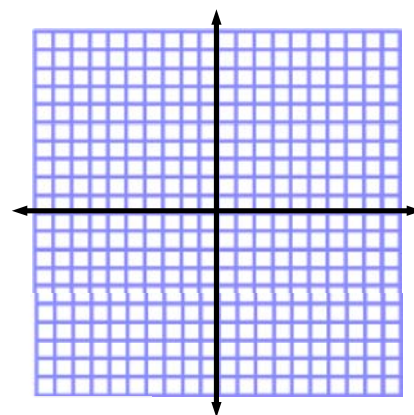


Warm-up 4-2

1. Is $y + x^2 = 3$ quadratic? Explain.

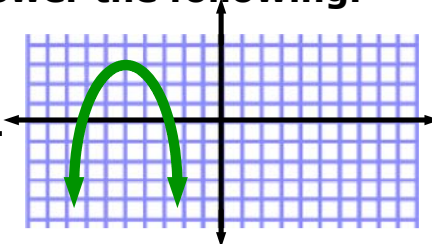
2. Use a table of values to graph $y = -1/2x^2$



Use the graph below to answer the following.

3. Identify the vertex.

4. Find the domain and range.



5. Does the function have a maximum or minimum? What is it?

Warm-up 4-2

1. Is $y + x^2 = 3$ quadratic? Explain.

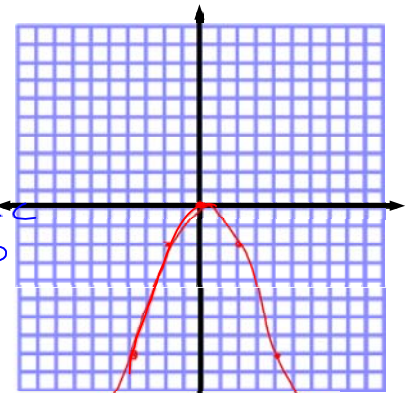
$$y = -x^2 + 3$$

yes, bc it follows the form $y = ax^2 + bx + c$ $a \neq 0$

2. Use a table of values to graph $y = -1/2x^2$

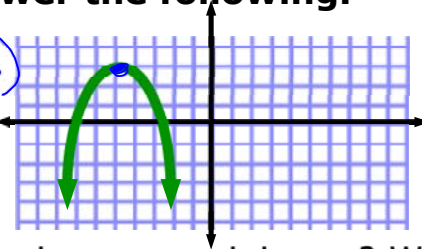
$$y = -\frac{1}{2}(-4)^2 = -\frac{1}{2}(16) = -8$$

$$y = -\frac{1}{2}(-2)^2 = -\frac{1}{2}(4) = -2$$



Use the graph below to answer the following.

