Name: ______________________________ Date: _____________

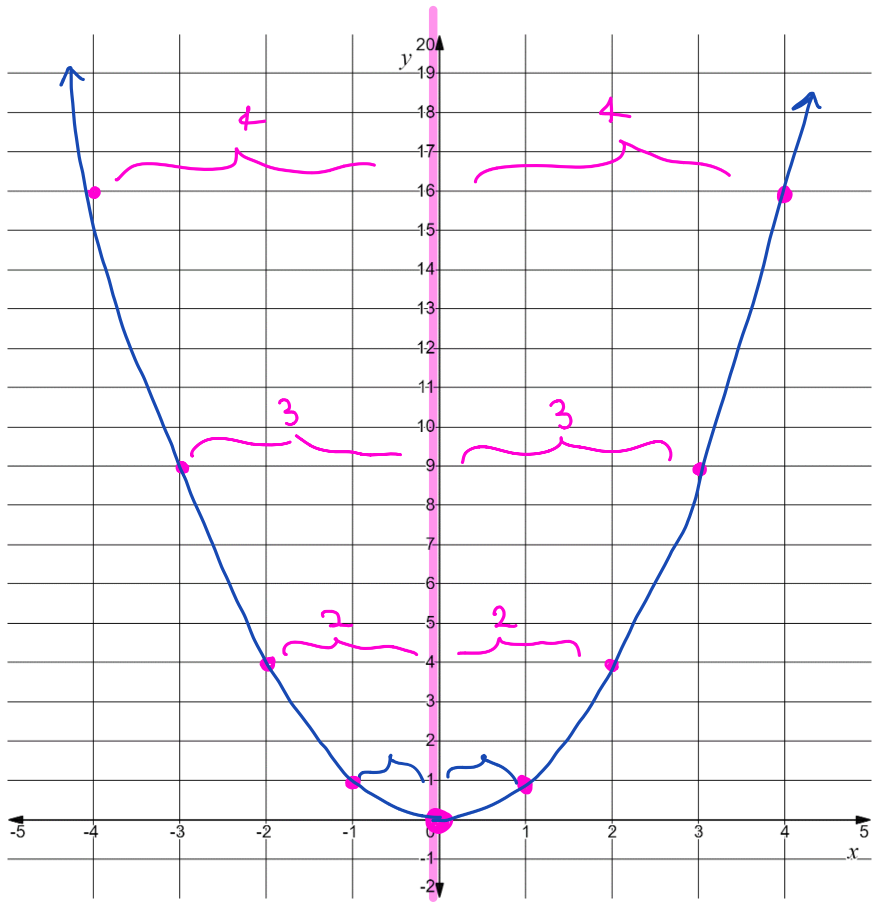
A quadratic relationship is one that has a degree of 2.

The standard form of a quadratic function is $y = ax^2 + bx + c$.

The "basic" quadratic function is $y = x^2$. Complete the table of values and then graph the function.

x	-4	-3	-2	-1	0	1	2	3	4
y	16	9	4	1	0	1	4	9	16

This shape is called a



Graph features:

- Vertex is the middle of your parabola.
  - your mirror point
  x y
  (0, 0)
- x-intercept is where you cross or touch the x-axis
  horizontal
  (0,0)
- y-intercept is where you cross the y-axis
  vertical
  (0,0)
- Axis of symmetry mirror that runs through the vertex
  $x = 0$

Assignment p. 181 #1 – 5 Quiz Next Day!

Example Consider $y = x^2 + 4x + 3$.

- From this form of the equation we know the

Standard form – we know the y-intercept $(x=0)$

$y = (\cancel{0})^2 + 4(\cancel{0}) + 3$

$y = 3$

- If we factor this equation, we will know the

$\underline{3} \times \underline{1} = 3$

$\underline{3} + \underline{1} = 4$

$y = \underline{x^2 + 3x} + \underline{x + 3}$

$= x(x+3) + (x+3)$

$= (x+3)(x+1)$

$0 = (x+3)(x+1)$

$x+3=0$ or $x+1=0$

$-3 \quad -3 \qquad -1 \quad -1$

$x = -3 \qquad x = -1$

– we can find the x-intercepts $(y=0)$

- We can find the vertex by

by finding the distance between the x-int. and cutting it in half.

