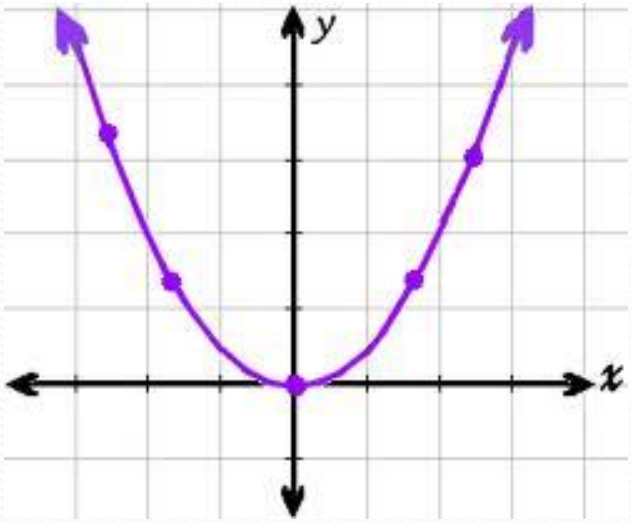
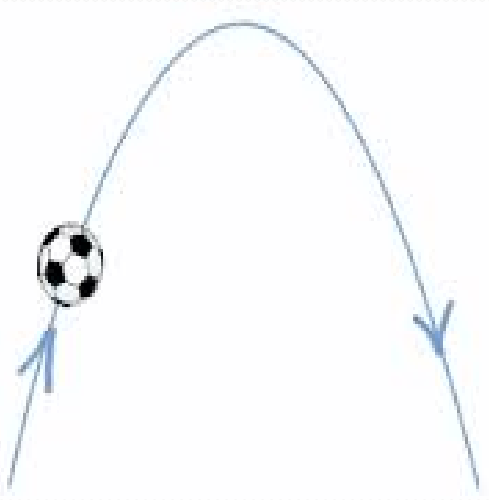
Chapter 9
Quadratic Equations and Functions

9.1
Graph $y=ax^2 + c$

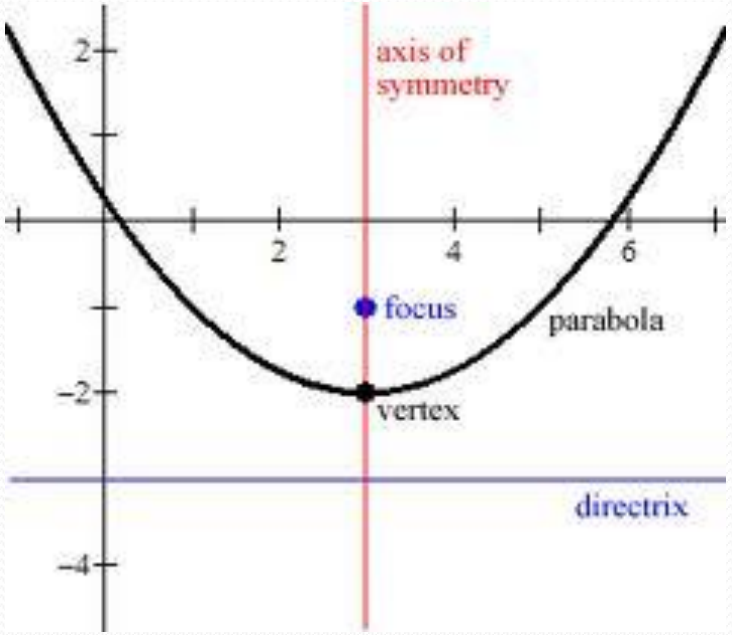
Quadratic Functions

- Highest _____
- Standard Form: _____
- Parabola – the _____ of a quadratic function





- Vertex – the _____ on a parabola
- Axis of symmetry – the line passing through the _____ that divides the parabola into _____



Graph of a Quadratic Function

- $y = ax^2 + bx + c$
- Positive a – parabola opens _____
- Negative a – parabola opens _____
- To find the _____of the vertex: $x = \frac{-b}{2a}$

