In 2.2 we discussed what it means to be a function and we have spent some time looking at the graphs of various functions. In this section we focus strictly on linear functions. We will look at some of the most important ideas with linear functions, their graphs, and take a peek at their applications as a modeling equation for real world situations.

Def: The **slope** of a line is defined to be the ratio of the change in y height of two points on the line to the change in the x distance of those same two points.

Slope can be thought of the steepness of the line.

What will a negative slope indicate? If it is a incline or decline as one looks from L to R.

Is it possible for two different lines to have the same slope? YES

So if the slopes are the same but the lines are different, what is a differentiating trait of the two lines?

y-int.

Def: The of any graph or line, is the point (ordered pair) where the line crosses the y-axis.

Def: The of any graph or line, is the point (ordered pair) where the line crosses the x-axis.

There are many forms that you can write the equation of a line:

Consider:

These are equivalent equations, yet we are probably use to seeing a line expressed in the later form.

The three most common forms of a line are:

1. Slope intercept form:
2. Point Slope form:
3. Standard form of a line:

In this section we will focus on first form.

## Slope-Intercept form of a line

Why is it called the y-intercept form of a line?

YOU CAN SEE SLOPE AND Y PART OF THE Y-INT. AT A GLANCE

Slope intercept form is a very useful way to express the equation of a line while making it immediately observable what the Slope of the line is and where it crosses the y-axis (also called the y-intercept)

Def: **Slope-intercept** form of a line is .

Any line with this form has slope *m*, and y intercept

Ex: For each of the following lines, find the slope, m, and the y intercept (ordered pair)



Ex: Find a linear function whose graph has the given slope and y-intercept.

Ex: Graph the lines using slope-intercept form (using slopes and intercepts)

*Note: important thing to know is 1. Find intercept 2. Use slope to find other points*

Repeat the 4 equations above:

## Applications

Discuss ADA compliant ramps 1:12 slope over 36 in rise. Max 30 ft run.

Discuss Biological models. Population curve for particular animal (exp. Growth curve but in certain region we look at current time of only few months we can approx curve with line.

This is called **linearization of a curve.**

Same can be done in Business or any other disapline where there is a mathematical model happening.

Ex: Fuel Economy: 450 mi. on a 15 ga tank. What is the MPG

Ex: 2.3.68 Running Rate: Ultra marathoner passes the 15-mi point of a race after 2 hr and reaches the 22 mi point 56 min later. Assuming running is at a constant rate, find the speed of the marathoner.