3. Identify the vertex. $(-5, 3)$



4. Find the domain and range.

$$D: x \in \mathbb{R}$$

$$R: y \leq 3$$

5. Does the function have a maximum or minimum? What is it?

$$\text{max } (-5, 3)$$

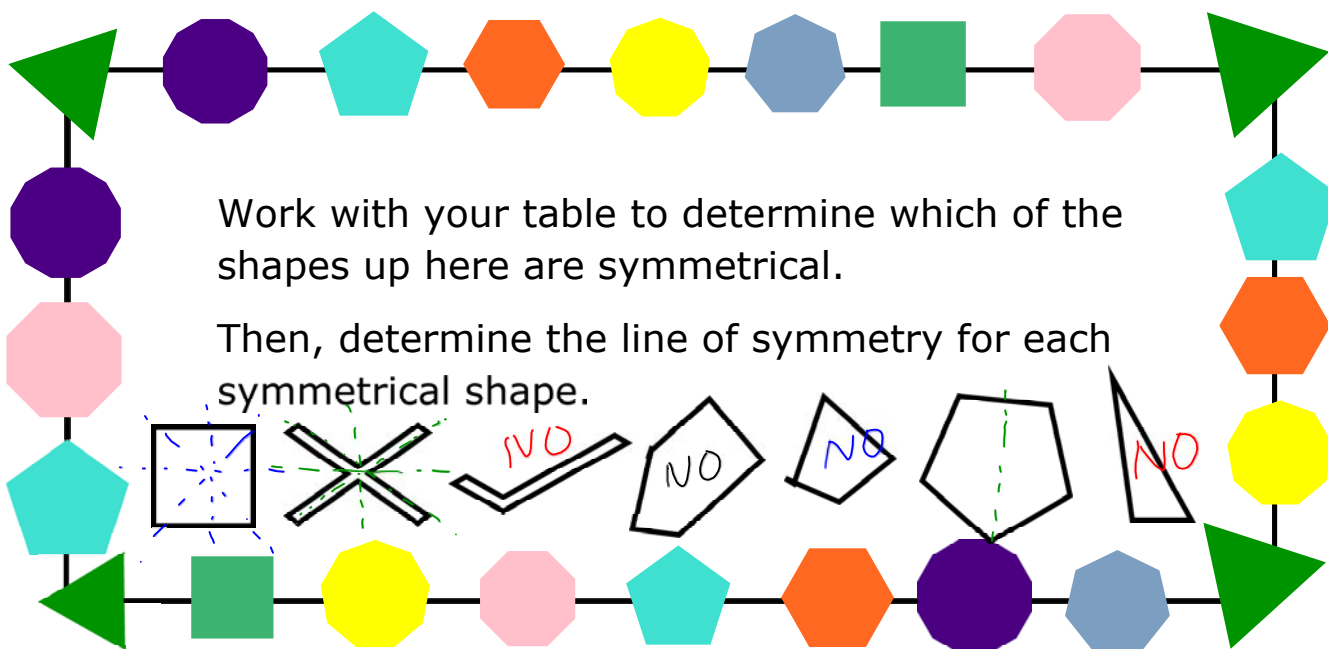
x	y
-4	-8
-2	-2
0	0
2	-2
4	-8

Quiz

Today's Goals


I can...

- find the axis of symmetry of a quadratic given an equation
- find the vertex from a quadratic equation
- graph quadratic functions
- apply quadratics



Work with your table to determine which of the shapes up here are symmetrical.

Then, determine the line of symmetry for each symmetrical shape.



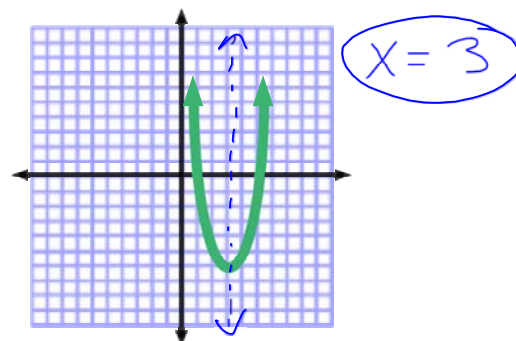
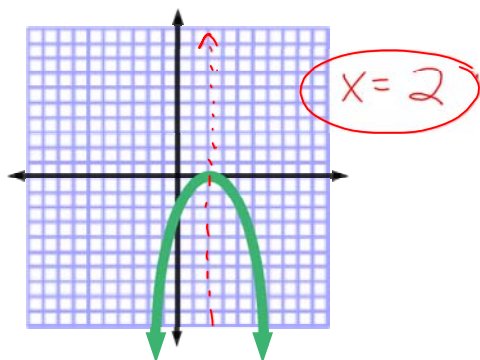
Axis of Symmetry

Definition: a vertical line that divides the parabola into 2 identical pieces.

$x =$ _____

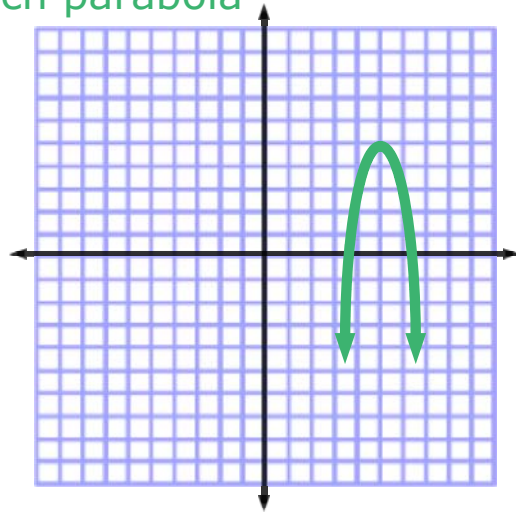
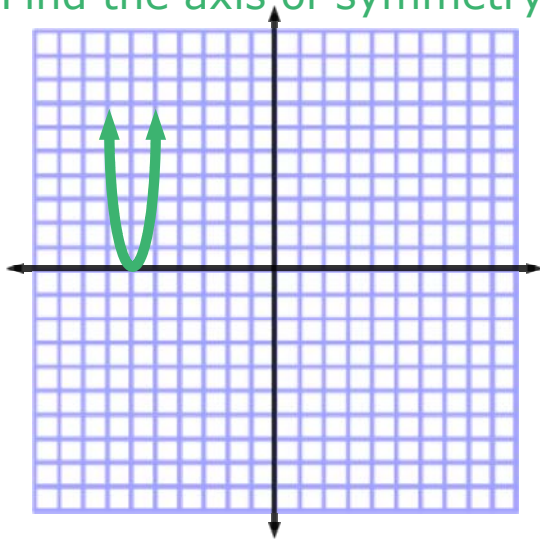


