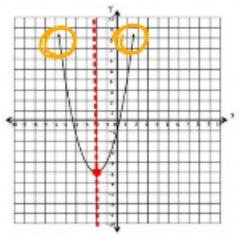
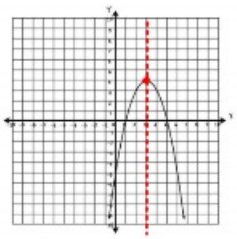
Analyzing Quadratic Graphs

GRAPH A



GRAPH B



Answer the questions given the graphs above.

1. *What is the **axis of symmetry** for Graph A?* $x=-2$
2. *What is the **axis of symmetry** for Graph B?* $x=3$
3. *What is the **vertex** of Graph A?* $(-2,-5)$ *Maximum or Minimum?* min.
4. *What is the **vertex** of Graph B?* $(3,4)$ *Maximum or Minimum?* max.

x-values y-values

5. *Identify the **domain** and **range** of Graph A.*

D: $-\infty \leq x \leq \infty$ all real #s

R: $y \geq -5$

6. *Identify the **domain** and **range** of Graph B.*

D: all real #s

R: $y \leq 4$

7. *Identify the **equation** for Graph A:* a^+ up

WRONG AOS

~~A. $y = x^2 - 4x - 1$~~ ~~C. $y = -x^2 - 4x - 1$~~

B. $y = x^2 + 4x - 1$ ~~D. $y = -x^2 + 4x - 1$~~ a^-

8. *Identify the **equation** for Graph B:* down a^-

a^+

~~A. $y = x^2 - 6x - 5$~~ ~~C. $y = -x^2 - 6x - 5$~~

~~B. $y = x^2 + 6x - 5$~~ D. $y = -x^2 + 6x - 5$ a^+

#7 a) x^2-4x-1

A.O.S. $\rightarrow x=\frac{-b}{2a}$

$x=\frac{4}{2(1)}=\frac{4}{2}$

$x=2$

#8 c) $y=-x^2-6x-5$

$x=\frac{6}{2(-1)}=\frac{6}{2}$

$x=3$

9. $y = x^2 - 3$

$a=1$

$b=0$

$c=-3$ ↳ y-int!

Axis of Symmetry: $x=0$ Vertex: $(0,-3)$ Sketch:

$x=\frac{-b}{2a}$

$x=\frac{0}{2(1)}$

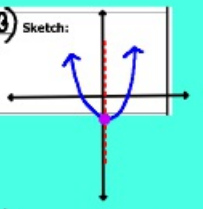
$x=0$

$y=x^2-3$

$=(0)^2-3$

$y=0-3$

$y=-3$



7. $y = -3x^2 - 24x - 42$

$a=-3$

$b=-24$

$c=-42$

Axis of Symmetry: $x=-4$ Vertex: $(-4,6)$ Sketch:

$x=\frac{-b}{2a}$

$x=\frac{24}{2(-3)}$

$x=-4$

$y=-3x^2-24x-42$

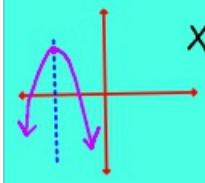
$=-3(-4)^2-24(-4)-42$

$y=-3(16)+96-42$

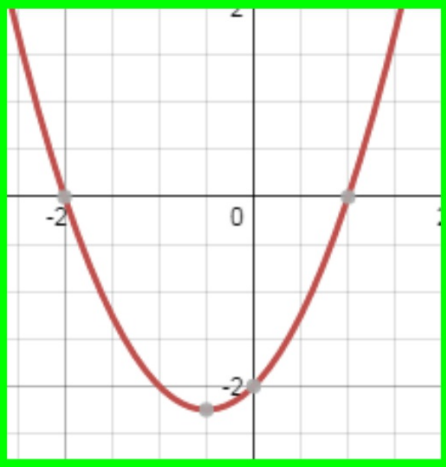
$y=-48+96-42$

$y=48-42$

$y=6$



Example: What is the equation of the graph below?



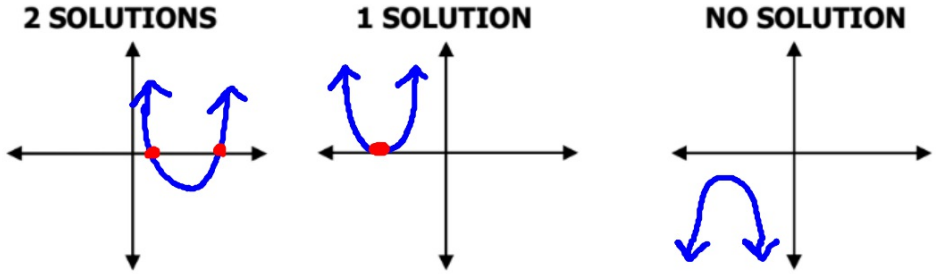
A. $y = -x^2 - 2x + 2$

B. $y = x^2 - x - 2$

C. $y = x^2 + x + 2$

D. $y = x^2 + x - 2$

Topic: Identifying Quadratics Roots	Date:

Main Ideas/Questions	Notes
Definition	The location(s) where the parabola crosses the x- axis
Also called...	x-intercepts, zeros, solutions
Number of Solutions	

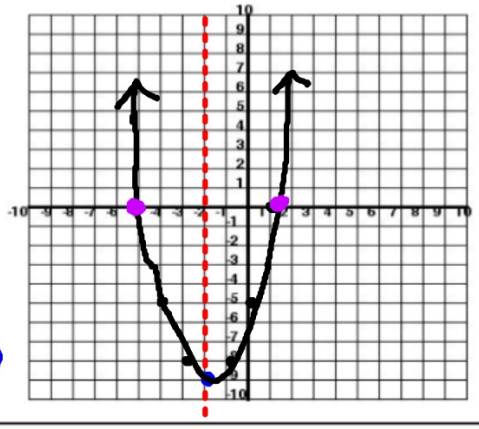
1. $y = x^2 + 4x - 5$

AOS = $x = -2$

Vertex = $(-2, -9)$

Solutions: { -5, 1}

x	y
-5	0
-4	-5
-3	-8
-2	-9
-1	-8
0	-5
1	0



Look for values of x when y = 0.

