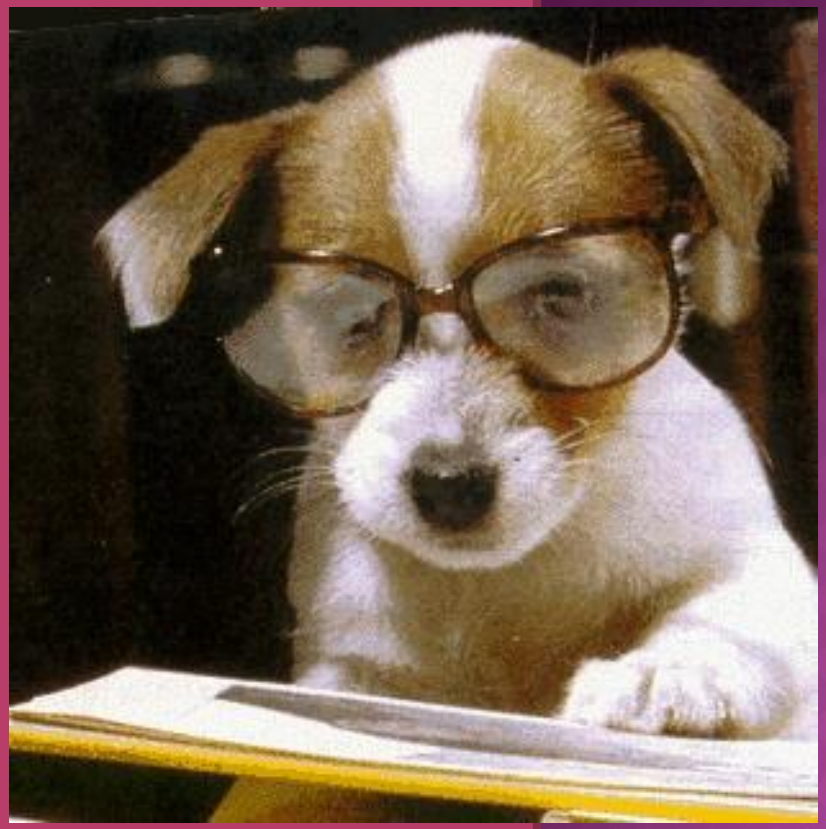
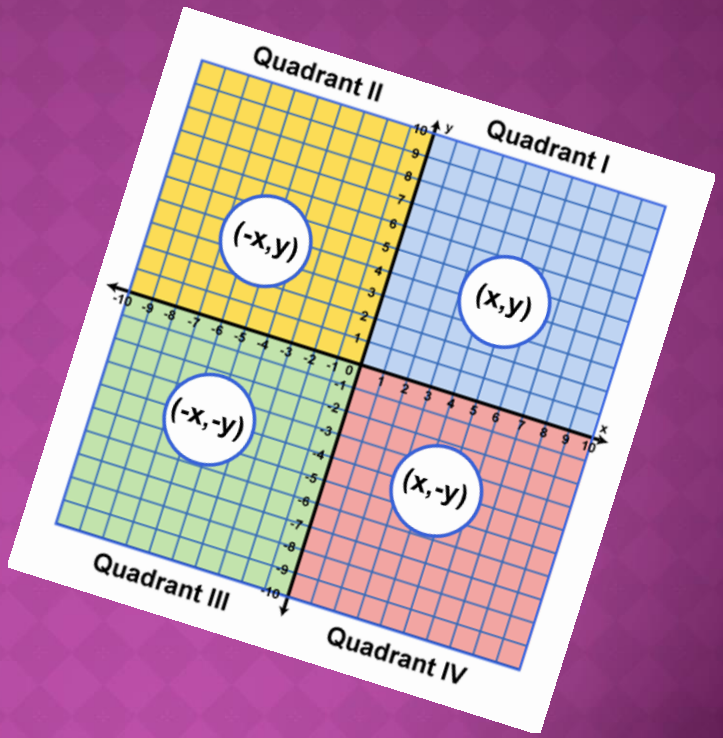


SCIENCE STUDY GUIDE: UNIT 10

The Second Dimension

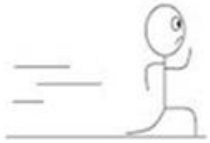


UNIT 10 LESSONS:

- Points on a Coordinate Plane
- Using Points to Solve Problems
- Equations with Two Variables
- Scatter Plots
- Interpreting Scatter Plots

POINTS ON A COORDINATE PLANE

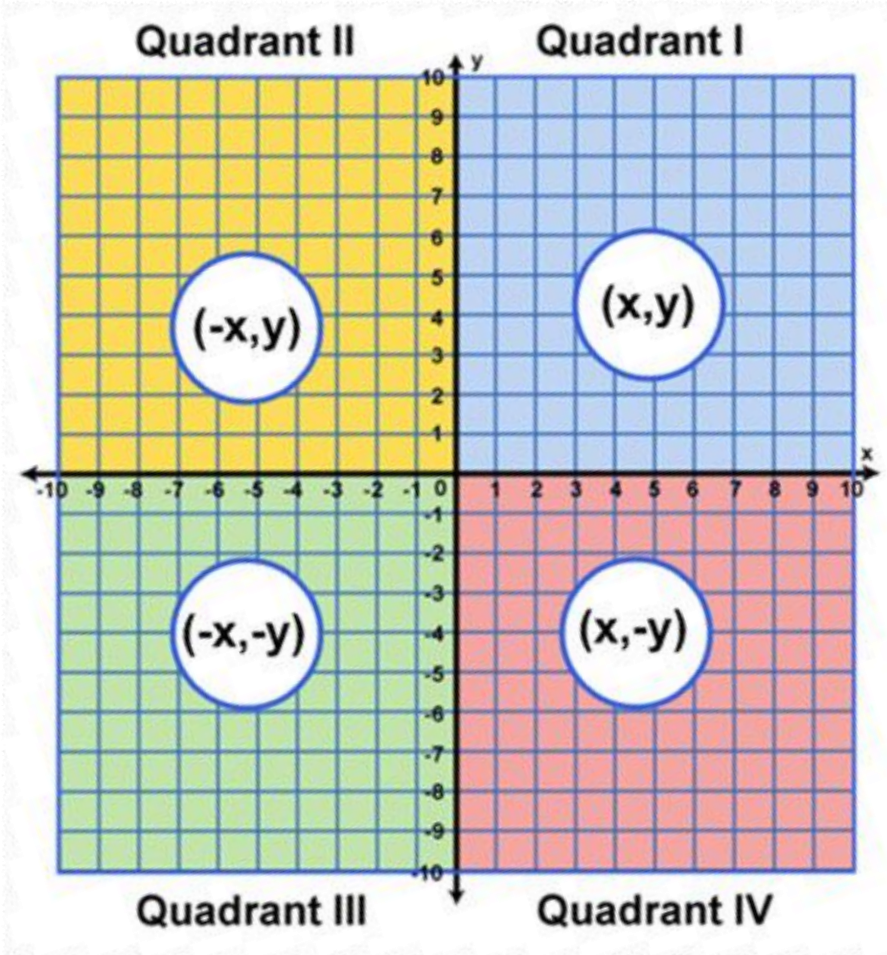
RUN across the X axis before you JUMP up the Y axis



y-coordinate

(2 , 8)

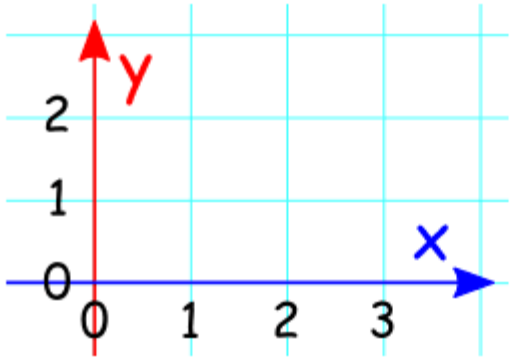
x-coordinate



X and Y Axis

The *left-right* (**horizontal**) direction is commonly called **X**.

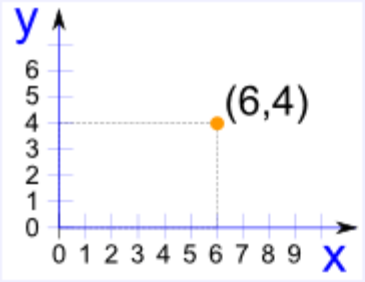
The *up-down* (**vertical**) direction is commonly called **Y**.