Method 1: Using Zeros *Method only works if there are zeros.*



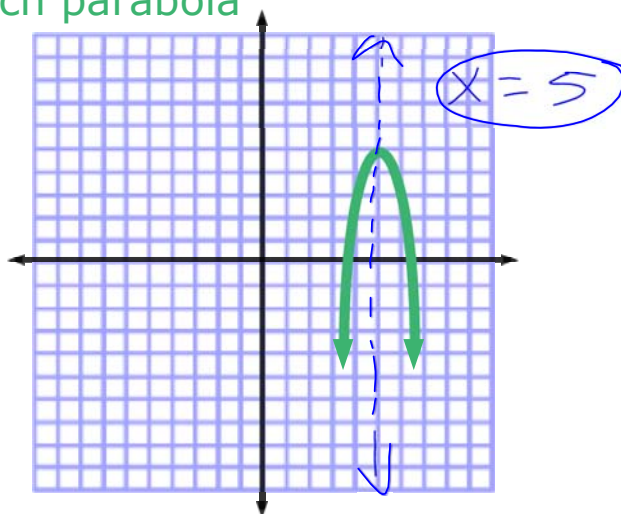
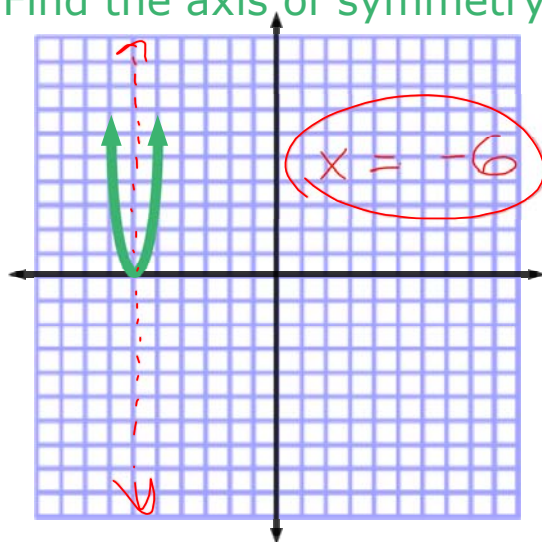
Try These!!

Find the axis of symmetry of each parabola



Try These!!

