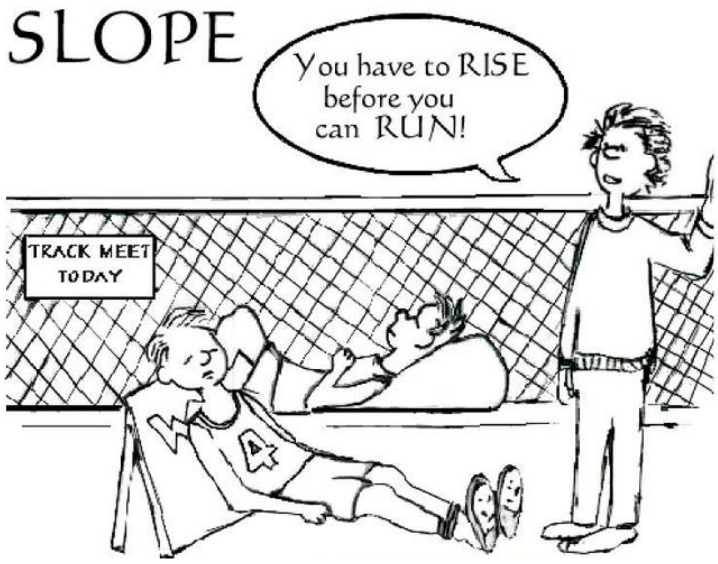
Algebra 1 CP   Name: ______________________________
3.3 Slope



If the rate of change is constant, then it is also called slope.

Slope is the average rate of change. It tells how steep a linear function is when graphed. It is represented by *m*.

(Side note: It is unsure why Americans use the letter m to represent slope. Slope comes from the Latin root “slupan,” for the word “slip.” Schools around the world use different letters, such as s, a, p, and k.)

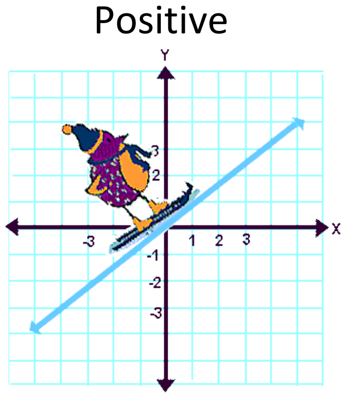
How to Find Slope

$$m = \frac{change\ in\ y}{change\ in\ x}\quad or\quad \frac{\Delta y}{\Delta x}\quad or\quad \frac{y_2 - y_1}{x_2 - x_1}\quad or\quad \frac{rise}{run}$$

(Another side note: Δ is the Greek letter delta, which means change)

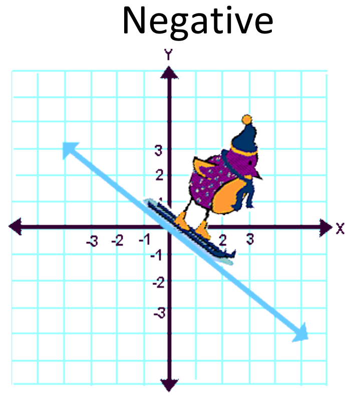
Four Different Types of Slope

Positive



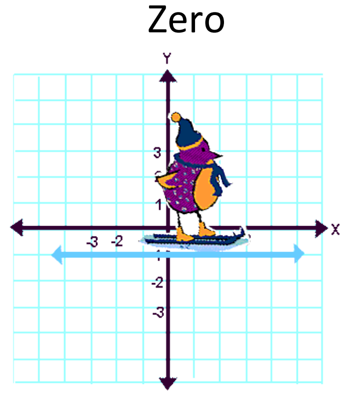
Line rises to right

Negative



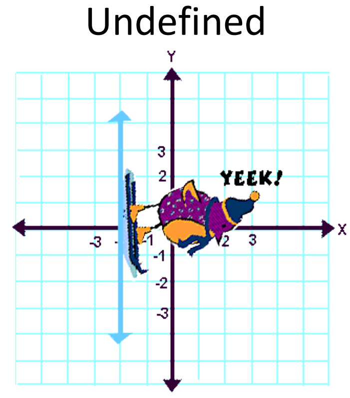
Line rises to left

Zero



Line is horizontal

Undefined

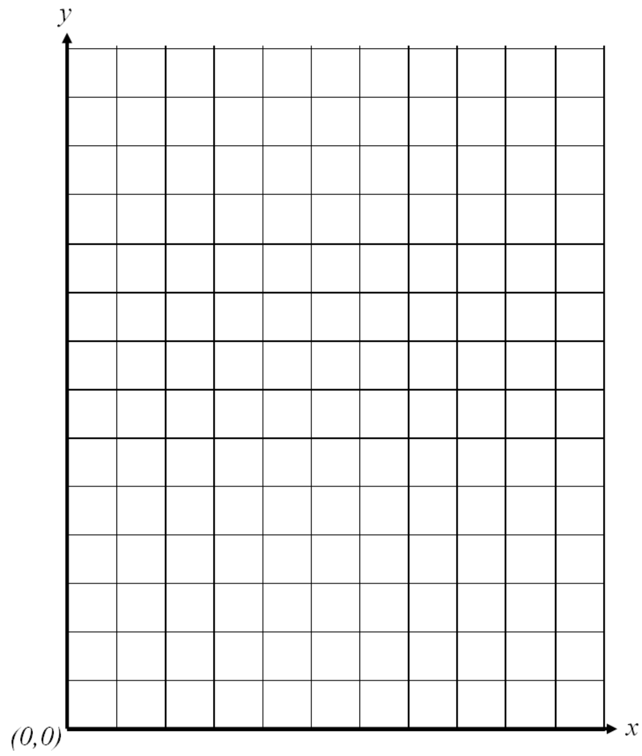


Line is vertical
(Not a function)

Example 1: Finding the Slope from a Graph

The table below shows the relationship between the number of seconds *y* it takes to hear the thunder after a lightning strike and the distance *x* you are from the lightning.

