

## Linear Equations and Graphs (Part 1): Intercepts and Slope

### Section 1: Solutions to 2-variable equations (KA link)

1. Which ordered pair is a solution to the equation  $y = 5x + 11$ ?

a.  $(-1, 6)$

$$y = 5x + 11$$

$$6 = 5(-1) + 11$$

$$6 = -5 + 11$$

$$6 = 6 \quad \checkmark$$

b.  $(2, 21)$

$$y = 5x + 11$$

$$21 = 5(2) + 11$$

$$21 = 10 + 11$$

$$21 = 21 \quad \checkmark$$

c. Both  $(-1, 6)$  and  $(2, 21)$

d. Neither.

$(x, y)$

2. [Challenge] Which ordered pair is a solution to the equation  $-2x + 2y = 6x - 2y$ ?

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

$$4y = 8x$$

$$y = 2x \quad \checkmark$$

a.  $(1, 2)$

$$y = 2x$$

$$2 = 2(1)$$

$$2 = 2 \quad \checkmark$$

b.  $(-1, 2)$

$$y = 2x$$

$$2 = 2(-1)$$

$$2 \neq -2$$

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

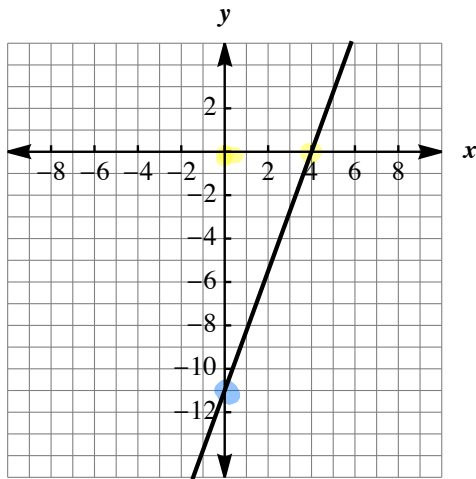
d. Neither.

## Section 2: Intercepts from a graph (KA link)

1. Determine the intercepts of the line.

x-intercept: (\_\_\_\_, 0)      y-intercept: (0, \_\_\_\_)

x-intercept: (4, 0)      y-intercept: (0, -11)



## Section 3: Intercepts from an equation (KA link)

1. Determine the intercepts of the line  $-6x + 7y = 14$ .

x-intercept: the y-coordinate value is 0:

$$-6x + 7(0) = 14$$

$$-6x = 14$$

$$x = -14/6 = -7/3$$

x-intercept:  $(-7/3, 0)$

y-intercept: the x-coordinate value is 0:

$$-6(0) + 7y = 14$$

$$7y = 14$$

$$y = 2$$

y-intercept:  $(0, 2)$

$$y = 0$$

$$x = 0$$

2. [Challenge] Determine the intercepts of the line  $-ax + by = 14$ .

x-intercept: the y-coordinate value is 0:

$$-ax + b(0) = 14$$

$$-ax = 14$$

$$x = -14/a$$

x-intercept:  $(-14/a, 0)$

y-intercept: the x-coordinate value is 0:

$$-a(0) + by = 14$$

$$by = 14$$

$$y = 14/b$$

y-intercept:  $(0, 14/b)$

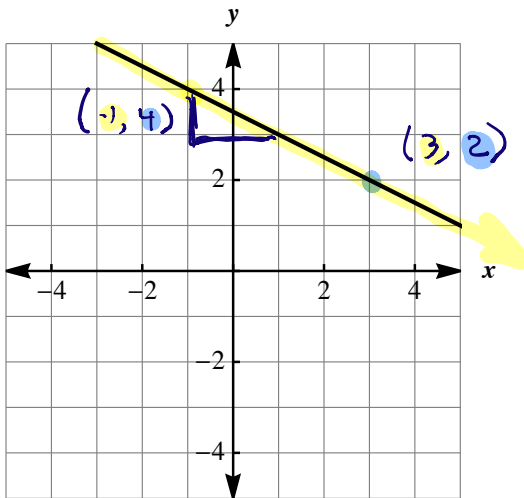
$$y = 0$$

$$x = 0$$

### Section 4: Slope from graph (KA link)

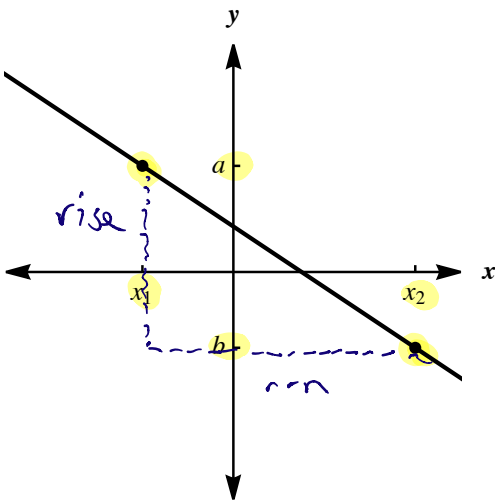
1. What is the slope of the line?  $m = \underline{\hspace{2cm}}$

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 4}{3 - (-1)} = \frac{-2}{4} = -\frac{1}{2}$$



2. [Challenge] What is the slope of the line?  $m = \underline{\hspace{2cm}}$

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



### Section 5: Slope from two points (KA link)

1. What is the slope of the line through  $(-2, -3)$  and  $(7, 13)$ ?  $m = \underline{\hspace{2cm}}$

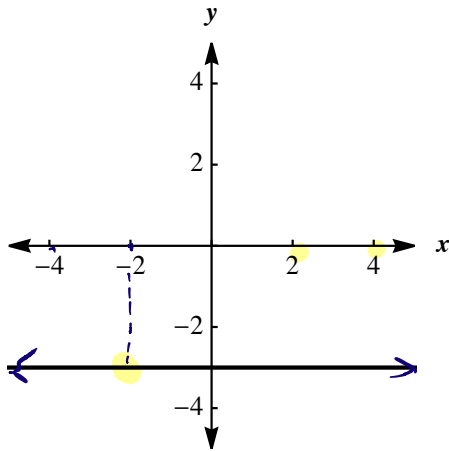
$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{13 - (-3)}{7 - (-2)} = \frac{16}{9}$$

2. [Challenge] What is the slope of the line through  $(-2, \pi)$  and  $(\pi, 2)$ ?  $m = \underline{\hspace{2cm}}$

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - \pi}{\pi - (-2)} = \frac{2 - \pi}{\pi + 2} = \frac{2 - \pi}{2 + \pi}$$

## Section 6: Horizontal and vertical lines (KA link)

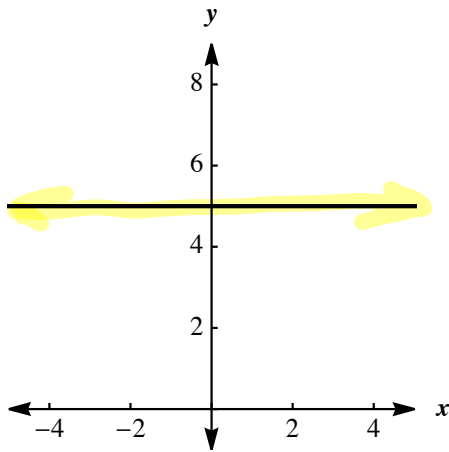
1. What is the equation of the horizontal line through  $(-2, -3)$ ?



$$y = -3$$

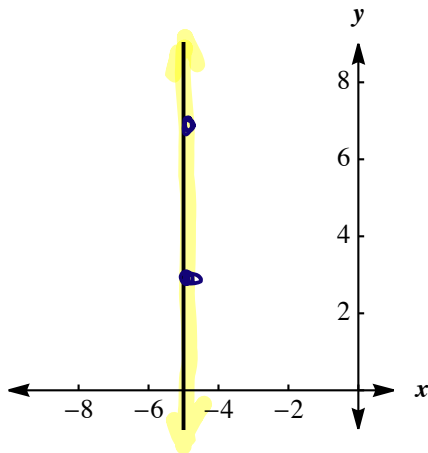
2. What is the slope of the line  $y = 5$ ?

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 5}{x_2 - x_1} = \frac{0}{x_2 - x_1} = 0$$



3. [Challenge] What is the slope of the line  $x = -5$ ?

$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_2 - y_1}{-5 - (-5)} = \frac{y_2 - y_1}{0} = \text{Undefined}$$



$$m \neq \infty$$