

## Topic: Graphing

## Graphing Quadratics

In addition a 3.0, student will demonstrate the ability to analyze another person's work to identify and correct errors.

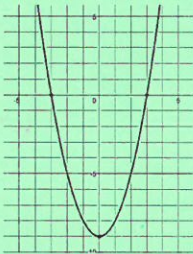
3	<input type="checkbox"/> Transformations of graphs <ul style="list-style-type: none"> <li>▪ Given graph, write the function.</li> <li>▪ Given a parent function and transformations, write a new function.</li> </ul> <input type="checkbox"/> Graph a polynomial <ul style="list-style-type: none"> <li>▪ Use the zeros to construct a rough graph of the function defined by the polynomial.</li> <li>▪ Show end behavior</li> </ul> <input type="checkbox"/> Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.
2	<input type="checkbox"/> Identify transformations of graphs <input type="checkbox"/> Identify domain graphically <input type="checkbox"/> Identify range graphically <input type="checkbox"/> Given the graph of a polynomial, identify the zeros. <input type="checkbox"/> Represent complex numbers on the complex plane in rectangular form (including real and imaginary numbers).
1	Insufficient progress towards foundational skills and knowledge.

## Line of Symmetry

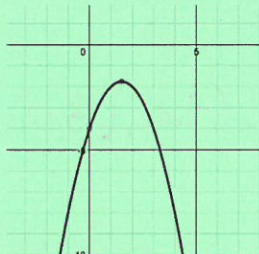


Watch (and take notes) the lecture called Line of Symmetry.

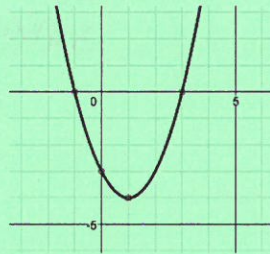
1. Write the equation of the line of symmetry of each graph.



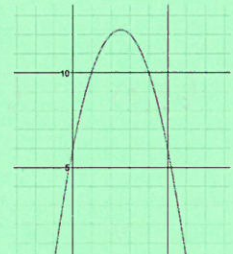
$$x=0$$



$$x=1.5$$



$$x=1$$



$$x=2.5$$

2. Find the line of symmetry of each equation.

a.  $x^2 + 9x + 20 = 0$

$$x = -4.5$$

b.  $x^2 - 9 = 0$

$$x=0$$

c.  $4x^2 + 12x - 16 = 0$

$$x = -1.5$$

d.  $3x^2 + 5x - 2 = 0$

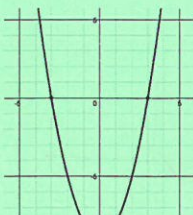
$$x = -5/6$$

## Finding the Vertex

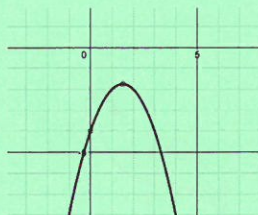


Watch (and take notes) the lecture called Vertex.

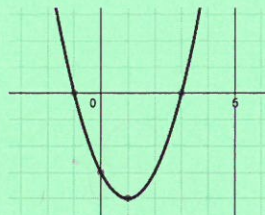
3. What is the vertex of each graph?



