

College Algebra

Name: [REDACTED]

Study Guide 1

Class: [REDACTED]

Due Date: 2/10/2021

Score: _____

No Work \Leftrightarrow No Points

Use Pencil Only \Leftrightarrow Be Neat & Organized

1. Consider a line segment \overline{AB} with endpoints $A(-3, 2)$ and $B(3, -6)$.

(a) (2 points) Find the distance between the two points.

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} = \sqrt{(-3 - 3)^2 + (2 - (-6))^2}$$
$$= \sqrt{36 + 64} = 10$$

(a) $D = 10$

(b) (2 points) Find the midpoint of the line segment \overline{AB} .

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = M \left(\frac{-3 + 3}{2}, \frac{2 + (-6)}{2} \right) = \left(\frac{0}{2}, \frac{-4}{2} \right) = (0, -2)$$

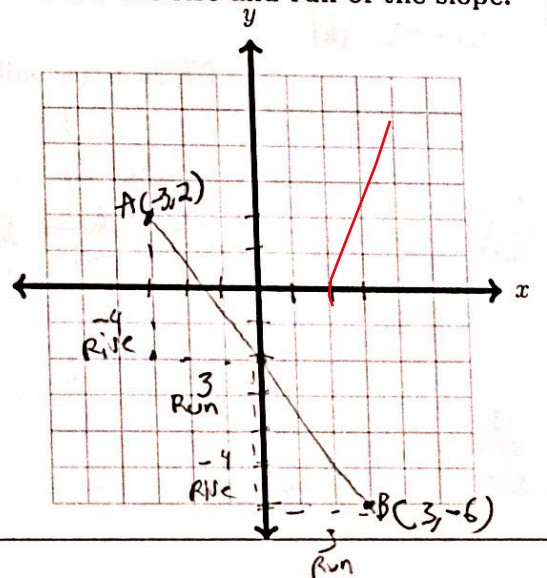
(b) $(0, -2)$

(c) (2 points) Find the slope of the line \overleftrightarrow{AB} .

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

(c) $m = -\frac{4}{3}$

(d) (2 points) Graph the line segment \overline{AB} . Show the rise and run of the slope.



$$\begin{array}{r} 2x + 5y = 10 \\ -2x \\ \hline 5y = -2x + 10 \\ \hline y = \frac{-2x + 10}{5} \end{array}$$

$$\begin{array}{r} 3x - 4y = 12 \\ -3x \\ \hline -4y = -3x + 12 \\ \hline y = \frac{-3x + 12}{-4} \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline 0 & -3 \\ 4 & 0 \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline 0 & 2 \\ 5 & 0 \end{array}$$

2. (8 points) Graph both linear equations in each system, clearly mark intercepts, rise and run of the slope, or any point used in the graph:

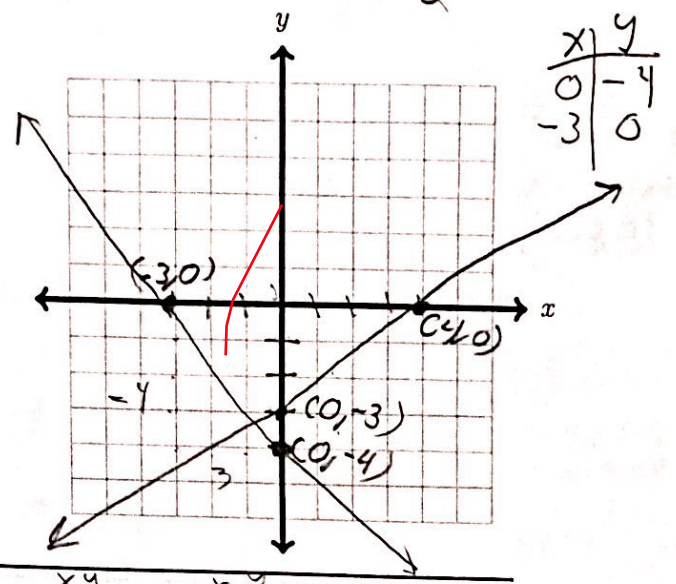
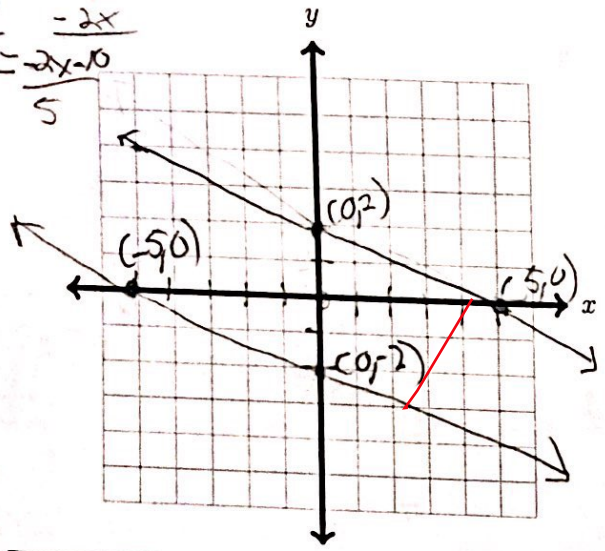
$$\begin{cases} 2x + 5y = 10 & m = \frac{2}{5} \\ 2x + 5y = -10 & m = -\frac{2}{5} \end{cases}$$

