P.4 LINES IN THE PLANE

Learning Targets for P.4

1. Calculate Average Rate of Change between 2 points
2. Write and graph an equation of a line in point-slope form
3. Write and graph an equation of a line in slope-intercept form
4. Write and graph an equation of a line in general form
5. Write and graph equations of horizontal and vertical lines
6. Understand how the slopes of parallel lines are related
7. Understand how the slopes of perpendicular lines are related

Slope

The slope of a non-vertical line is given by $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

A vertical line has _____, and a horizontal line has _____ .

Parallel Lines have slopes that are _____ .

Perpendicular Lines have slopes that are _____.

IMPORTANT ♫: You will be best served in this class if you think of slope as a _____.

Equations of a Line

The first equation of a line you used in algebra was probably the *slope – intercept form*: _____
The slope is _____, and the *y*-intercept is _____.

In precalculus, it is actually easier to write the equation of a line in *point – slope form*: _____
The point is _____, and the slope is _____.

♫: To write an equation of a line, all you need is a _____ and the _____.

Another format used to write the equation of a line is called *standard (general) form*: _____

Example 1: Which of the equations above has "*y* written as a function of *x*" ?

Example 2: The point-slope form is written as _____ if you want "*y* written as a function of *x*"

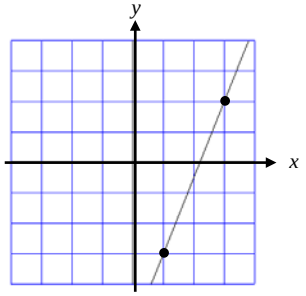
Example 3: For each of the following, write the equation of the line with the given information in point-slope form.

a) Point (–2, 6); Slope = –1

b) Point (1, –3); Slope = $\frac{5}{6}$

c) Points (12, 0) and (6, 3) are on the line.

d)



Example 4: Find the slope-intercept form of the line passing through (–2, 4) and having the following characteristics:

a) Slope of $\frac{7}{16}$

b) Parallel to the line $5x - 3y = 3$

c) Passing through the origin

d) Parallel to the y – axis.

Example 5: Find the general form of the line passing through (1, 3) and having the following characteristics:

a) Slope of $-\frac{2}{3}$

b) Perpendicular to the line $x + 2y = 0$

c) Passing through the point (2, 4)

d) Parallel to the x – axis.

Example 6: Consider the circle of radius 5 centered at (0, 0). Find an equation of the line tangent to the circle at (3, 4).

Example 7: The relationship between Fahrenheit and Celsius temperatures in linear.

a) Use the facts that water freezes at 0° C or 32° F, and water boils at 100° C or 212° F (not your recollection of temperature formulas) to find an equation that relates Celsius and Fahrenheit.

b) Using your equation, find the Celsius equivalent of 80° F and the Fahrenheit equivalent of –10° C.

c) Is there a temperature at which a Fahrenheit thermometer and a Celsius thermometer give the same reading? If so, what is it?

Example 8: Find the value of x or y so that the line through the pair of points has the given slope.

a) Points $(x, 2)$ and $(4, 8)$ with slope = 2.

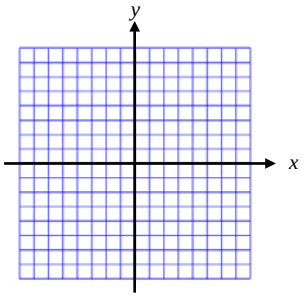
b) Points $(-1, 3)$ and $(4, y)$ with slope = ½ .

Example 9: At this point, we have covered 5 types of linear equations:

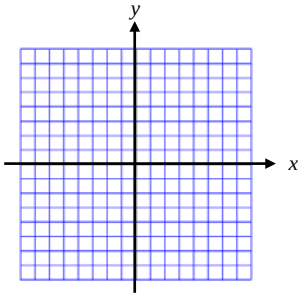
Horizontal Line
Point – Slope Form
Slope – Intercept Form
Standard Form
Vertical Line

Identify which form each equation below is in and graph each linear equation on the graph paper provided.

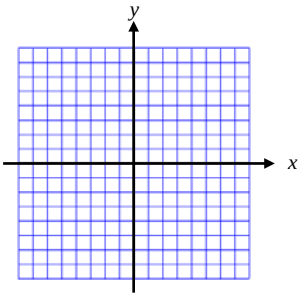
a) $y-2=3(x-1)$



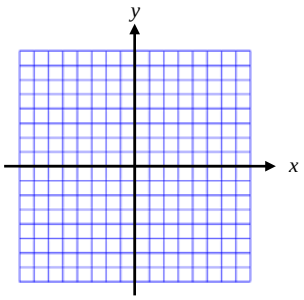
b) $y=3x+4$



c) $2x+3y=6$



d) $y=7$



e) $x=-2$