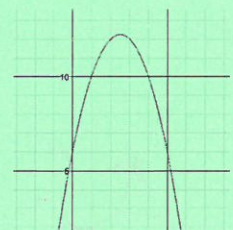
$$(0, -9)$$



$$(1.5, -1.75)$$



$$(1, -4)$$



$$(2.5, 12)$$



4. Find the vertex of each equation.

a.  $x^2 + 9x + 20 = 0$

~~$(-4, 0)$~~   
 ~~$(-5, 0)$~~   
 $(-4.5, -25)$

b.  $x^2 - 9 = 0$

~~$(3, 0)$~~   
 ~~$(-3, 0)$~~   
 $(0, -9)$

c.  $4x^2 + 12x - 16 = 0$

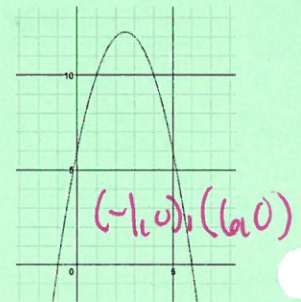
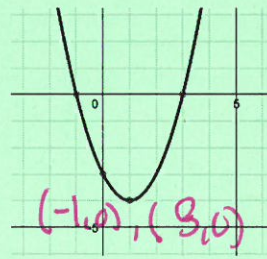
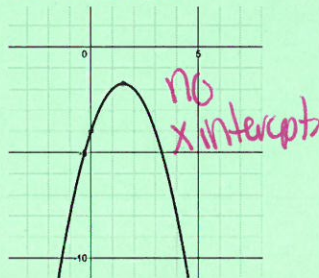
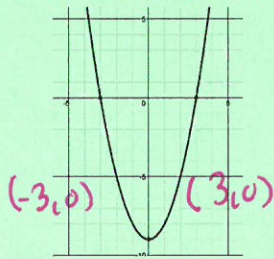
~~$(2, 0)$~~   
 ~~$(-1, 0)$~~   
 $(-1.5, -25)$

d.  $3x^2 + 5x - 2 = 0$

~~$(-2, 0)$~~   
 ~~$(1, 0)$~~   
 $(-.83, -4.08)$

**X-Intercepts (zeros)**Watch (and take notes) the lecture called X-Intercepts.

5. Identify the x-intercepts (zeros) of each graph.



6. Find the x-intercepts (zeros) of each equation.

a.  $x^2 + 9x + 20 = 0$

$(-4, 0), (-5, 0)$

b.  $x^2 - 9 = 0$

$(3, 0), (-3, 0)$

c.  $4x^2 + 12x - 16 = 0$

$(-4, 0), (1, 0)$

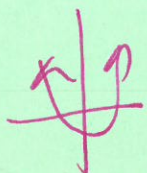
d.  $3x^2 + 5x - 2 = 0$

$(-2, 0), (1/3, 0)$

**End Behavior**Watch (and take notes) the lecture called End Behavior

7. Sketch a graph with the correct end behavior.

a.  $x^2 + 9x + 20 = 0$



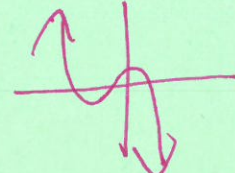
b.  $-x^2 - 9 = 0$



c.  $4x^3 + 12x - 16 = 0$



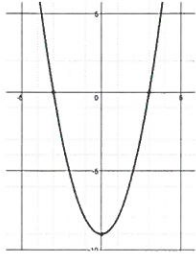
d.  $-3x^3 + 5x - 2 = 0$



**Domain and Range**

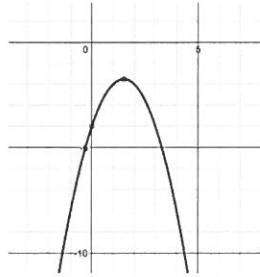
Watch (and take notes) the lecture called Domain and Range.

8. What is the domain and range of each graph?



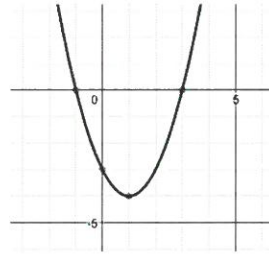
$$D = -\infty < x < \infty$$

$$R = -9 \leq y < \infty$$



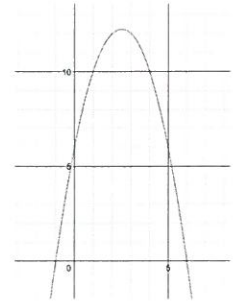
$$D = -\infty < x < \infty$$

$$R = -\infty < y \leq 2$$



$$D = -\infty < x < \infty$$

$$R = -4 \leq y < \infty$$



$$D = -\infty < x < \infty$$

$$R = -\infty < y \leq 12$$

**Graphing Quadratics (putting it all together)**

Watch (and take notes) the lecture called Graphing Quadratics.