Put them together on a graph ...

... and you are ready to go

Example:



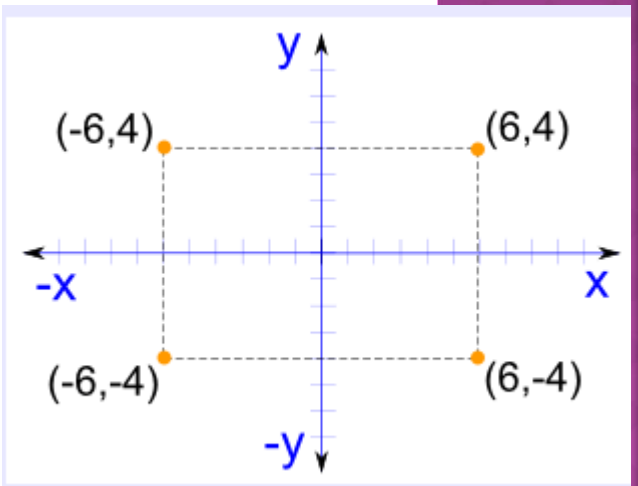
Point **(6,4)** is

6 units across (in the **x** direction), and

4 units up (in the **y** direction)

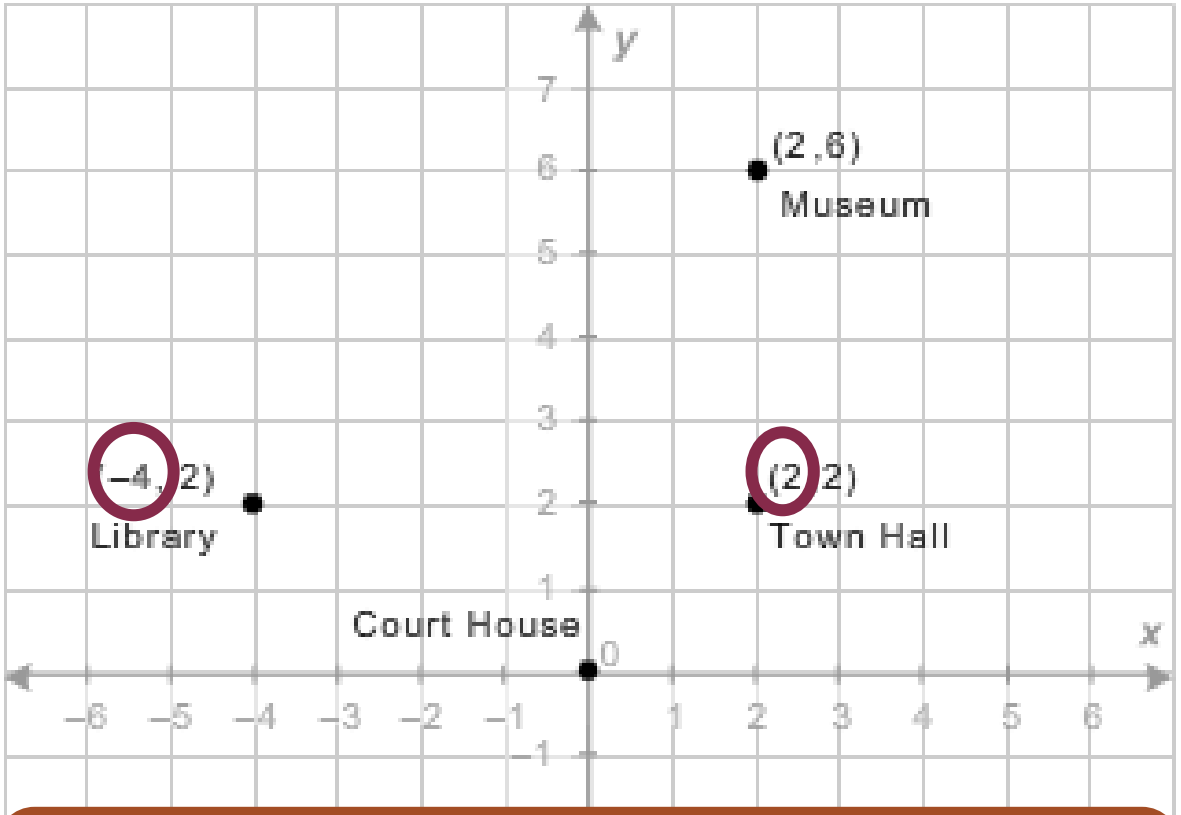
So **(6,4)** means:

Go along 6 and then go up 4 then "plot the dot".



