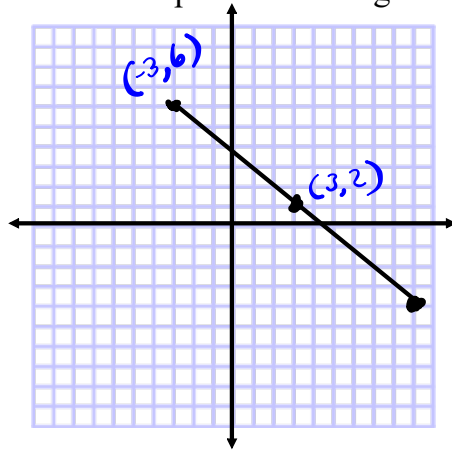1) Determine the slope of a line segment **perpendicular** to this line

$(-3,6)$

$(3,2)$

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

$= \dfrac{2 - 6}{3 - (-3)}$

$= \dfrac{2 - 6}{3 + 3}$

$= \dfrac{-4}{6}$

$m = \dfrac{-2}{3}$

$m\perp = \dfrac{+3}{2}$

2)a) Determine the slope of a line that is **perpendicular** to the line
through S(3,1) and R(8, -5)

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{-5 - 1}{8 - 3} = \dfrac{-6}{5}$ $m\perp = \dfrac{+5}{6}$

b) Determine the slope of a line that is **parallel** to the line through
M(-3, -4) and J(11, 2)

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

$= \dfrac{2 - (-4)}{11 - (-3)}$

$= \dfrac{2 + 4}{11 + 3} = \dfrac{6}{14} = \dfrac{3}{7}$ $\boxed{m_{/\!/} = \dfrac{3}{7}}$

3) Slope of a line is $\dfrac{-1}{4}$

a) What is the slope of the line that is parallel to this line? $m_{/\!/} = \dfrac{-1}{4}$

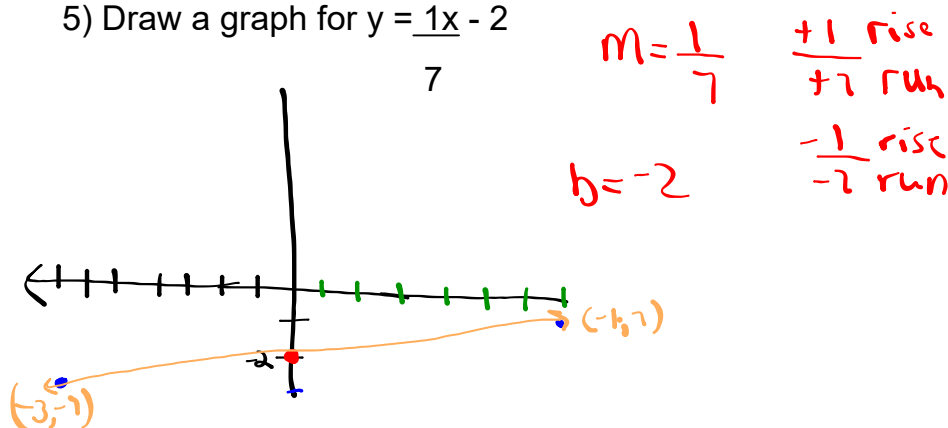b) What is the slope of the line that is perpendicularly to this line?

b) $m\perp = 4$

4) A line has **x-intercept 2** and **y-intercept -7** Determine the slope of
a line a) **parallel** to this line. b) **Perpendicular** to this line

$(2,0)$ $(0,-7)$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{-7 - 0}{0 - 2} = \dfrac{-7}{-2} = \dfrac{+7}{2}$ $m_{/\!/} = \dfrac{7}{2}$ $m\perp = \dfrac{-2}{7}$

