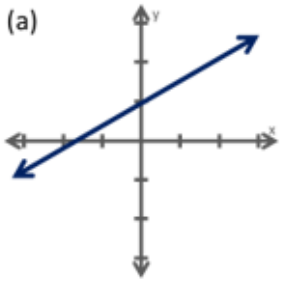
Lesson 11: Graphing Lines

Objectives	Terms
• To identify the slope and y-intercept of a line. • To graph a line using different forms of a linear function. • To use a graph of a line to write the equation of a line. • To write and graph a linear function based on real-world situations.	• Linear function • Slope ○ Types of Slope • Y-intercept • X-intercept • Standard form • Slope-intercept form • Point-slope form

Think about this: What makes an equation linear?

Which of the following examples represents a linear relationship? **Circle** all that apply.

(a)



(b)

x	y
0	3
1	5
2	7
3	9

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

(d) $y = 4x - 2$

Think about: What do your selections have in common?

Definitions:

- **Linear Function**: Linear functions have a constant _____ and a line that doesn't change _____ when graphed in a coordinate plane.
  - **Y-intercept**:
    - Where the graph crosses the _____.
    - As a coordinate point, it is: _____
  - **X-intercept:**
    - Where the graph crosses the _____.
    - As a coordinate point, it is: _____
  - **Slope**: the change of the _____ over the change of the _____. Slope is the behavior of the line.
    - Some other ways to write slope are below.
      - Formula:
      - Words:
      - Symbols:
      - Rate of Change:

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Practice: Use the coordinate points to calculate slope.			

Types of Slopes: When finding the slope of a linear function, there are 4 possibilities:

Positive Slope	**Negative Slope**
Zero Slope	**Undefined Slope**

Think about this: How can we use the graph of a line to write the equation of a line?

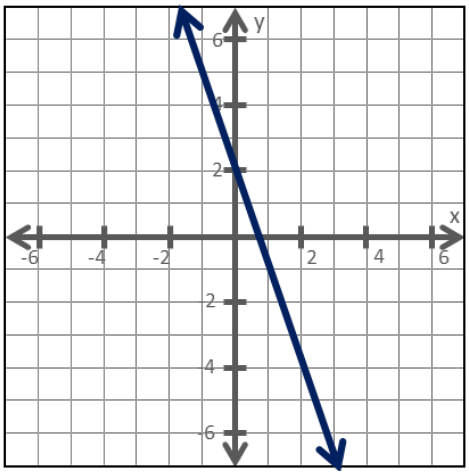
Practice: Use the graph to answer each question.

1. What is the x-intercept of the graph?

2. What is the y-intercept of the graph?

3. What is the slope of the line?

4. What does the slope mean?



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Equations of Linear Functions

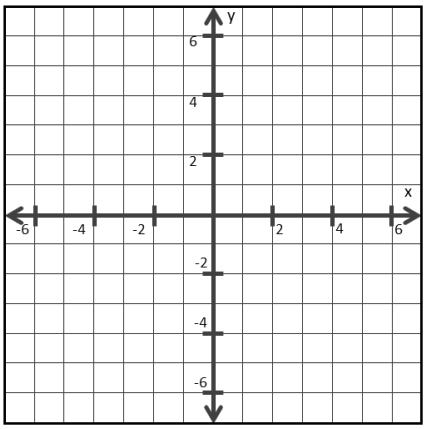
There are three equations we can use to represent a linear function.

- All forms have: x (input) and y (output).
  - **Standard Form**
    - Equation: _____
    - Can use the x-intercept and the y-intercept to graph.
  - **Slope-intercept form**
    - Equation: _____
    - Gives the slope and the y-intercept of the graph.
  - **Point-slope form**
    - Equation: _____
    - Gives the slope and a coordinate point of the graph.

Practice: For each of the following, use the equation to answer each question and to graph the line.

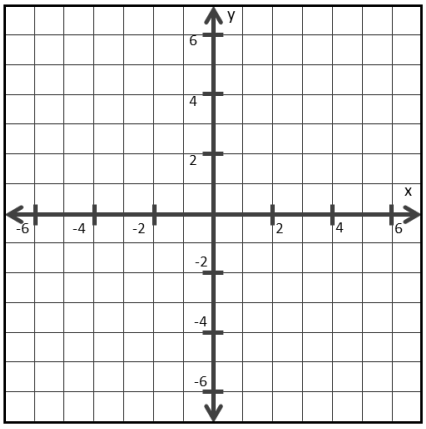
1. Equation: $y = \frac{3}{2}x - 6$

Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



2. Equation: $y - 2 = \frac{1}{2}(x - 6)$

Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



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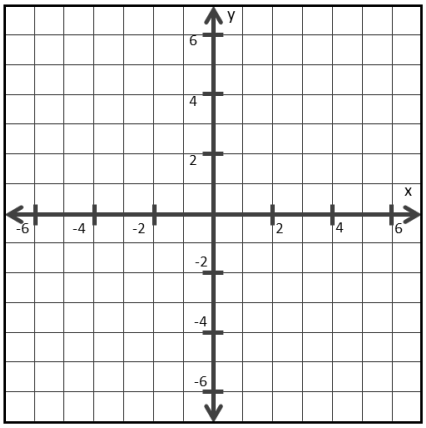
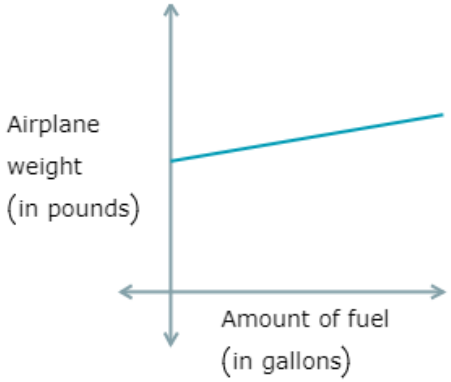
3. Equation: $-2x + y = -4$

Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



4. Suppose that the weight (in pounds) of an airplane is a linear function of the amount of fuel (in gallons) in its tank. When carrying 12 gallons of fuel, the airplane weighs 1978 pounds. When carrying 40 gallons of fuel, it weighs 2160 pounds.



   a. What is the slope of this function?

   b. What does the slope mean in this context?

   c. How much does the airplane weigh if it is carrying 46 gallons of fuel?

Where will you see this in upcoming material?	What are the calculator skills you needed?