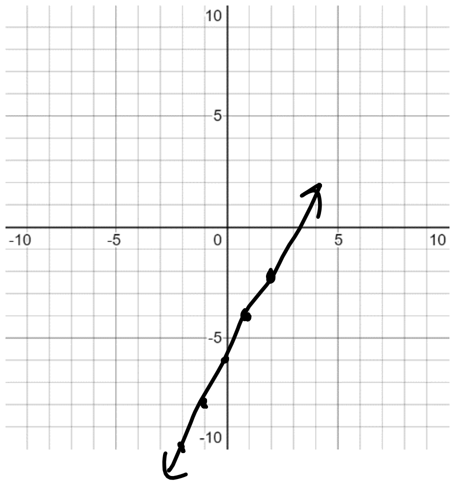
Fundamentals of Graphing and Slope

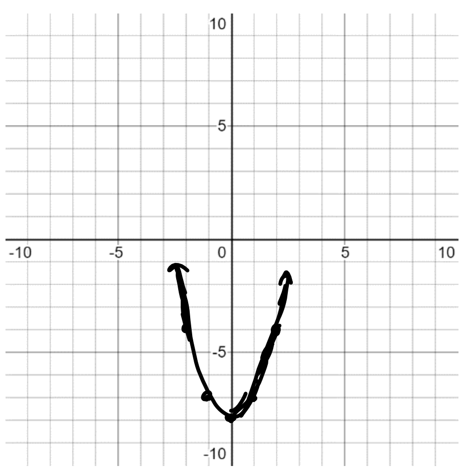
Examples: Graph the equations by creating a table of values and plotting the points.

1. $y = 2x - 6$



X	y=2x-6	
-2	y=2(-2)-6=-10	(-2,-10)
-1	y=2(-1)-6=-8	(-1,-8)
0	y=2(0)-6=-6	(0,-6)
1	y=2(1)-6=-4	(1,-4)
2	y=2(2)-6=-2	(2,-2)

2. $y = x^2 - 8$



X	y=x²-8
-2	$y=(-2)^2-8=-4$
-1	$y=(-1)^2-8=-7$
0	$y=(0)^2-8=-8$
1	$y=(1)^2-8=-7$
2	$y=(2)^2-8=-4$

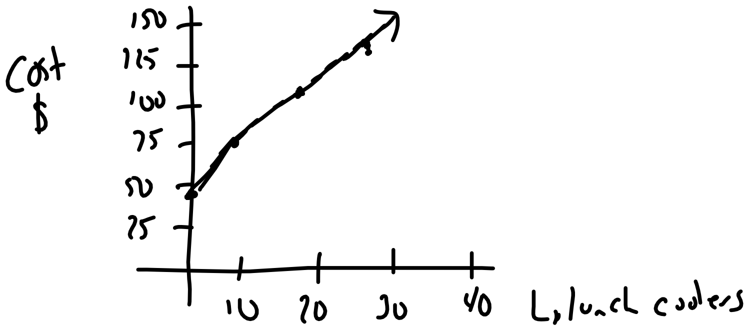
Example: An equation for the total cost, *C*, in dollars for purchasing *L* lunch coolers is $C = 45 + 3L$.

a. Create a table of points that satisfy this equation.

L	C
0	45
10	75
20	105
30	135

45+3( )

b. Create a graph for the equation using your points. Label your graph with units.