- The axis of symmetry

$x = -2$

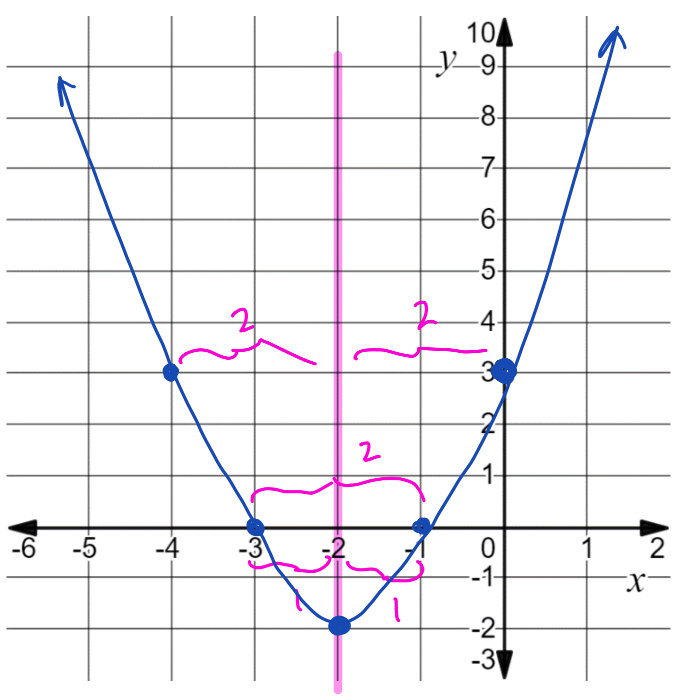
$y = (-2)^2 + 4(-2) + 3$

$= 4 - 8 + 3$

$= -4 + 3$

$= -1$

vertex $(-2, -1)$



x	-5	-4	-3	-2	-1	0	1
y	7	3	0	-1	0	3	7

We are going to use http://www.mathopenref.com/quadraticexplorer.html to explore quadratic functions.

$y = \cancel{ax}^2 + bx + c$

- What happens as a changes?

if a is -ve – frowning
if a is +ve – smiling
- big a value makes it tall & skinny
- small a value makes it wide.

- What happens if $a = 0$?

- not a parabola
- just a line

- What happens as b changes?

- the curve dances

- What happens if $b = 0$?

- the vertex is on the y-axis.

- What happens as c changes?

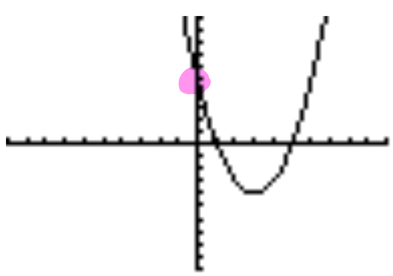
- the y-intercept changes

- What happens if $c = 0$?

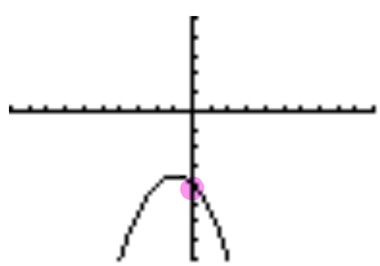
the y-intercept is zero

Example For the graphs below, predict whether a, b, c are positive, negative or zero.

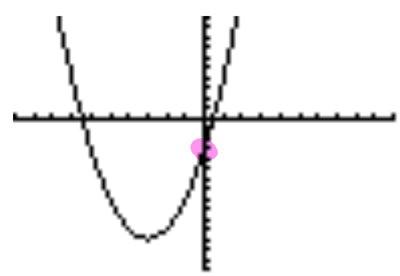
a.



b.



c.



	a.	b.	c.
a	+ve	-ve	+ve
b	+ve (vertex has +ve x value)	-ve	-ve
c	+ve	-ve	-ve.