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

$a=1 \quad b=-2 \quad c=1$

AOS = $x=1$

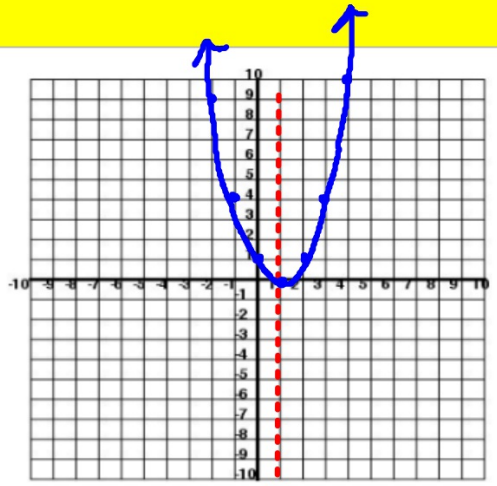
Vertex = $(1, 0)$

$x = \frac{2}{2(1)} = 1$

$y=(1)^2-2(1)+1$

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

x-int.



Solutions: {1}

Look for values of x when y = 0.

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

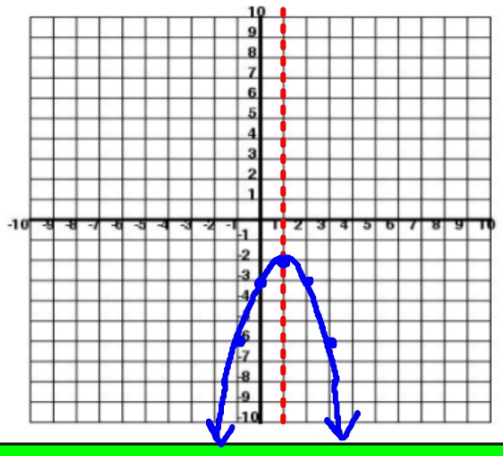
$a=-1 \quad b=2 \quad c=-3$

AOS = $x=1$

Vertex = $(1, -2)$

$$x = \frac{-b}{2a} = \frac{-2}{2(-1)}$$

x	y
-2	-11
-1	-6
0	-3
1	-2
2	-3
3	-6
4	-11



No real roots.

$x=1$

$y=-(1)^2+2(1)-3$

$=-1+2-3$

Look for values of x when y = 0

The Discriminant

Used to determine the number of solutions.

Formula:

$$d = b^2 - 4ac$$

If d > 0, then there are 2 *solutions.*

If d = 0, then there are 1 *solutions.*

If d < 0, then there are 0 *solutions.*

7. $y = x^2 + 5x + 4$

$a=1 \quad b=5 \quad c=4$

$d=(5)^2-4(1)(4)$

$d=9$

2 sol.

8. $y = x^2 - 3x + 10$

$a=1 \quad b=-3 \quad c=10$

$d=(-3)^2-4(1)(10)$

$d=-31$

0 sol.

9. $y = x^2 + 10x + 25$

$a=1 \quad b=10 \quad c=25$

$d=(10)^2-4(1)(25)$

$d=0$

1 sol.

10. $y = 2x^2 - 4x - 3$

11. $y = 4x^2 - 12x + 9$

12. $y = -3x^2 + 5x - 8$

Graphing v. Factoring

Graphing:

The equation needs to be in the form:

$y=ax^2+bx+c$

Graph the equation and identify the roots, aka the x-intercepts, or the zeroes.

Factoring:

The equation needs to be in the form:

$ax^2+bx+c=0$

Factor completely and then set each factor equal to 0. Solve each equation for x.

Main Ideas/Questions	Notes/Examples		
SOLVING QUADRATICS By Factoring	In many cases, we can find the solutions (or roots, zeros, x-intercepts) of a quadratic equation by factoring, rather than graphing. Follow the steps below to find the solutions of the given equation by factoring.		
	❶	Set the quadratic equation equal to 0.	**Given:** $y = x^2 + 3x - 10$
	❷	Factor the left side.	
	❸	Set each factor equal to 0 and solve each factor for x.	
	❹	Write your answer using curly braces.	

1. $x^2 + 4x + 3 = 0$	**2.** $x^2 + 11x + 24 = 0$

5. $x^2 - 10x + 21 = 0$	**6.** $x^2 - x - 20 = 0$

9. $x^2 - 8x = 0$	**10.** $3x^2 + 15x = 0$

13. $x^2 - 64 = 0$	**14.** $x^2 - 25 = 0$

EQUATIONS NOT IN Standard Form

MOVE ➖ FACTOR ➖ SOLVE!

17. $x^2 + 4x = 21$	**18.** $x^2 - 45 = 4x$

21. $11x^2 = x^2 + 8x$	**22.** $16x^2 = 9$