Distance (*x*)	0	1	2	3	4	5
Seconds (*y*)	0	5	10	15	20	25



YOU TRY:

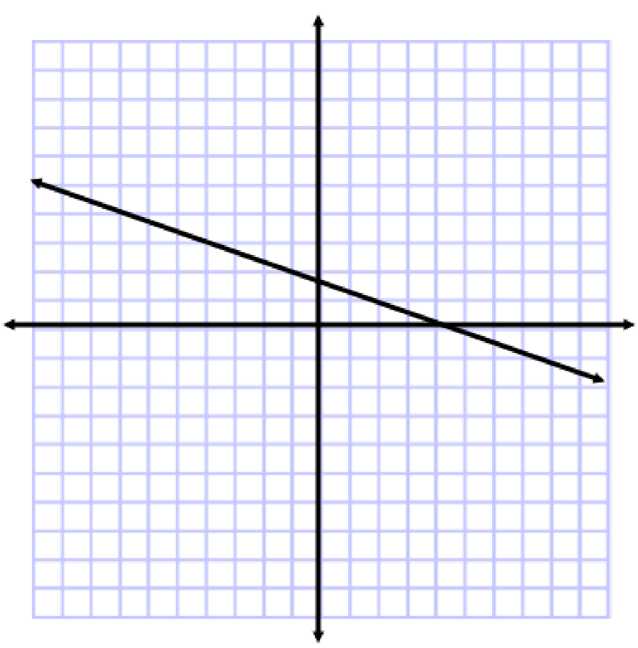
a. Graph the data.

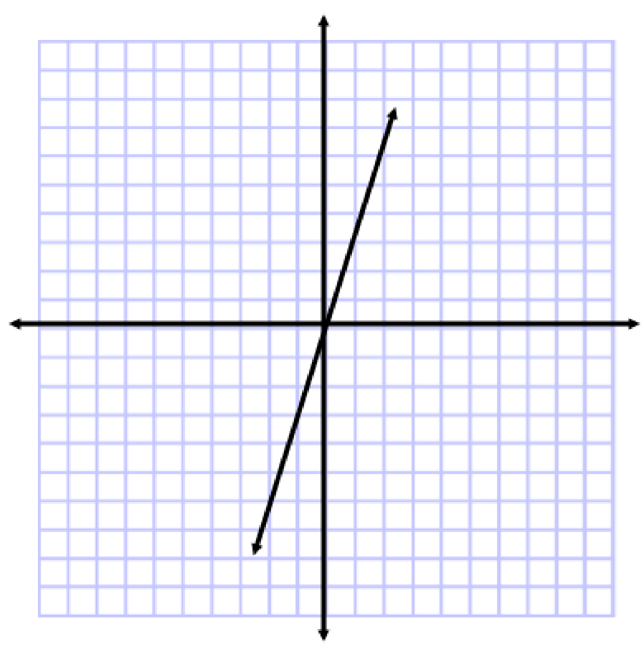
b. Find the slope of the line.
(You can simply read the slope from your graph here.)

$$m = \frac{change\ in\ y}{change\ in\ x} = \frac{rise}{run} =$$

c. Interpret the slope. What does it mean in the context of the problem?

YOU TRY:
Find the rate of change (slope) for each line.





Example 2: Finding the Slope through Given Points

The table below shows the distance *y* Cheryl traveled in *x* minutes while competing in the cycling portion of a triathlon. We know she travels at a constant rate of change. (So, these points would form a line.)

a. Find the slope of this linear function.

Time (min)	45	90	135	180
Distance (km)	5	10	15	20

Pick any two points to calculate the slope.
(5, 45) and (15, 135) are fine

You need to calculate the change in y and the change in x here. It doesn't matter which point is considered #1 or #2. You need to subtract using the same ordering.

$$m = \frac{change\ in\ y}{change\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{135 - 45}{15 - 5} = \frac{90}{10} = \frac{9}{1}$$

b. **YOU TRY:** Interpret the slope. What does it mean in the context of the problem?

YOU TRY:

a. Find the slope of the line that passes through the given points. Distance in inches is x, and distance in miles is y.

Distance on Map (in.)	2	4	6	8
Actual Distance (mi)	40	80	120	160

b. Interpret the slope. What does it mean in the context of the problem?

Example 3: Find the Slope through Two Points

Find the slope of the line that passes through (-2, 0) and (1, 5).

You need to calculate the change in y and the change in x here. It doesn't matter which point is considered #1 or #2. You need to subtract using the same ordering.

$$m = \frac{change\ in\ y}{change\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{1 - -2} = \frac{5}{1 + 2} = \frac{5}{3}$$

YOU TRY:

Find the slope of the line that passes through each pair of points.

a. (-3, 4) and (2, -3)

b. (-3, -1) and (2, -1)

c. (-2, 4) and (-2, -3)

d. (3, 6) and (4, 8)

e. (-4, -2) and (0, -2)

f. (-4, 2) and (-2, 10)

g. (6, 7) and (-2, 7)