Graph the quadratic

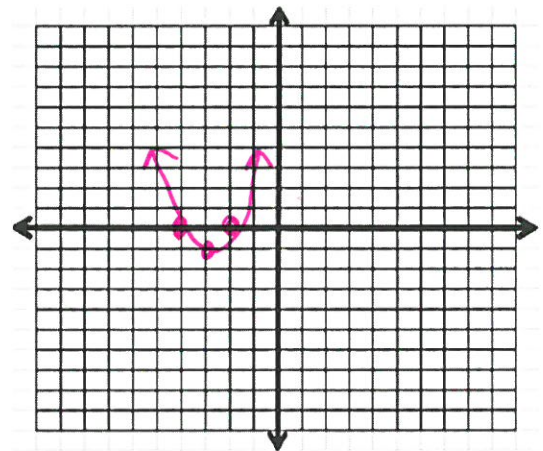
equations.

a.  $y = x^2 + 6x + 8$

$$(-2, 0), (-4, 0)$$

$$x = -3$$

$$(-3, -1)$$

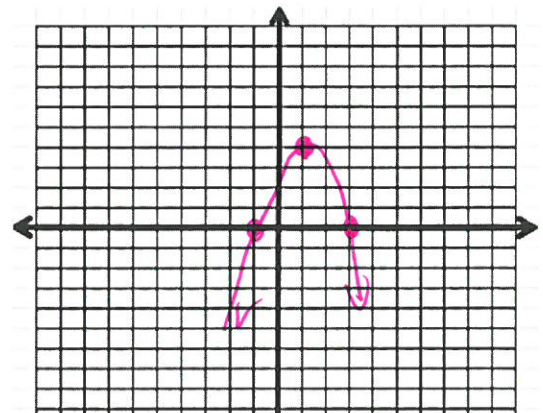


b.  $y = -x^2 + 2x + 3$

$$(-1, 0), (3, 0)$$

$$x = 1$$

$$(1, 4)$$



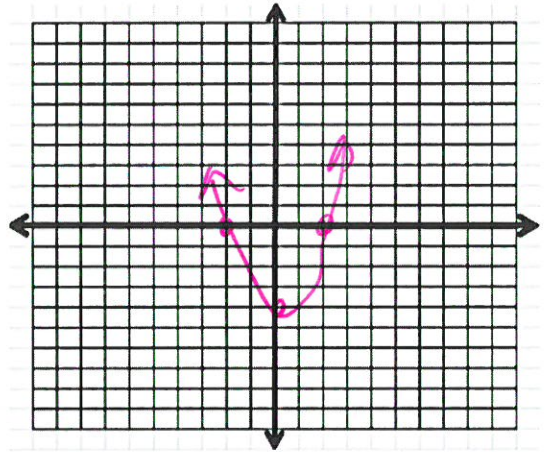


c.  $y = x^2 - 4$

$(-2, 0), (2, 0)$

$x = 0$

$(0, -4)$

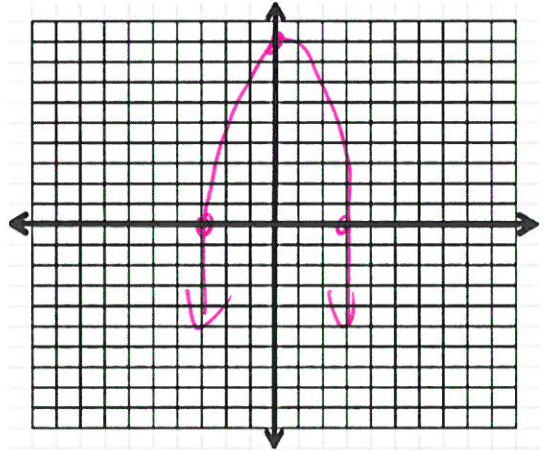


d.  $y = -x^2 + 9$

$(-3, 0), (3, 0)$

$x = 0$

$(0, 9)$

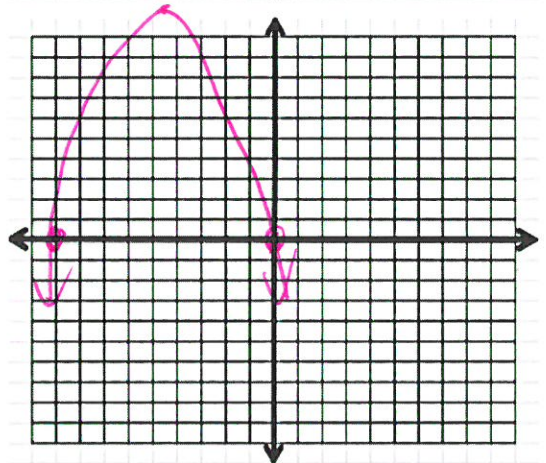


e.  $y = -2x^2 - 18x$

$(-9, 0), (0, 0)$

$x = -4.5$

$(-4.5, 40.5)$