5) Draw a graph for y = $\dfrac{1x - 2}{7}$

$m = \dfrac{1}{7}$ $\dfrac{+1}{+7}$ rise/run

$b = -2$ $\dfrac{-1}{-7}$ rise/run

$(-4,7)$

$(-3,-7)$

6) Write an equation for the line

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

$= \frac{-4 - 5}{4 - (-2)}$

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

$= \frac{-9}{6}$

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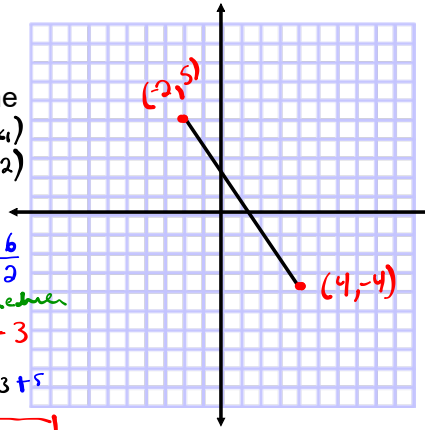
$y - y_1 = m(x - x_1)$

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

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

Reduce

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

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

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

(Graph with points $(-2, 5)$ and $(4, -4)$)

7) Fred works on appliances. Fred charges a initial fee of $30, plus a hourly fee of $20. Write an equation to represent the total cost, C dollars, for h hours. $C = 20h + 30$

8) write the point and slope from the following equations of a line

$(-2, 7)$ $m = \frac{2}{3}$ $m = \frac{3}{4}$ $P(10, -4)$

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

$y - 7 = -\frac{2}{3}x - \frac{4}{3}$

$y - 7 = -\frac{2}{3}x - \frac{4}{3} + 7$

$y = -\frac{2}{3}x - \frac{4}{3} + \frac{21}{3}$

$\boxed{y = -\frac{2}{3}x + \frac{17}{3}}$

b) $y + 4 = \frac{3}{4}(x - 10)$

$y + 4 = \frac{3}{4}x - \frac{30}{4}$

$y + 4 = \frac{3}{4}x - \frac{30}{4} - \frac{4}{1}$

$y = \frac{3}{4}x - \frac{30}{4} - \frac{16}{4}$

$y = \frac{3}{4}x - \frac{46}{4} \leftarrow$ Reduce

$\boxed{y = \frac{3}{4}x - \frac{23}{2}}$

c) $y - 7 = 3(x - 9)$

$y - 7 = 3x - 27$

$y - 7 = 3x - 27 + 7$

$\boxed{y = 3x - 20}$

9) Write an equation of a line in point-slope form for the following:

a) slope $= -\frac{2}{7}$, R(6, -1)

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

$y + 1 = -\frac{2}{7}(x - 6)$

b) m= 5,   P(4, 11)

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

$y - 11 = 5(x - 4)$

10) For the above questions (9a,b) convert the point-slope equation to slope-intercept equation

a)

$y + 1 = -\frac{2}{7}x + \frac{12}{7}$

$y + 1 = -\frac{2}{7}x + \frac{12}{7} - 1$

$y = -\frac{2}{7}x + \frac{12}{7} - \frac{7}{7}$

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

b) $y - 11 = 5x - 20$

$y - 11 = 5x - 20 + 11$

$\boxed{y = 5x - 9}$

let y=0

11) Determine the x-intercept for y-8 = 2(x + 10)

$0 \dfrac{-8}{2} = \dfrac{2(x+10)}{2}$

$-4 = x + 10 \quad -10$

$\boxed{-14 = x}$

12) Determine the y-intercept for y + 5 = 2(x - 6)

let x=0

$y + 5 = 2(-6)$

-12

$y + \cancel{5} = -12 - 5$

$\boxed{y = -17}$

13) Write the following equation in general form: $y = \left(\dfrac{-2}{3}x\right)(7) \cdot 3$

$3y = -2x - 21$

$2x + 3y + 21 = 0$

14) The coordinates of the endpoints of segments are given below. Are the two line segments **parallel, perpendicular, or neither**?
   P(4,-3), U(16,5) and K(-5,2), F(7,-1)

$M = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{5+3}{16-4}$

$= \dfrac{8}{12}$

Reduce

$m_{PU} = \dfrac{2}{3}$

$M_{KF} = \dfrac{-1-2}{7+5}$

$= \dfrac{-3}{12}$ Reduce

$= \dfrac{-1}{4}$

Neither

15) **Write an equation** for the line that passes through W(-7, 12) and N(-4,3).

