



****Make sure you know all the formulas****

Slope

Slope Formula	Slopes of Parallel Lines	Slopes of Perpendicular Lines
$m = \frac{y_2 - y_1}{x_2 - x_1}$	same slope 	opposite reciprocals $-\frac{2}{1} + \frac{1}{2}$ 

Three forms of a line

slope-intercept form $y = mx + b$	point-slope form $y = m(x - x_1) + y_1$	standard form $Ax + By = C$
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Three methods of graphing a line

make a table $\begin{array}{c c} x & y \\ \hline & \end{array}$	use slope-intercept form $y = mx + b$ plot b, then use slope	find the intercepts and plot them $(0, \quad)$ $(\quad, 0)$ plug in zeros
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How to write the equation of a line or linear model with the given information

Slope and y-intercept given	Slope and a point given	Two points given
$m = 3, b = (0, -1)$ $y = 3x - 1$	$m = 5, (-2, -4)$ $y = 5(x + 2) - 4$ $y = 5x + 10 - 4$ $y = 5x + 6$	$(4, 5), (5, 7)$ $m = \frac{7-5}{5-4} = \frac{2}{1} = 2$ $y = 2(x - 4) + 5$ $y = 2x - 8 + 5$ $y = 2x - 3$

Two special types of lines, with equations and slopes

vertical line  $x = _$ undefined slope	horizontal line  $y = _$ zero slope
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Graphing linear inequalities in two-variables

What are the steps to graph an inequality? Solve for y to find the slope and y-intercept - plot y-intercept and use the slope When do you reverse the inequality symbol? when you divide by a negative	Inequality Symbol	Type of Line	Direction of Shading
	$y > mx + b$	dotted	above
	$y \geq mx + b$	solid	above
	$y < mx + b$	dotted	below
	$y \leq mx + b$	solid	below

Chapter 4 Review Problems

1. Without graphing, find the slope of the line between each pair of points.

a. $(5,1)$ and $(3,4)$

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

b. $(8,2)$ and $(-5,2)$

$$m = \frac{2 - 2}{-5 - 8} = \frac{0}{-13} = 0$$

c. $(2,-1)$ and $(7,-2)$

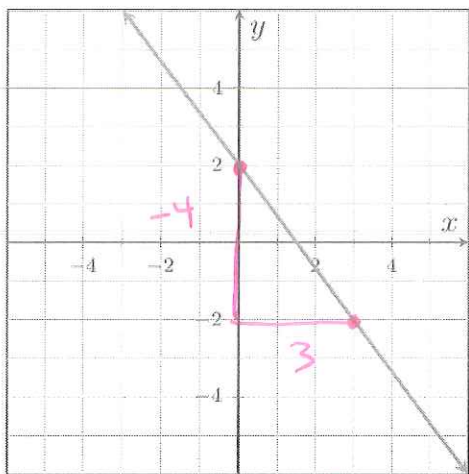
$$m = \frac{-2 - (-1)}{7 - 2} = \frac{-2 - (-1)}{7 - 2} = \frac{-1}{5} = -\frac{1}{5}$$

d. $(2,-7)$ and $(2,1)$

$$m = \frac{1 - (-7)}{2 - 2} = \frac{8}{0} \text{ undefined}$$

2. a. Write the equation of the line below.

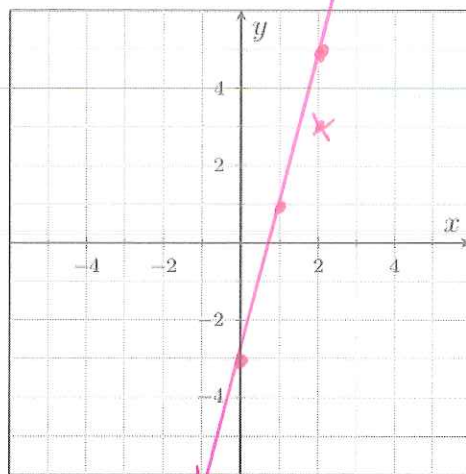
$b = 2$ $m = -\frac{4}{3}$



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

b. Graph the line by making a table.

$y = 4x - 3$



x	y
-2	-11
-1	-7
0	-3
1	1
2	5

(also see table on next page)