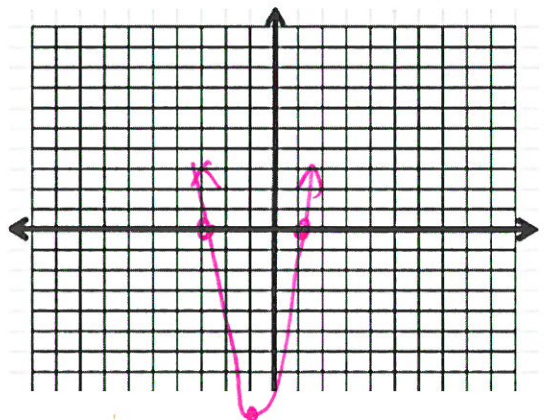


f.  $y = 2x^2 + 4x - 6$

$(-3, 0), (1, 0)$

$x = -1$

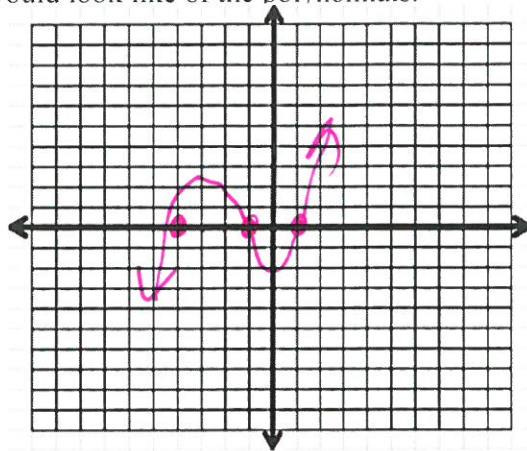
$(-1, -8)$



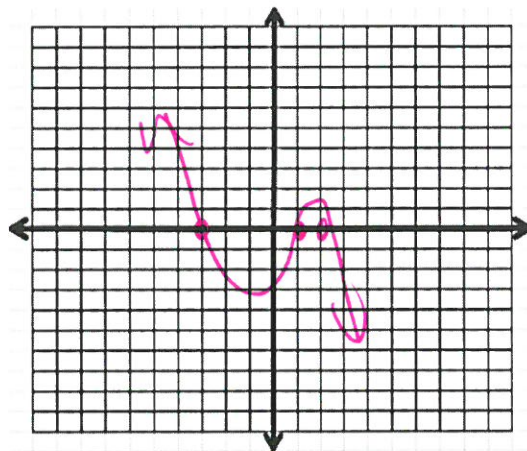
**Thinking About End Behavior**

10. Above, you learned about x-intercepts (zeros) and end behavior. The polynomials below are written in standard form and are factored for you. Sketch what the graph would look like of the polynomials.

a.  $x^3 + 4x^2 - x - 4$   
 $(x + 1)(x - 1)(x + 4)$



b.  $-x^3 + 7x - 6$   
 $-(x - 2)(x + 3)(x - 1)$



c.  $x^4 + 5x^3 + 5x^2 - 5x - 6$   
 $(x + 3)(x - 1)(x + 2)(x + 1)$

