

Algebra RH

Graphing Linear Equations Review

Vocabulary:

| | | | |
|-------------------|--------------|-------------|---------------------|
| coordinate plane | y-coordinate | x-intercept | perpendicular |
| x-axis (abscissa) | ordered pair | y-intercept | opposite reciprocal |
| y-axis (ordinate) | quadrants | slope | domain |
| x-coordinate | function | parallel | range |

What should I be able to do?

- Know and understand the definition of a function and be able to determine if a set of ordered pairs, mapping diagram, table of values or a graph represents a function.
- Graph linear equations using 3 methods (table of values method, intercept method, slope-intercept method)
- Determine algebraically if a point is a solution to an equation
- Graph horizontal and vertical lines
- Find the slope of a line from a graph (rise/run)
- Determine the slope of a line using the slope formula
- Associate a line with a positive slope, negative slope, zero slope or undefined slope
- Determine if lines will intersect, be parallel or perpendicular
- Identify the slope and y-intercept when an equation is written in $y = mx + b$ form
- Write the equation of a line in slope-intercept and point-slope form given a graph or written information
- Graph a linear function with a restricted domain and range

Equations and Formulas

$x = a$ (equation of a vertical line)
 $y = b$ (equation of a horizontal line)

$y = mx + b$ (slope-intercept form of a linear equation)
 $y - y_1 = m(x - x_1)$ (point-slope form of a linear equation)

$$m = \frac{y_2 - y_1}{x_2 - x_1} \text{ or } m = \frac{\text{rise}}{\text{run}} \text{ or } m = \frac{\Delta y}{\Delta x} \text{ (slope formula)}$$

Practice Problems

Graph the following linear equations using a table of values.

1. $y - 2 = x$ 2. $y - 3x = -4$ #2, use the domain $[-2, 5]$

$y = x + 2$

| x | y |
|----|---|
| -2 | 0 |
| -1 | 1 |
| 0 | 2 |
| 1 | 3 |
| 2 | 4 |

$y = 3x - 4$ no arrows

| x | y |
|----|-----|
| -2 | -10 |
| -1 | -7 |
| 0 | -4 |
| 1 | -1 |
| 2 | 2 |
| 3 | 5 |
| 4 | 8 |
| 5 | 11 |

Graph the following linear equation using the intercept method.

3. $\frac{2(x - 2y - 6)}{2} = \frac{0}{2}$

$x - 2y - 6 = 0$

$x - 2y = 6$

x int: $\frac{C}{A} = \frac{6}{1} = 6$

y int: $\frac{C}{B} = \frac{6}{-2} = -3$

or

$2x - 4y - 12 = 0$

$2x - 4y = 12$

x int: $\frac{C}{A} = \frac{12}{2} = 6$

y int: $\frac{C}{B} = \frac{12}{-4} = -3$

15. Write two equations for any two parallel lines.

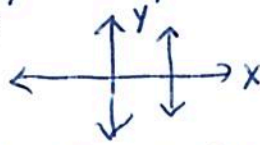
parallel lines have equal slopes
and different y intercepts

$$y = 3x - 5$$

$$y = 3x + 2$$

Write an equation of a line that is parallel to the y-axis

vertical line $x = \#$



$$x = 6$$

Is the x-axis parallel or perpendicular to the y-axis?

perpendicular \rightarrow intersects at a right angle

Determine if $2y - x = 6$ and $-2x - y - 4 = 0$ are parallel, perpendicular or neither.

$$2y = x + 6$$

$$y = \left(\frac{1}{2}\right)x + 3$$

$$-y - 4 = 2x$$

$$-y = 2x + 4$$

$$y = (-2)x - 4$$

slopes of lines are
opposite (signs)
reciprocals

16. Can all three methods of graphing be used to graph $y = \frac{2}{3}x$? Explain.

Is the point $(4.7, 3)$ on the line?

substitute into equation
if it is a solution (true)
the point is on the line

$$3 = \frac{2}{3}(4.7)$$

$$3 \neq 3.1\bar{3}$$

the point is not on the line

No, intercepts
would only
generate one
point.