Slope – The ratio of vertical change and horizontal change of a line. The increase or decrease in *y* for a unit change in *x*. For a line going through the two distinct points (x_1, y_1) and (x_2, y_2),

$$slope = \frac{rise}{run} = \frac{change\,in\,y}{change\,in\,x} = \frac{y_2 - y_1}{x_2 - x_1}.$$

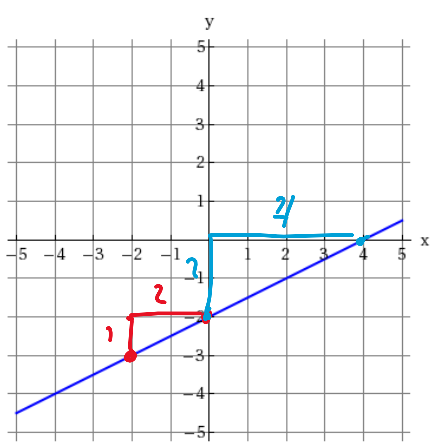
$\frac{\text{numerator}}{\text{denom.}} = \frac{\text{top}}{\text{bottom}}$

Slope also represents the amount the output variable is changing for every unit change in the input variable.

Examples: Find the slope

1. Use the graph to find the slope of the line.

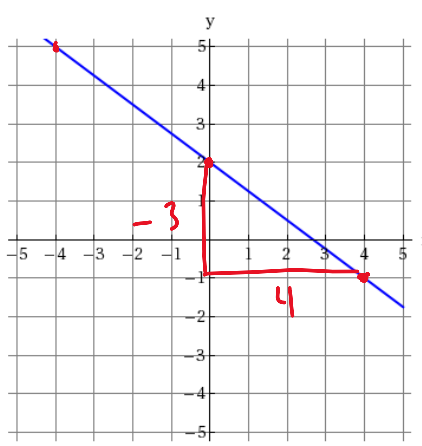
a.



$m = \frac{1}{2}$

$m = \frac{2}{4} = \frac{1}{2}$

b.



$m = \frac{-3}{4}$

2. Use a table of values to find the slope of the line.

x	-4	-1	5	8
y	-24	-16.5	-1.5	6

1 2

1 2

$m = \frac{-16.5 - (-24)}{-1 + (+4)} = \frac{7.5}{3} = 2.5$

$m = \frac{-1.5 + (+16.5)}{5 + (+1)} = \frac{15}{6} = 2.5$

3. Determine whether the table gives all points on a line.

a.

x	6	10	12	22
y	11	16	18.5	31

$m = \frac{18.5 - 11}{12 - 6} = \frac{7.5}{6} = \boxed{1.25}$

$m = \frac{31 - 16}{22 - 10} = \frac{15}{12} = \boxed{1.25}$

yes all on a line

b.

x	-3	2	4	8
y	5.4	3.4	2.8	1

$m = \frac{2.8 - 3.4}{4 - 2} = \frac{-.6}{2} = -.3$

$m = \frac{1 - 5.4}{8 + (+3)} = \frac{-4.4}{11} = -.4$

Not all on a line

Fundamentals of Graphing and Slope Part 2

Linear Equations – An equation is linear if it has a constant rate of change (the slope is constant). That is, for every unit change in the input, the output has a constant amount of change.

Slope-intercept form of a line: $y = mx + b$

Slope – The increase or decrease in the output variable for a unit change in the input variable. In the slope-intercept form of a line, slope is represented by *m*.

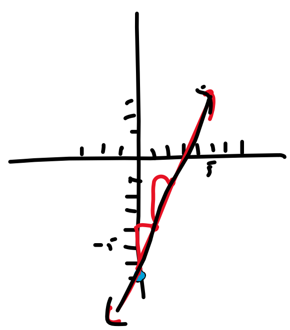
Vertical Intercept – The point where the line crosses the vertical axis. In the slope-intercept form of a line, the vertical intercept is $(0, b)$. This is more frequently called the *y*-intercept.

Examples: Determine slope and *y*-intercept. Sketch using intercept and slope.

