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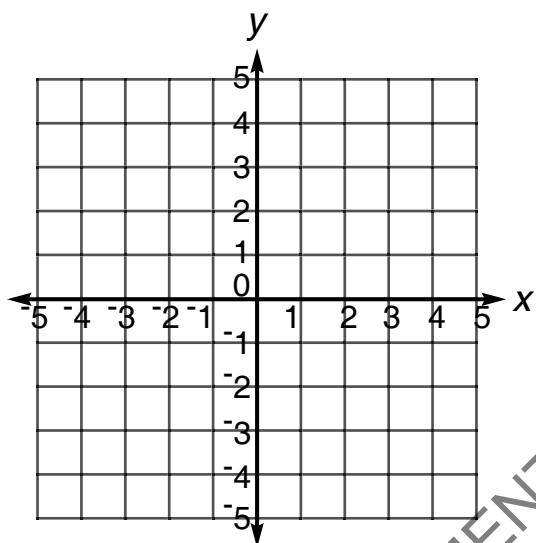
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# COORDINATE PLANE

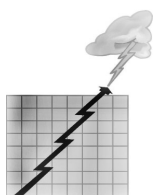
Stand up. Stretch out your arms. You have made a human coordinate plane!

A coordinate plane is a graph. It has two number lines that cross. The  $x$  axis is horizontal like your arms. The  $y$  axis is vertical. It goes up and down like your body.



The axes cross at  $(0, 0)$ , the point of origin. The arrows on the lines mean the lines go on forever.

**The Game: Draw a coordinate graph. Include the  $x$  axis and the  $y$  axis. Include the positive and negative numbers.**



*Lift your arms to shoulder level. Your arms are like which axis?*

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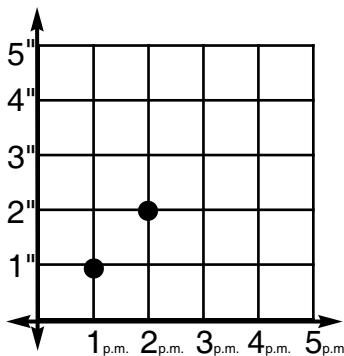


# TELLING THE FUTURE

Look at trends to predict the future.

## Break It Down:

You can predict the future! Not really, but you can have an idea about what might happen.



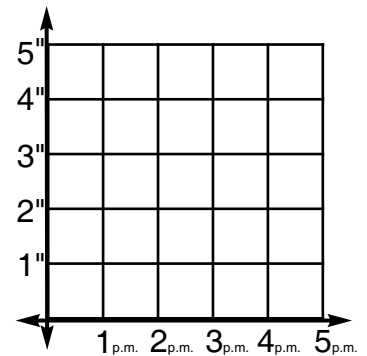
Example:  
 It began to rain at noon.  
 By 1 p.m., it had rained one inch.  
 By 2 p.m., it had rained two inches.

If it keeps raining at the same rate, how much rainfall will there be by 3 p.m.?  
 \_\_\_\_\_

### The Game: Plot the rainfall, graph the line, and fill in the blanks.

It began to rain at noon.  
 By 1 p.m., it had rained one inch.  
 By 2 p.m., it had rained two inches.  
 By 4 p.m., it had rained a total of four inches.

Plot the rainfall. Draw a line through the points.

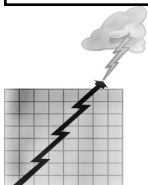


It keeps raining!

What do you think the total rainfall will be at 5 p.m.? \_\_\_\_\_

What do you think the total rainfall will be at 6 p.m.? \_\_\_\_\_

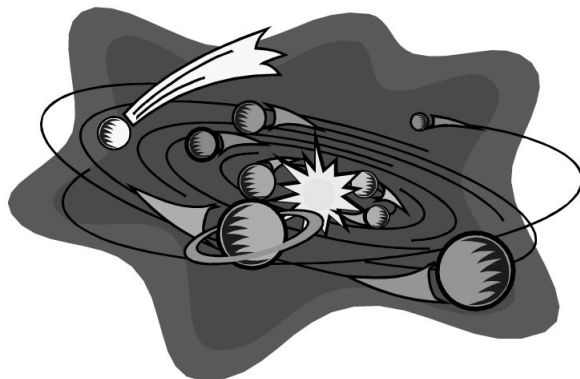
Do you predict that there is a chance of a flood? \_\_\_\_\_



What is another word for guess or foretell?  
 \_\_\_\_\_

# QUADRATIC

Quadratic equations explain about real life, such as the planets' orbits around the sun.



## Break It Down:

A quadratic equation is an equation with one or more variables in it raised to the second power, or squared, and there are no variables in it that have a higher power than that. Look for  $x^2$  or  $y^2$  in it!

Attention! This is the formula for a quadratic equation that we are going to use:

$$y = ax^2 + bx + c$$

( $a$ ,  $b$ , and  $c$  can have any value, except that  $a$  cannot be 0.)