1. table of values
2. slope/intercept form
3. x intercept
y intercept

17. (a) Graph a graph of a line with an x-intercept of 2 and a y-intercept of -1.

(b) What is the equation of this line?

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{0 - (-1)}{2 - 0} = \frac{1}{2}$$

y intercept
is -1

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

18. Write the equation of a line that passes through the points $(-1, 1)$ and $(3, -1)$.

$$\frac{\Delta y}{\Delta x} = \frac{1 - (-1)}{-1 - (3)} = \frac{2}{-4} = -\frac{1}{2}$$

y intercept

$$y = mx + b$$

$$1 = -\frac{1}{2}(-1) + b$$

$$1 = \frac{1}{2} + b \quad b = +\frac{1}{2}$$

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

19. Write the equation of a line that is perpendicular to the graph of $2x - y = 4$ and has an x-intercept of -4.

$$\text{slope of } 2x - y = 4$$

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

$$y = 2x - 4$$

slopes are opposite reciprocals

opposite reciprocal slope

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

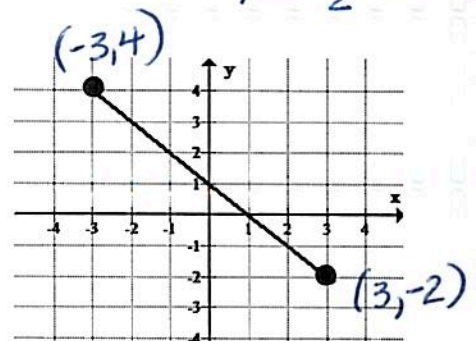
$$y - y_1 = m(x - x_1)$$

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

20. In interval notation, identify the domain and range of the linear equation shown at right.

Domain: $[-3, 3]$

Range: $[-2, 4]$



Graph the following linear equations using the slope-intercept method.

$$4. \frac{x-6}{2} = \frac{2y}{2}$$

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

$$\text{slope (m)} = \frac{1}{2}$$

$$\text{y-intercept (b)} = -3$$

$$5. -x = y$$

$$m = -1$$

$$b = 0$$

$$6. -x - 3y = 0$$

$$-3y = x$$

$$y = -\frac{1}{3}x$$

$$m = -\frac{1}{3} \quad b = 0$$

On the same set of axes, graph the following horizontal and vertical lines.

$$7. x = -2$$

| x | y |
|----|----|
| -2 | -1 |
| -2 | 0 |
| -2 | 4 |

$$8. y = 5$$

| x | y |
|----|---|
| -1 | 5 |
| 2 | 5 |
| 5 | 5 |

$$9. x = 6$$

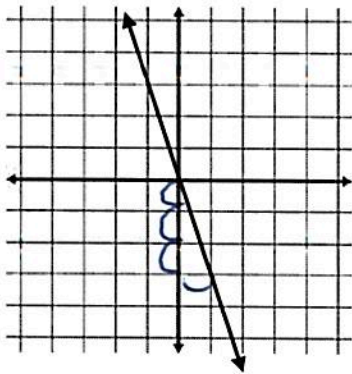
| x | y |
|---|----|
| 6 | -2 |
| 6 | 1 |
| 6 | 3 |

$$10. y = -3$$

| x | y |
|----|----|
| -1 | -3 |
| 0 | -3 |
| 2 | -3 |

11. Write an equation for each of the following lines

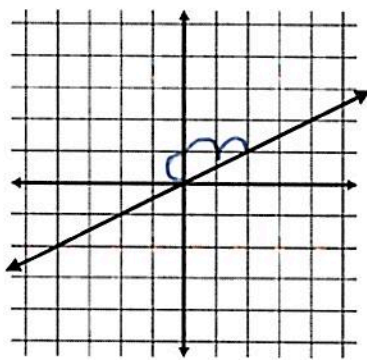
a.