USING POINTS TO SOLVE PROBLEMS

What is the distance between the Town Hall and the Library in city blocks?



Either value can be substituted for x!

1) Counting

2) $d = |x_2 - x_1|$ formula

EQUATIONS WITH TWO VARIABLES

- If an ordered pair (x,y) falls on the line, it is true!
- If it does not, it is not true!!!
- If you plug in an ordered pair and it does not SOLVE the equation, it is not true!

x	y
−2	−6
−1	−4
0	−2
1	0
2	2

$y = 2x - 2$

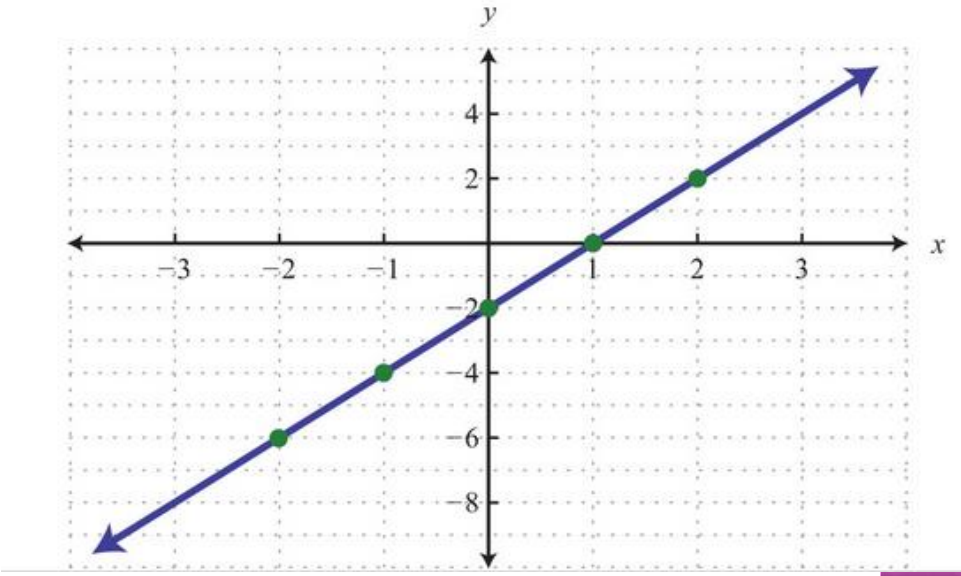
$y = 2(-2) - 2 = -4 - 2 = -6$

$y = 2(-1) - 2 = -2 - 2 = -4$

$y = 2(0) - 2 = 0 - 2 = -2$

$y = 2(1) - 2 = 2 - 2 = 0$

$y = 2(2) - 2 = 4 - 2 = 2$



PLUG IT IN!!! (x,y)

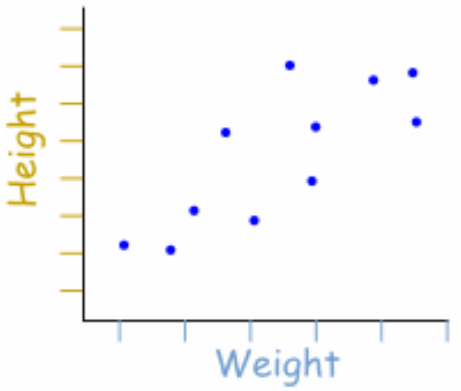
Example 1: Determine whether $(1, -2)$ and $(-4, 1)$ are solutions to $6x - 3y = 12$

Solution: Substitute the x- and y-values into the equation to determine whether the ordered pair produces a true statement.

Check $(1, -2)$	*Check* $(-4, 1)$
$6x - 3y = 12$	$6x - 3y = 12$
$6(1) - 3(-2) = 12$	$6(-4) - 3(1) = 12$
$6 + 6 = 12$	$-24 - 3 = 12$
$12 = 12$ ✓	$-27 = 12$ ×

Answer: $(1, -2)$ is a solution, and $(-4, 1)$ is not.

