranging Equations

Anytime we have looked at equations of lines that have all been in the form $y = mx + b$. However, there are some cases in which an equation is written in a different form and we have to rearrange it in order to put it in $y = mx + b$ form.

For example: Write $3x + y = 7$ in the form $y = mx + b$

Rearrange the following equations in the form $y = mx + b$

a) $2x + y = 4$

$$\hookrightarrow y = -2x + 4$$

b) $3x - 3y = 9$

$$\begin{aligned} \rightarrow -3y &= -3x + 9 \\ \frac{-3y}{-3} &= \frac{-3x + 9}{-3} \end{aligned}$$

$$y = x - 3$$

c) $x + 2y - 12 = 0$

$$\begin{aligned} \hookrightarrow \quad \quad \quad \hookrightarrow \\ \frac{2y}{2} &= \frac{-x + 12}{2} \\ y &= \frac{-1}{2}x + 6 \end{aligned}$$

d) $y + 4 = 10x$

$$\hookrightarrow y = 10x - 4$$

e) $2y = 50x - 100$

$$\frac{2y}{2} = \frac{50x - 100}{2}$$

$$y = 25x - 50$$

f) $2x = -y + 13$

$$\begin{aligned} \downarrow \\ \frac{2x - 13}{-1} &= \frac{-y}{-1} \end{aligned}$$

$$-2x + 13 = y$$

Graphing

Three ways to do it

1. Using a Table of Values
2. Using $y = mx + b$
3. Using intercepts