$$y = 4(-2) - 3 = -8 - 3 = -11$$

$$y = 4(-1) - 3 = -4 - 3 = -7$$

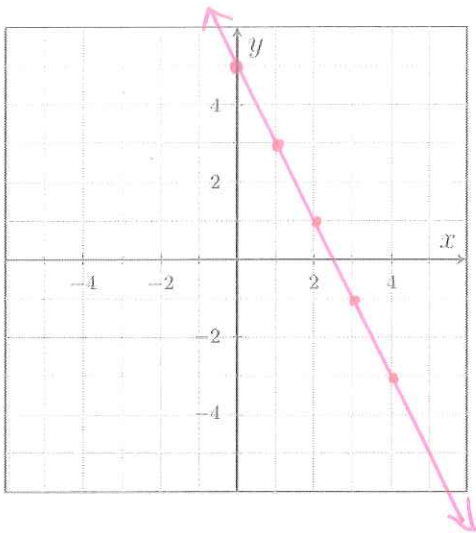
$$y = 4(1) - 3 = 1$$

$$y = 4(2) - 3 = 8 - 3 = 5$$

x	$y = 4x - 3$	(x, y)
-2	$y = 4(-2) - 3 = -11$	$(-2, -11)$
-1	$y = 4(-1) - 3 = -4 - 3 = -7$	$(-1, -7)$
0	$y = 4(0) - 3 = -3$	$(0, -3)$
1	$y = 4(1) - 3 = 4 - 3 = 1$	$(1, 1)$
2	$y = 4(2) - 3 = 8 - 3 = 5$	$(2, 5)$
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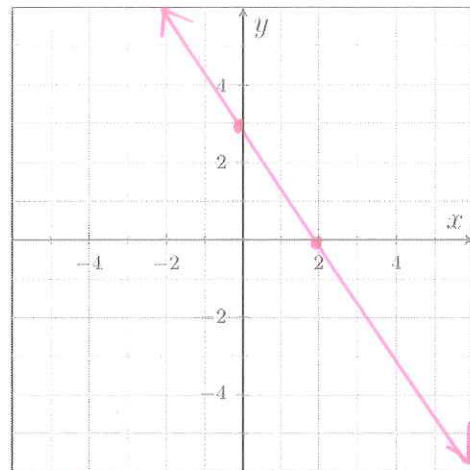
3. a. Graph the line using the slope and y-intercept

$$y = -2x + 5$$



b. Graph the line by finding the intercepts

$$3x + 2y = 6$$



$$\begin{aligned} 3(0) + 2y &= 6 & 3x + 2(0) &= 6 \\ \frac{2y}{2} &= \frac{6}{2} & \frac{3x}{3} &= \frac{6}{3} \\ y &= 3 & x &= 2 \end{aligned}$$

4. a. Write the equation $2x + 4y = -8$ in slope-intercept form. What is the slope and y-intercept of this line?

$$\begin{aligned} 2x + 4y &= -8 \\ -2x + -2x & \\ \frac{4y}{4} &= \frac{-2x - 8}{4} \\ y &= -\frac{1}{2}x - 2 \end{aligned}$$

$$\begin{aligned} m &= -\frac{1}{2} \\ b &= (0, -2) \end{aligned}$$

b. Write the equation of a line passing through the point $(2, 7)$ with a slope of -4 . State this in slope-intercept form.

$$\begin{aligned} y &= m(x - x_1) + y_1 \\ y &= -4(x - 2) + 7 && \text{point-slope} \\ y &= -4x + 8 + 7 \\ y &= -4x + 15 && \text{slope-intercept} \end{aligned}$$

c. Write the equation of a line passing through the points $(-2, 6)$ and $(4, -12)$.

$$\begin{aligned} m &= \frac{-12 - 6}{4 - (-2)} = \frac{-18}{6} = -3 \\ y &= -3(x - 4) - 12 \\ y &= -3x + 12 - 12 \\ y &= -3x \end{aligned}$$

d. What is the slope of the line $x = 7$? What is the slope of the line $y = -5$?

$x = 7$
vertical line
slope is
undefined

$y = -5$
horizontal line
slope = 0

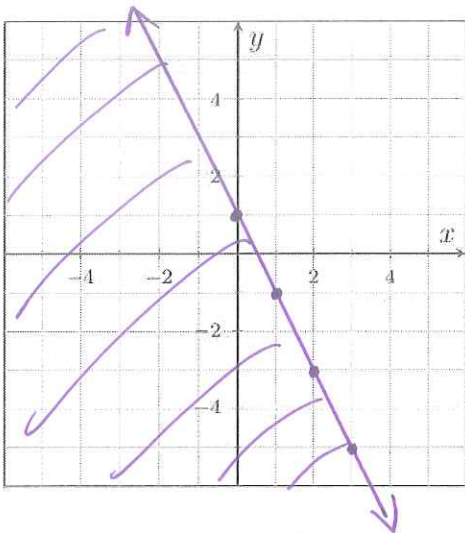
e. Are the lines $y = 5x$ and $y = -5x$ parallel, perpendicular, or neither?

$m = 5$ and -5 . neither

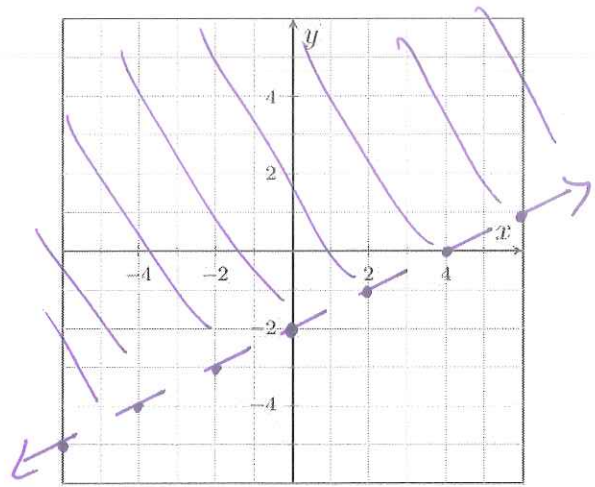
f. Are the lines $y = -3x + 1$ and $y = \frac{1}{3}x + 1$ parallel, perpendicular, or neither?

$m = -3$ and $\frac{1}{3}$ perpendicular

5. a. Graph the linear inequality $y \leq -2x + 1$.



b. Graph the inequality $2x - 4y < 8$



$$\begin{aligned}
 2x - 4y &< 8 \\
 -2x & \quad -2x \\
 -4y &< -2x + 8 \\
 \frac{-4y}{-4} &< \frac{-2x + 8}{-4} \\
 y &> \frac{1}{2}x - 2
 \end{aligned}$$