$$m = -\frac{3}{1} \quad b = 0$$

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

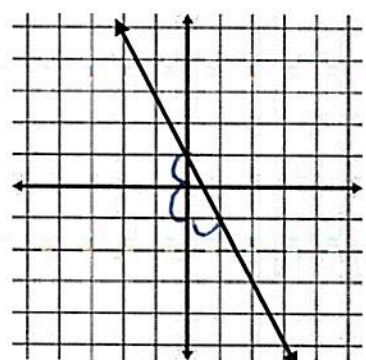
b.



$$m = \frac{1}{2} \quad b = 0$$

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

c.



$$m = -\frac{2}{1} \quad b = 1$$

$$= -2 \quad y = -2x + 1$$

12. Identify the slope and y-intercept of each equation.

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

$$b = 3$$

$$a. 2y - 3x = 6$$

$$2y = 3x + 6$$

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

$$b. y = -5$$

$$m = 0$$

$$b = -5$$

$$c. \left(\frac{1}{2}x\right) = \left(2 - \frac{1}{4}y\right)^4$$

$$2x = 8 - y$$

$$2x - 8 = -y$$

$$-2x + 8 = y$$

$$m = -2$$

$$b = 8$$

13. Find the slope of a line that runs through the following points.

$$x_1, y_1 \quad x_2, y_2$$

$$a. (3, 4) \text{ and } (-2, 14)$$

$$\frac{\Delta y}{\Delta x} = \frac{14 - 4}{-2 - 3} = \frac{10}{-5} = -2$$

$$x_1, y_1 \quad x_2, y_2$$

$$b. (-6, -2) \text{ and } (4, -2)$$

$$\frac{\Delta y}{\Delta x} = \frac{-2 - (-2)}{-6 - (4)} = \frac{0}{-10} = 0$$

14. Find the value of p given the slope of a line is -4 and that line passes through (2, -4) and (6, p)

$$m = \frac{\Delta y}{\Delta x}$$

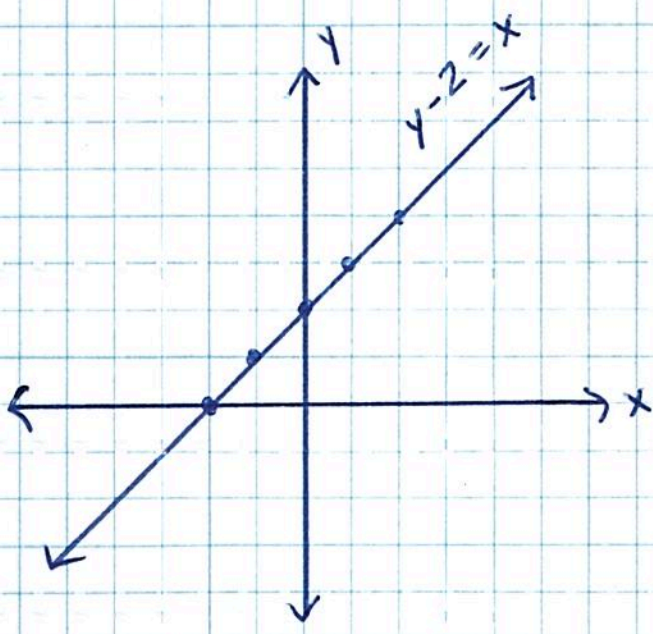
$$-4 = \frac{p - (-4)}{6 - 2}$$

$$-4 = \frac{p + 4}{4}$$

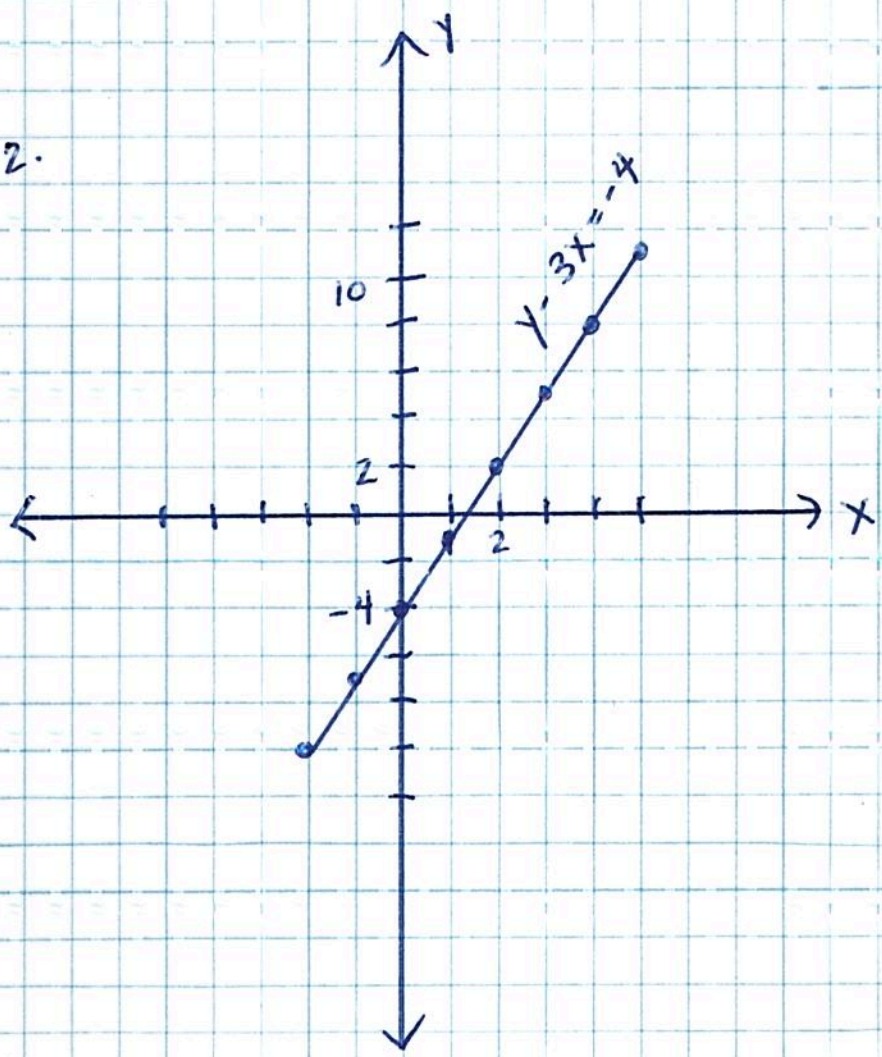
$$-16 = p + 4$$

$$-20 = p$$

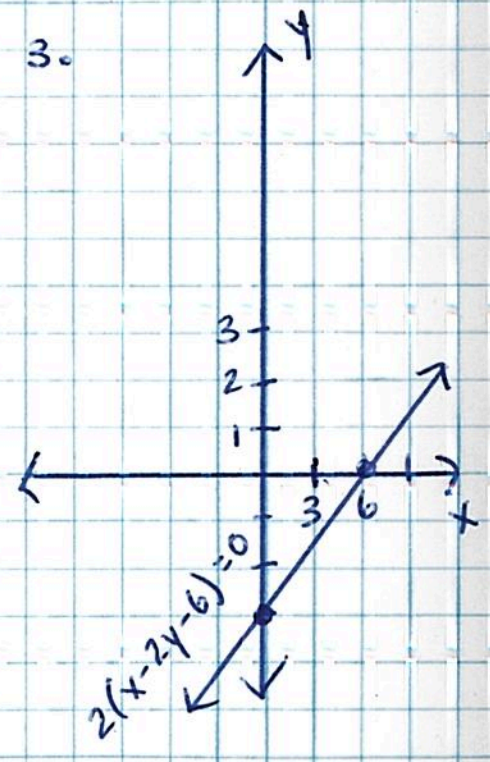
1.