$$\begin{cases} \frac{3}{4} = m & 3x - 4y = 12 \\ -\frac{4}{3} = m & 4x + 3y = -12 \end{cases}$$

$$\begin{array}{r} 4x + 3y = -12 \\ -4x \\ \hline 3y = -4x - 12 \\ \hline y = \frac{-4x - 12}{3} \end{array}$$

$$\begin{array}{r} 2x + 5y = -10 \\ -2x \\ \hline 5y = -2x - 10 \\ \hline y = \frac{-2x - 10}{5} \end{array}$$

$$\begin{array}{r|l} x & y \\ \hline -5 & 0 \\ 0 & -2 \end{array}$$



3. Consider a line segment \overline{AB} with endpoints $A(-5, 1)$ and $B(1, 3)$.

(a) (2 points) Find the distance between the two points.

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} = \sqrt{(-5 - 1)^2 + (1 - 3)^2} = \sqrt{36 + 4} = 2\sqrt{10}$$

$$d = 2\sqrt{10}$$

(b) (2 points) Find the midpoint of the line segment \overline{AB} .

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = M \left(\frac{-5 + 1}{2}, \frac{1 + 3}{2} \right) = \left(\frac{-4}{2}, \frac{4}{2} \right) = (-2, 2)$$

$$(b) (-2, 2)$$

(c) (2 points) Find the slope of the line \overleftrightarrow{AB} .

$$\text{slope } m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{1 - 3}{-5 - 1} = \frac{-2}{-6} = \frac{1}{3}$$

$$(c) m = \frac{1}{3}$$

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

$$\text{slope } m = \frac{3}{5}$$

4. (8 points) Graph both linear equations in each system, clearly mark intercepts, rise and run of the slope, or any point used in the graph:

$$y(0, -3)$$

$$0 = \frac{3}{5}x - 3$$

$$\frac{3}{5}x = 3$$

$$x = 5$$

$$(-5, 0)$$

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

$$\text{slope } m = \frac{3}{5}$$

$$y(0, +3)$$

$$0 = \frac{3}{5}x + 3$$

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

$$x = -5$$

$$(-5, 0)$$

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

$$\text{slope } m = \frac{3}{5}$$

$$y(0, -3)$$

$$0 = \frac{3}{5}x - 3$$

$$\frac{3}{5}x = 3$$

$$x = 5$$

$$(5, 0)$$

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

$$\text{slope } m = \frac{3}{5}$$

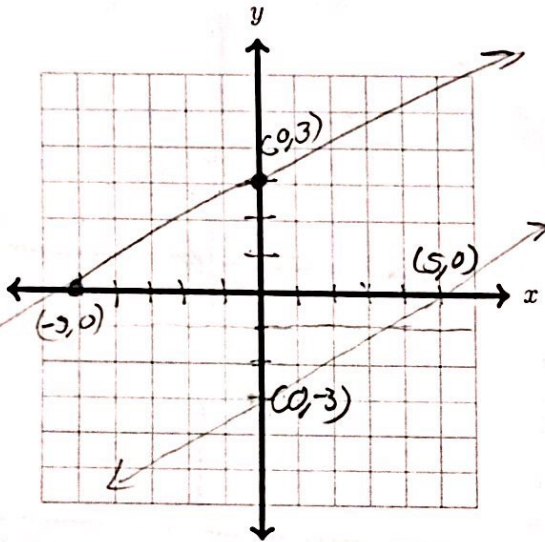
$$y(0, +3)$$

$$0 = \frac{3}{5}x + 3$$

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

$$x = -5$$

$$(-5, 0)$$



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

$$\text{slope } m = \frac{3}{4}$$

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

$$y(0, 2)$$

$$0 = \frac{3}{4}x + 2$$

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

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

$$(-2\frac{2}{3}, 0)$$

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

$$\text{slope } m = -\frac{4}{3}$$

$$y(0, -2)$$

$$0 = -\frac{4}{3}x - 2$$

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

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

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

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

$$\text{slope } m = \frac{3}{4}$$

$$y(0, 2)$$

$$0 = \frac{3}{4}x + 2$$

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

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

$$(-2\frac{2}{3}, 0)$$

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

$$\text{slope } m = -\frac{4}{3}$$

$$y(0, -2)$$

$$0 = -\frac{4}{3}x - 2$$

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

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

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

5. Find the slope of line \overleftrightarrow{AB} that contains the points $A(-3, 5)$ and $B(3, -2)$.

(a) (2 points) $B(3, -2)$.