Examples of quadratic equations:

$$0 = 2x^2 + 5x + 3$$

$$x^2 + 3x + 5 = 0$$

$$3x^2 - 4x + 3 = 0$$

$$-5x^2 - 2x + 3 = 7$$

This is a quadratic equation too:

$$0 = x^2 - 2x$$

Don't be tricked!  $a = 1$ ,  $b = -2$ , and  $c = 0$

**The Game: Circle the  $x^2$  in each quadratic equation.**

$$y = ax^2 + bx + c$$

$$-5x^2 - 2x + 3 = 7$$

$$0 = 2x^2 + 5x + 3$$

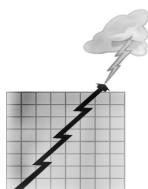
$$0 = x^2 - 2x$$

$$y = 1x^2 + 3x + 2$$

$$3x^2 - 4x + 3 = 0$$

$$0 = 1x^2 + -2x$$

$$x^2 + 3x + 5 = 0$$



What is the formula that we are using for a quadratic equation?

# IN STANDARD FORM

Rewrite quadratic equations in standard form.



**Break It Down:**

$$y = ax^2 + bx + c$$

Change to standard form. →

Find  $a$ . →

Find  $b$ . →

Find  $c$ . →

$$y = x^2 + 2$$

$$y = x^2 + 0x + 2$$

$$a = 1$$

$$b = 0$$

$$c = 2$$

Change to standard form. →

Find  $a$ . →

Find  $b$ . →

Find  $c$ . →

$$-3x^2 + x + 1$$

$$y = -3x^2 + x + 1$$

$$a = -3$$

$$b = 1$$

$$c = 1$$

**The Game: Fill in the blanks.**

Change to standard form. →

Find  $a$ . →

Find  $b$ . →

Find  $c$ . →

$$x^2 - 1$$

$$y = 1x^2 + 0x + \underline{\hspace{2cm}}$$

$$a = 1$$

$$b = 0$$

$$c = \underline{\hspace{2cm}}$$

Change to standard form. →

Find  $a$ . →

Find  $b$ . →

Find  $c$ . →

$$y = x^2 - 2x$$

$$y = \underline{\hspace{2cm}}x^2 - 2x + \underline{\hspace{2cm}}$$

$$a = 1$$

$$b = -2$$

$$c = \underline{\hspace{2cm}}$$



*Does a quadratic equation have a constant term?*

# SHAPE

The shape of the parabola is important.

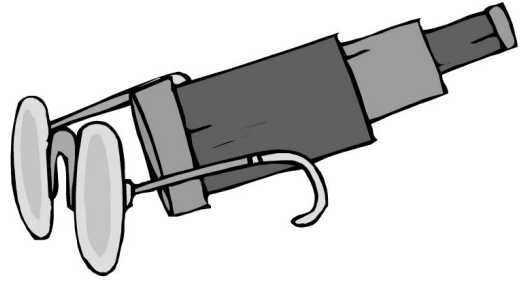
## Break It Down:

The shape tells about the coefficient.

The coefficient is a number that is multiplied by a letter (variable).

Examples:

$$\begin{array}{ll} 2 \text{ is the coefficient of } x^2. \rightarrow & 2x^2 \\ -2 \text{ is the coefficient of } x^2. \rightarrow & -2x^2 \end{array}$$



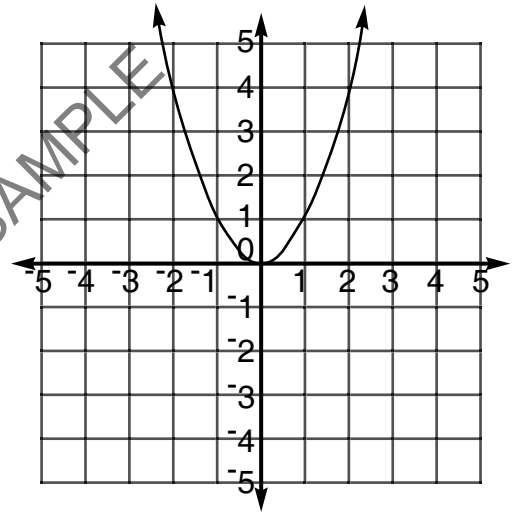
## $x^2$ or $1x^2$

This parabola opens upward.

The coefficient is positive.

The coefficient is 1.

Does the U-shaped parabola look like a cup or a cap? \_\_\_\_\_



The left half of this parabola is the mirror image of the right half. The parabola is vertical, and is symmetrical about the y-axis, so it is an even function.

**The Game: Underline the coefficients of  $x^2$ .**  
**Write P for POSITIVE or N for NEGATIVE.**

$2x^2$  \_\_\_\_\_

$1x^2$  \_\_\_\_\_

$-5x^2$  \_\_\_\_\_

$4x^2$  \_\_\_\_\_

$6x^2 + 3$  \_\_\_\_\_