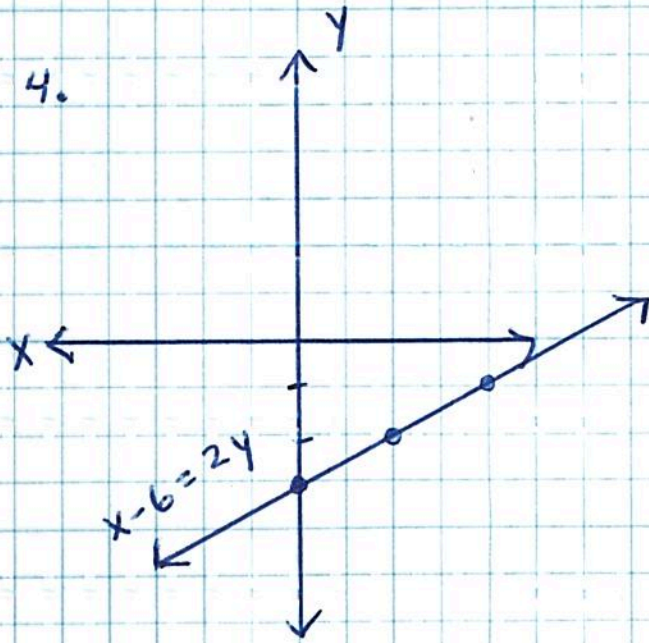
2.



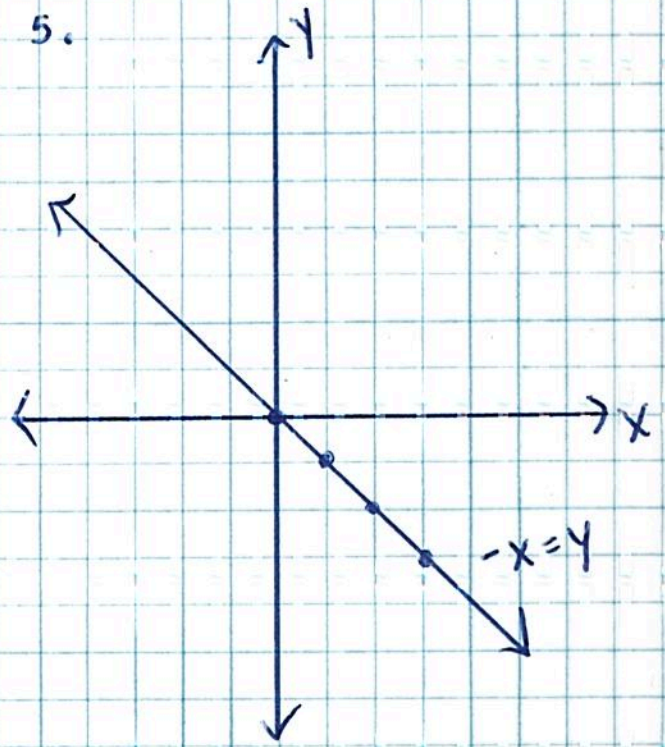
3.



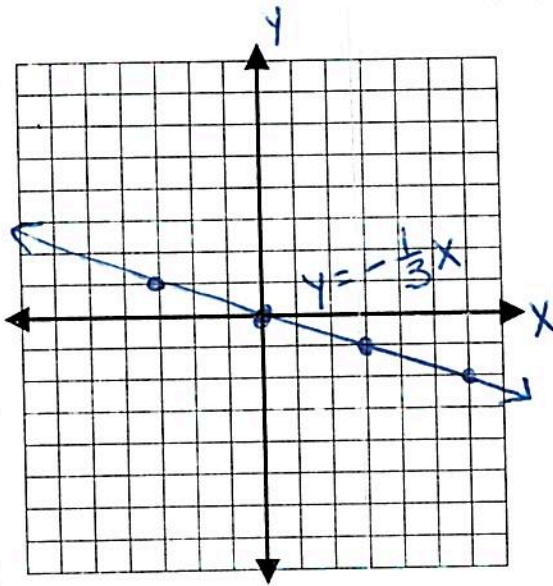
4.



5.



6.



7-10