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{5 - (-2)}{-3 - 3} = \frac{7}{-6} = -\frac{7}{6}$$

(b) (2 points) $B(7, 5)$.

$$m = \frac{5 - 2}{-3 - 7} = \frac{3}{-10} = -\frac{3}{10}$$

(c) (2 points) $B(-3, 0)$.

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

(a) $-\frac{7}{6}$

(b) $-\frac{3}{10}$

(c) undefined

6. (6 points) Graph both linear equations in each system, clearly mark intercepts, rise and run of the slope, or any point used in the graph:

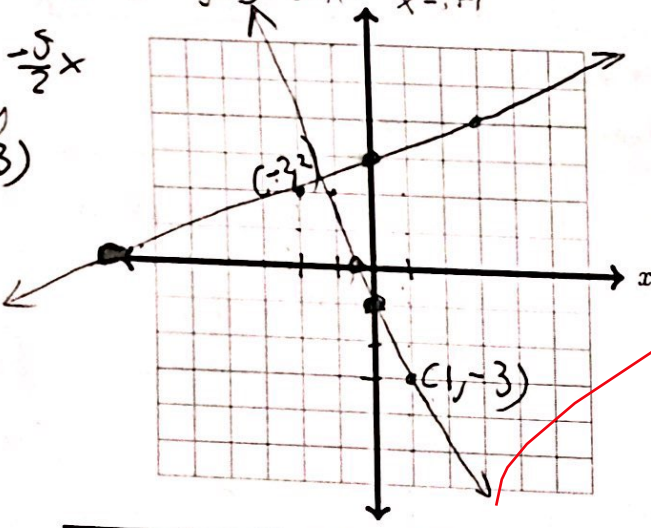
$\text{slope} = \frac{2}{5}x$

$(-2, 2) \quad m = \frac{2}{5}x \quad \begin{cases} y-2 = \frac{2}{5}(x+2) \\ y=+2 \end{cases} \quad \begin{matrix} x = -2 \\ x = -2 \end{matrix}$

$m = \frac{-5}{2}x \quad \begin{cases} y+3 = \frac{-5}{2}(x-1) \\ y = -3 \end{cases} \quad (1, -3) \quad \begin{matrix} x = +1 \\ x = +1 \end{matrix}$

$\text{slope} = \frac{-5}{2}x$

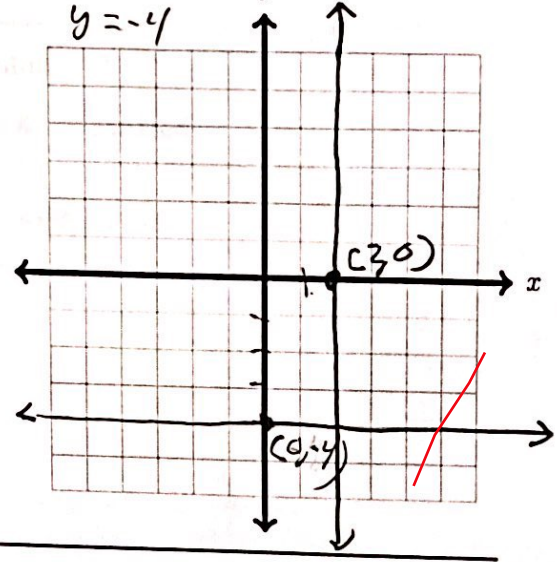
$\begin{matrix} x & y \\ (1, -3) \end{matrix}$



$x = 2, 0$

$\begin{cases} x = 2 \text{ undefined} \\ y+4 = 0 \text{ slope} = 0 \end{cases}$

$\frac{-y}{-y} \quad y = -4$



7. Algebra Review Problems:

(a) (2 points) Solve $3(x-5) + 2 = 7 - 2x$.

$= 3x - 15 + 2 = 7 - 2x$

$= 3x + 2x = 7 + 15 - 2$

$= 5x = 20$

$\frac{5x}{5} = \frac{20}{5} = 4$

$x = 4$

(a) 4

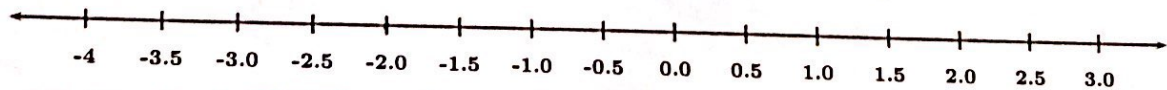
(b) (2 points) Simplify $(x^5)^2 \cdot x^4$ by using exponential rules.

$x^6 \cdot x^4 = x^{10}$

(b) x^{10}

(c) (2 points) Solve $-3 < 2x + 1 \leq 7$, then graph the solution.

$= -\frac{4}{2} < 2x \leq \frac{6}{2} = -2 > x \leq 3$



(d) (2 points) Multiply $(2x^3 - 4)(2x^3 + 4)$ using FOIL method.

$(2x^3 - 4)(2x^3 + 4)$

$= 4x^6 + 8x^3 - 8x^3 - 16$

$= 4x^6 - 16$

(d) $4x^6 - 16$