1. $y = 3x - 7$

$m = 3 = \frac{3}{1} = \frac{\uparrow 3}{\rightarrow 1}$

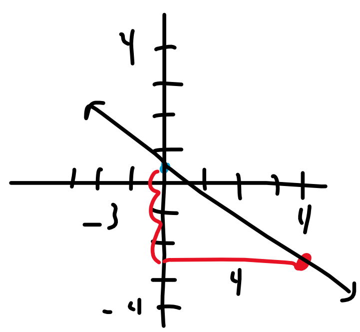
$b = -7 \quad (0, -7)$



2. $y = -\frac{3}{4}x + \frac{1}{2}$

$m = -\frac{3}{4} = \frac{\text{down } 3}{\text{rt } 4}$

$b = \frac{1}{2} \rightarrow \left(0, \frac{1}{2}\right)$

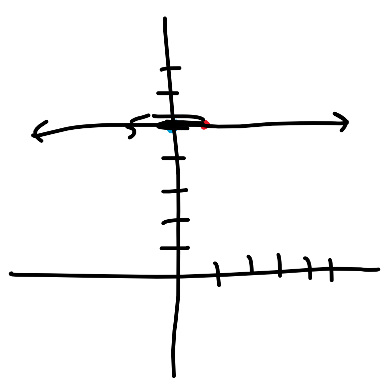


3. $y = 5$

$y = 0x + 5$

$m = 0 = \frac{0}{1} = \frac{\text{up } 0}{\text{rt } 1}$

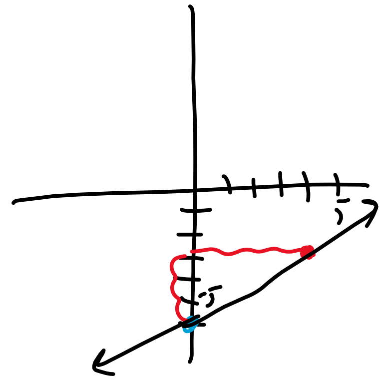
$b = 5 \rightarrow (0, 5)$



4. $y = \frac{3}{4}x - 6$

$m = \frac{3}{4} = \frac{\text{up } 3}{\text{rt } 4}$

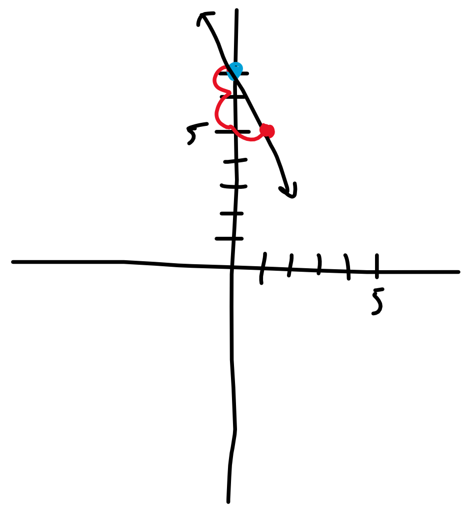
$b = -6 \quad (0, -6)$



5. $y = -2x + 7$

$m = -2 = -\frac{2}{1} = \frac{\text{down } 2}{\text{rt } 1}$

$b = 7 \quad (0, 7)$



Examples: Find the slope of the model and explain its meaning in the situation.

1. The pressure inside a vacuum chamber can be represented by $P = 35 - 0.07s$, where *P* is the pressure in pounds per square inch (psi) of the vacuum chamber after being pumped down for *s* seconds.

$m = -0.07$

$m = \frac{\Delta s}{\Delta x} = \frac{psi}{sec}$

pressure is decreasing by .07 psi/sec

2. The cost for making tacos at a local street stand can be represented by $C = 0.55t + 140.00$, where *C* is the cost in dollars to make tacos at the local street stand when *t* tacos are made.

$m = 0.55$

cost per taco is $0.55 to make

3. Let $C = 4.5p + 1200$ be the total cost in dollars to produce *p* pizzas a day at a local pizzeria

$m = 4.5$ $4.50/pizza to produce

4. Let $D = 0.28t + 5.59$ be the percentage of adults aged 18 years old and over in the United States that have been diagnosed with diabetes, *t* years since 2000.

$m = 0.28$

$m = \frac{D}{t}$ $\frac{\text{\% adults}}{\text{yrs}}$

diagnosis is increasing at 0.28% per year