Find the axis of symmetry of each parabola



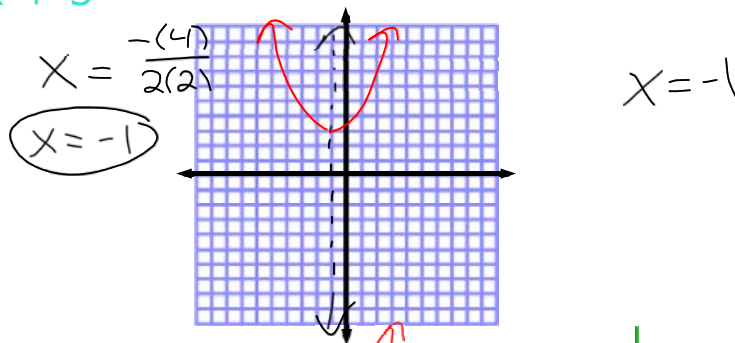
Method 2: Formula

Quadratic MUST be in the form $y = ax^2 + bx + c$

axis of symmetry is the vertical line $x = -\frac{b}{2a}$

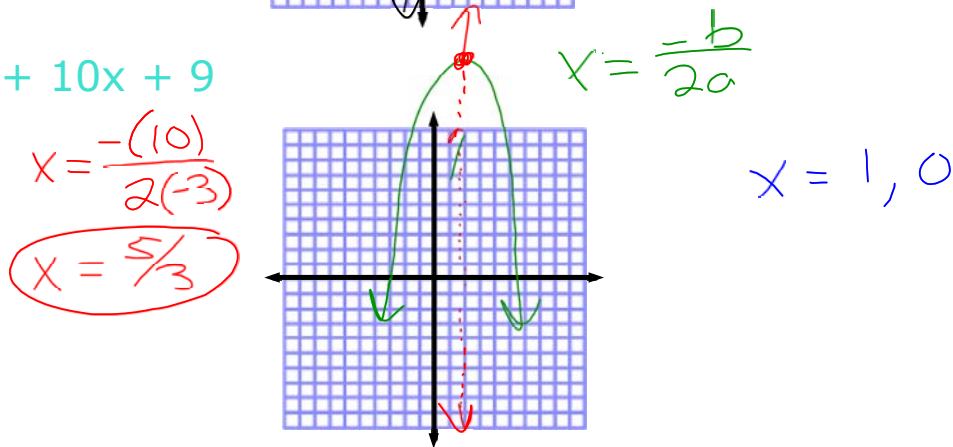
$y = 2x^2 + 4x + 5$

$a = 2$
 $b = 4$
 $c = 5$



$y = -3x^2 + 10x + 9$

$a = -3$
 $b = 10$
 $c = 9$



Finding Vertex

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

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

$$a = -1$$

$$b = -2$$

$$c = 0$$

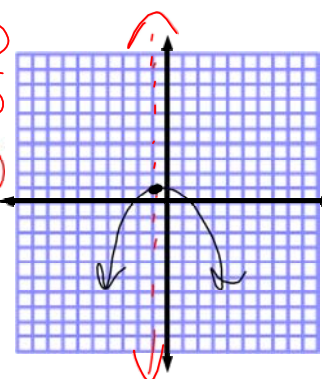
$$X = \frac{-(-2)}{2(-1)}$$

$$X = -1$$

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

$$y = -1 + 2$$

$$y = 1$$



Step 1: Find axis of symmetry

Step 2: Substitute

Step 3: Write as ordered pair

$$(-1, 1)$$

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

$$a = 1$$

$$b = -4$$

$$c = -10$$

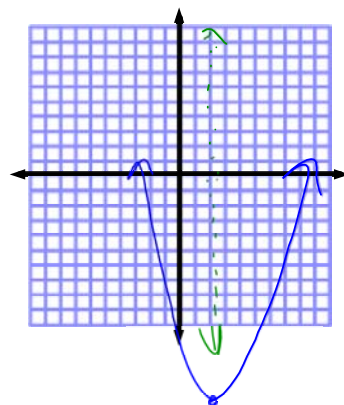
$$X = \frac{-(-4)}{2(1)}$$

$$X = 2$$

$$y = (2)^2 - 4(2) - 10$$

$$y = 4 - 8 - 10$$

$$y = -14$$



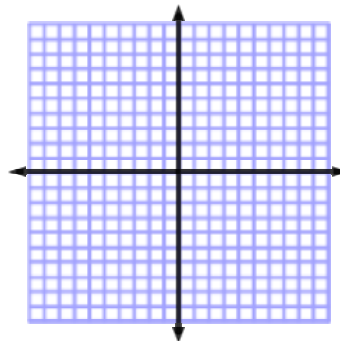
$$X = \frac{-b}{2a}$$

$$(2, -14)$$

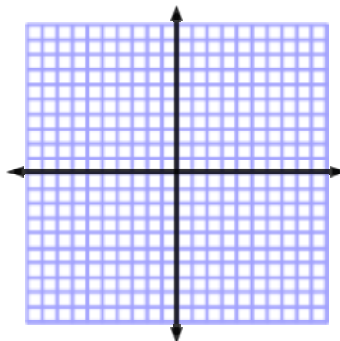
Try These!!

Find the vertex of the graph of the following:

$$y = 0.25x^2 + 2x + 3$$



$$y = -3x^2 + 6x - 7$$



Try These!!

Find the vertex of the graph of the following:

$$y = 0.25x^2 + 2x + 3$$

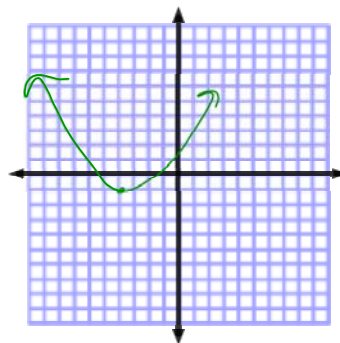
$$a = 0.25$$

$$b = 2$$

$$c = 3$$

$$(-4, -1)$$

$$x = \frac{-2}{2(0.25)} = -4$$



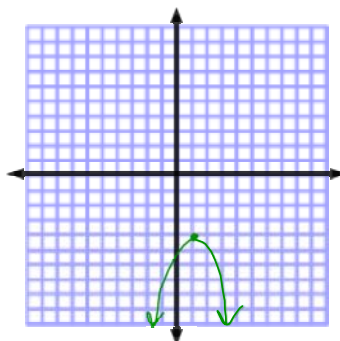
$$y = -3x^2 + 6x - 7 \quad (1, -4)$$

$$a = -3$$

$$b = 6$$

$$c = -7$$

$$x = \frac{-6}{2(-3)} = 1$$



Section 10.3: Graphing Quadratic Functions

What information have we learned to find from a quadratic?

- has an x^2
- * points
- forms a parabola
- constant 2nd difference
- * x-intercept (zeros)
- * y-intercept
- * graph
- * table
- vertex
- axis of symmetry
- up or down
- narrow or wide
- * Domain
- * Range
- * max or min

Think and Discuss...

1. How do you find the zeros of a function from its graph?
2. Describe how to find the axis of symmetry of a quadratic function if its graph does not cross the x -axis
3. Sketch a graph that fits the given description.
 - a. Opens upward, has 2 zeros
 - b. Opens downward, has no zeros

Project:

- Each unit should be on a new 1/2 page (front and back)
 - > each unit should have definitions, examples, and process steps if needed
 - > there are 9 units
- Be sure to have all major concepts from each unit
- Be creative and show your style on your project

Homework

USA TestPrep Practice-(Quad/Expon)

pg. 535 #3-15 (odd), 18

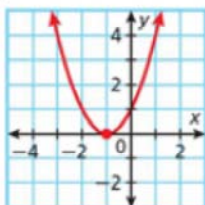
pg. 541 #1-7 (odd)

pg. 535

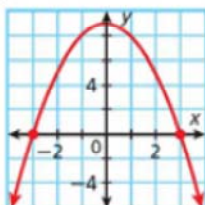
SEE EXAMPLE 1

Find the zeros of each quadratic function from its graph. Check your answer.

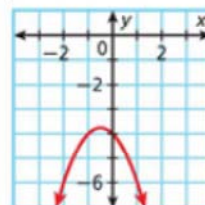
3. $y = x^2 + 2x + 1$



4. $y = 9 - x^2$



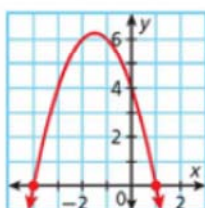
5. $y = -x^2 - x - 4$



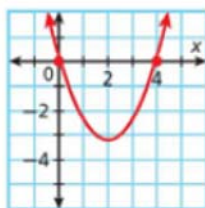
SEE EXAMPLE 2

Find the axis of symmetry of each parabola.

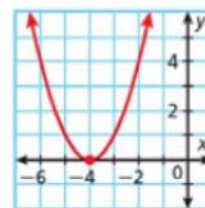
6.



7.



8.



SEE EXAMPLE 3

For each quadratic function, find the axis of symmetry of its graph.

9. $y = x^2 + 4x - 7$

10. $y = 3x^2 - 18x + 1$

11. $y = 2x^2 + 3x - 4$

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

SEE EXAMPLE 4

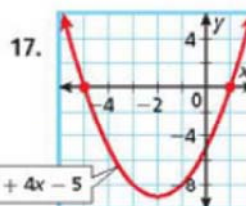
Find the vertex.

13. $y = -5x^2 + 10x + 3$

14. $y = x^2 + 4x - 7$

15. $y = \frac{1}{2}x^2 + 2x$

16. $y = -x^2 + 6x + 1$



SEE EXAMPLE 5

18. **Archery** The height in feet above the ground of an arrow after it is shot can be modeled by $y = -16t^2 + 63t + 4$. Can the arrow pass over a tree that is 68 feet tall? Explain.

8-3

Exercises

pg. 541



GUIDED PRACTICE

SEE EXAMPLE 1

Graph each quadratic function.

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

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

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

4. $y = x^2 + 4x - 8$

5. $y + x^2 + 5x + 2 = 0$

6. $y = 4x^2 + 2$

SEE EXAMPLE 2

7. **Multi-Step** The height in feet of a golf ball that is hit from the ground can be modeled by the function $f(x) = -16x^2 + 96x$, where x is the time in seconds after the ball is hit. Find the ball's maximum height and the time it takes the ball to reach this height. Then find how long the ball is in the air.