SCATTER PLOTS



A graph of plotted points that show the relationship between two sets of data.

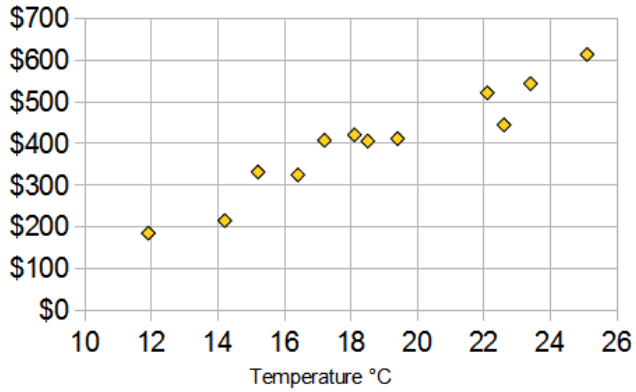
In this example, each dot represents one person's weight versus their height.

(The data is plotted on the graph as "Cartesian (x,y) Coordinates")

The local ice cream shop keeps track of how much ice cream they sell versus the noon temperature on that day. Here are their figures for the last 12 days:

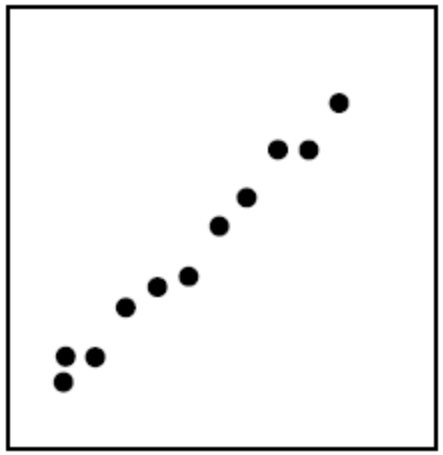
Ice Cream Sales vs Temperature	
Temperature °C	**Ice Cream Sales**
14.2°	$215
16.4°	$325
11.9°	$185
15.2°	$332
18.5°	$406
22.1°	$522
19.4°	$412
25.1°	$614
23.4°	$544
18.1°	$421
22.6°	$445
17.2°	$408

And here is the same data as a Scatter Plot:

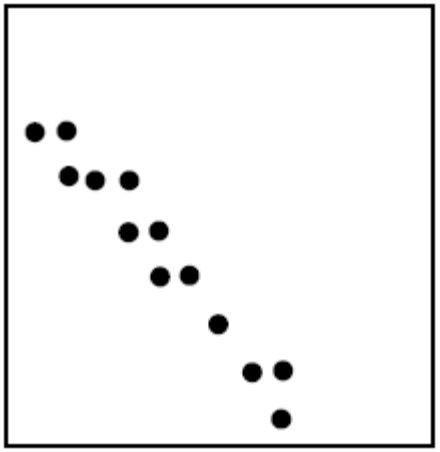


It is now easy to see that **warmer weather leads to more sales**, but the relationship is not perfect.

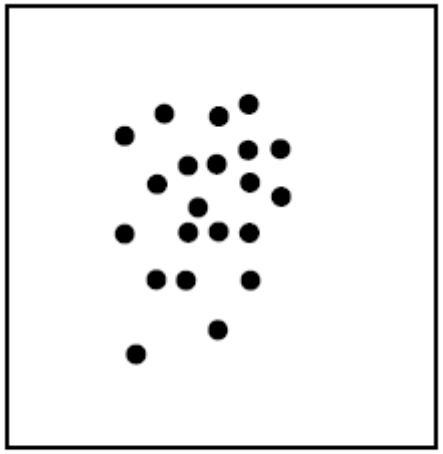
INTERPRETING SCATTER PLOTS



Strong positive correlation



Strong negative correlation



No correlation

INDEPENDENT VS DEPENDENT VARIABLES

Independent Variable = represents a value you control or it affects another

Dependent Variable = a variable whose value changes with changes in the independent variable

The longer you ride your bike, the farther you will travel.

VARIABLES: Time riding and distance traveled

INDEPENDENT VARIABLE: The time spent riding the bike (we can control that)

DEPENDENT VARIABLE: The distance traveled because it depends on how long we ride our bike