$M = \dfrac{3-12}{-4+7}$

$= \dfrac{-9}{3}$

$\boxed{m_{WN} = -3}$

a) slope-point form

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

$y - 12 = -3(x + 7)$

OR

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

b) slope-intercept form

$y - 12 = -3x - 21$

$y - 12 + 12 = -3x - 21 + 12$

$\boxed{y = -3x - 9}$

$y - 3 = -3x - 12 \quad +3$

$\boxed{y = -3x - 9}$

16) Write this equation in general form:

a) $y = -4x + 6$

$$5y = -4x + 30$$
$$5y = -4x + 30$$
$$4x + 5y = 30$$
$$\boxed{4x + 5y - 30 = 0}$$

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

$$3y - 15 = 2(x+7)$$
$$3y - 15 = 2x + 14 - 15$$
$$3y = 2x - 1$$
$$\boxed{0 = 2x - 3y - 1}$$

17) For the following line determine: $3x + 6y - 24 = 0$ $+24$

$$3x + 6y = 24$$
$$3x + 6y = 24$$

i) the slope

$$m = -\tfrac{1}{2}$$

ii) the y-intercept

$$b = +4$$

iii) the x-intercept

$$6y = -3x + 24$$
$$\tfrac{6y}{6} = \tfrac{-3x}{6} + \tfrac{24}{6}$$
$$\boxed{y = -\tfrac{1}{2}x + 4}$$

$-x + y = 0$
$3x + 6y - 24 = 0$
$3x + 6(0) - 24$
$3x - 24 = 0$
$\tfrac{3x}{3} = \tfrac{24}{3}$
$\boxed{x = 8}$

18) <u>*Write an equation*</u> for the line **that passes through Z(–1, 3)** and is:
(leave answer in slope intercept form)

a) **perpendicular to the line** $y = \dfrac{-5}{4}x - 3$ $m_1 = \dfrac{4}{5}$ Z(-1,3)

$$y - 3 = \tfrac{4}{5}(x+1)$$
$$y - 3 = \tfrac{4}{5}x + \tfrac{4}{5} + \tfrac{3}{1}$$
$$y = \tfrac{4}{5}x + \tfrac{4}{5} + \tfrac{15}{5}$$
$$\boxed{y = \tfrac{4}{5}x + \tfrac{19}{5}}$$

b) **parallel** to the **line** $8x + 3y + 10 = 0$

$$8x + 3y + 10 = 0$$
$$8x + 3y + 10 = 0 - 8x - 10$$
$$\tfrac{3y}{3} = \tfrac{-8x}{3} - \tfrac{10}{3}$$
$$y = \tfrac{-8}{3}x - \tfrac{10}{3}$$
$$m_{//} = -\tfrac{8}{3}$$ Z(-1,3)

$$y - 3 = \tfrac{-8}{3}(x+1)$$
$$y - 3 = \tfrac{-8}{3}x - \tfrac{8}{3}$$
$$y - 3 = \tfrac{-8}{3}x - \tfrac{8}{3} + \tfrac{3}{1}$$

$$y = \tfrac{-8}{3}x - \tfrac{8}{3} + \tfrac{15}{3}$$
$$\boxed{y = \tfrac{-8}{3}x + \tfrac{7}{3}}$$

19) The line AB has a **_slope of -2_** and it passes through the points F(-9,5) and G(-3, k) , determine the value of "k".
(SHOW ALL WORK)

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

$$-2 = \tfrac{(k-5)}{-3-(-9)}$$

$$-2 = \tfrac{(k-5)}{-3+9}$$

$$-2 = \tfrac{(k-5)}{6}$$

$$6 \times -2 = \tfrac{(k-5)}{6} \times 6$$

$$-12 = k - 5$$

$$-12 + 5 = k - 5 + 5$$
$$\boxed{-7 = k}$$

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

slope intercept form

$$y = mx + b$$

Point slope form

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

General form

$$Ax + By + c = 0$$

Distance

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Mid point

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

SLOPE

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

Types of questions:

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

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

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

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) $2x + 3y = 12$

b) $x - 3y = 9$

Finding the Equation of a Line

<u>*Using slope y-intercept form to find the equation of a line*</u>

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

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**
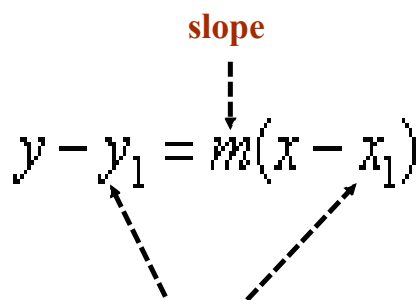
Example:

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

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?

Point - Slope Form

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

slope

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

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.

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

Parallel Lines

More on Slope...

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

Remember $y = mx + b$ $m = slope$

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

You can see this when you graph it...

Perpendicular Lines

When two lines are perpendicular, their slopes are the opposite reciprocal of one another.

Example...

The lines y = 2x + 1 and y = -1/2x + 1 are perpendicular.

Again, you can see this when you graph the two lines on a coordinate plane.

Example:
What is the slope of each pair of lines? Are they parallel or perpendicular?

a)   y = 2x - 4
     y = 2x - 8

b)   y = 4
     y = 9

c)   y = 4x
     y = -1/4 x

d)   x = 4
     y = 4

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) $2x + y = 4$

b) $3x - 3y = 9$

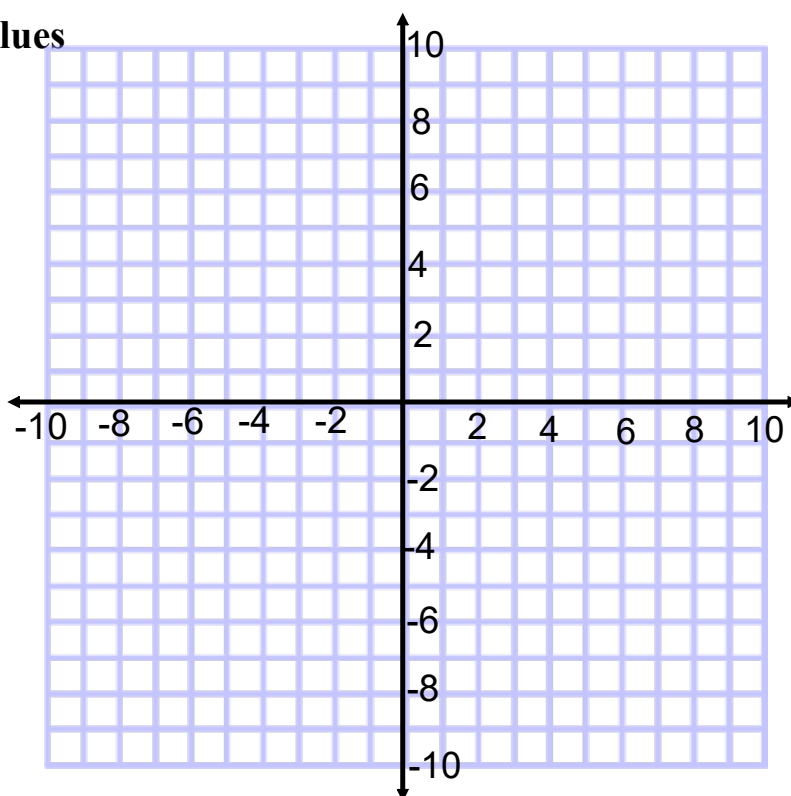**c) $x + 2y - 12 = 0$**

d) $y + 4 = 10x$

e) $2y = 50x - 100$

f) $2x = -y + 13$

Graphing

Three ways to do it

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

Homework

WORKSHEET TEST REVIEW (Day 1).notebook