To Graph a Quadratic Equation

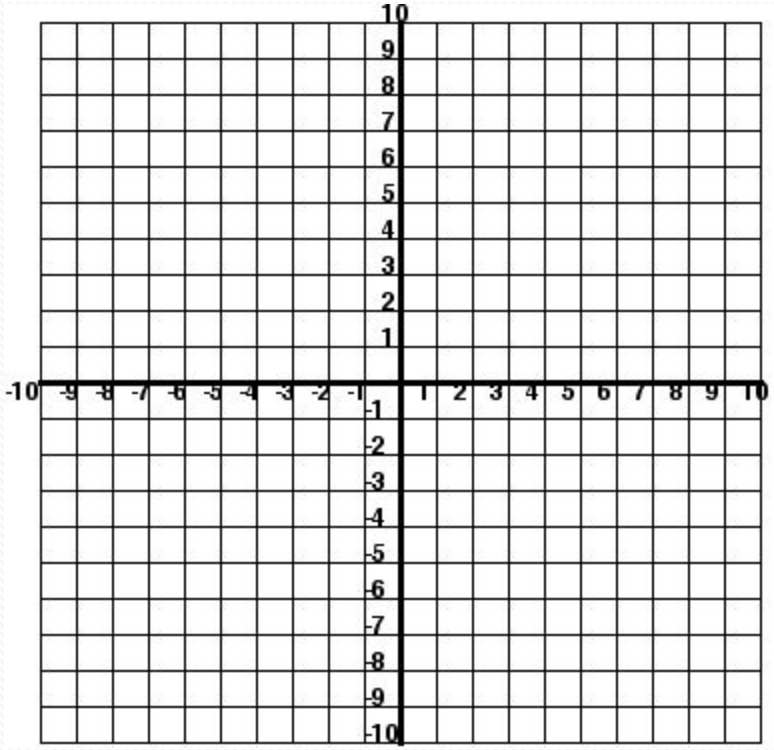
- 1) Find the _____of the vertex

- 2) Find the _____of the vertex by _____ from Step 1.

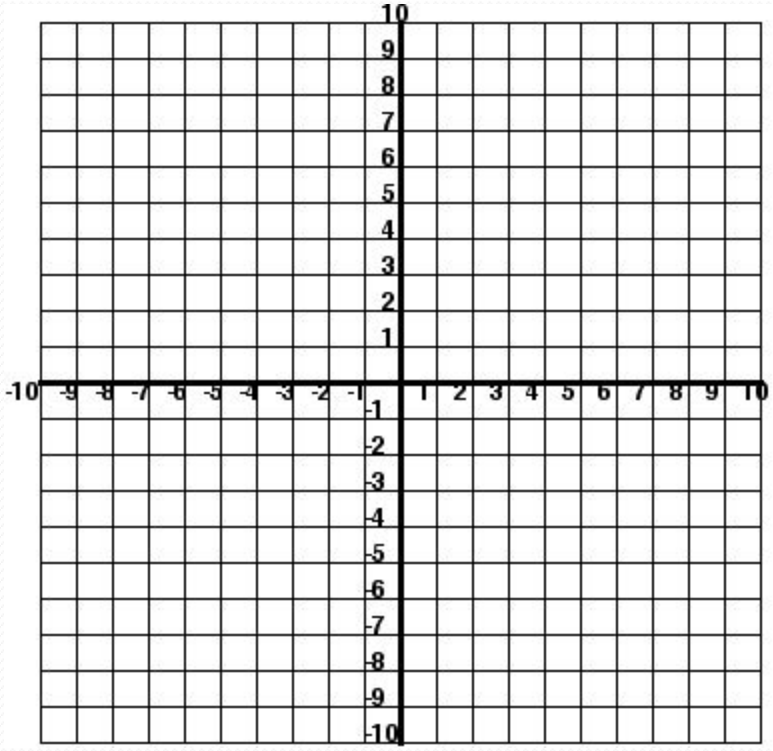
- 3) Make a _____ of values.
  - Pick two values _____ and two values _____ the x-coordinate of the vertex.
  - Use these _____.

- 4) Plot the points and connect them with a _____ to form a _____ _____

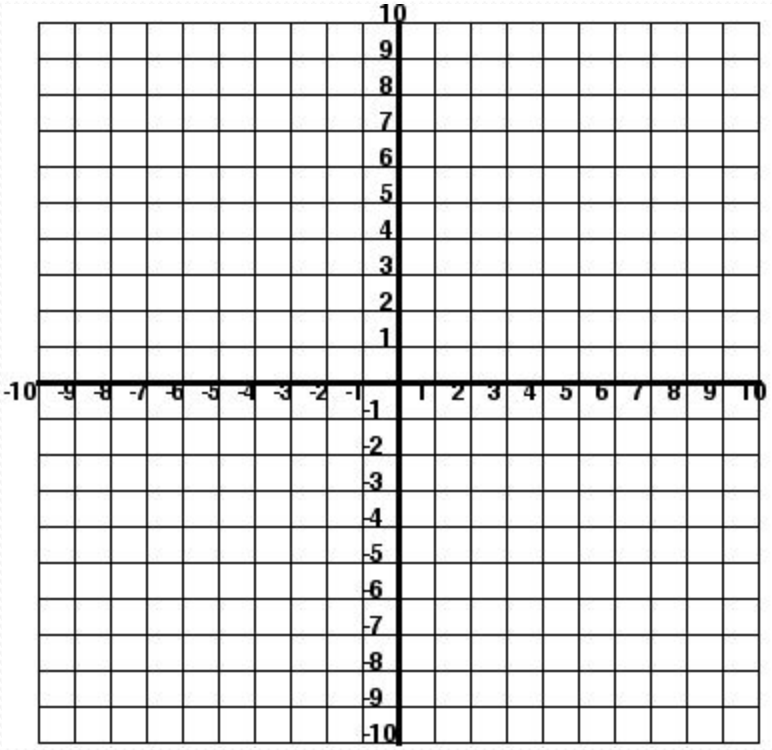
- Graph: $y = x^2$



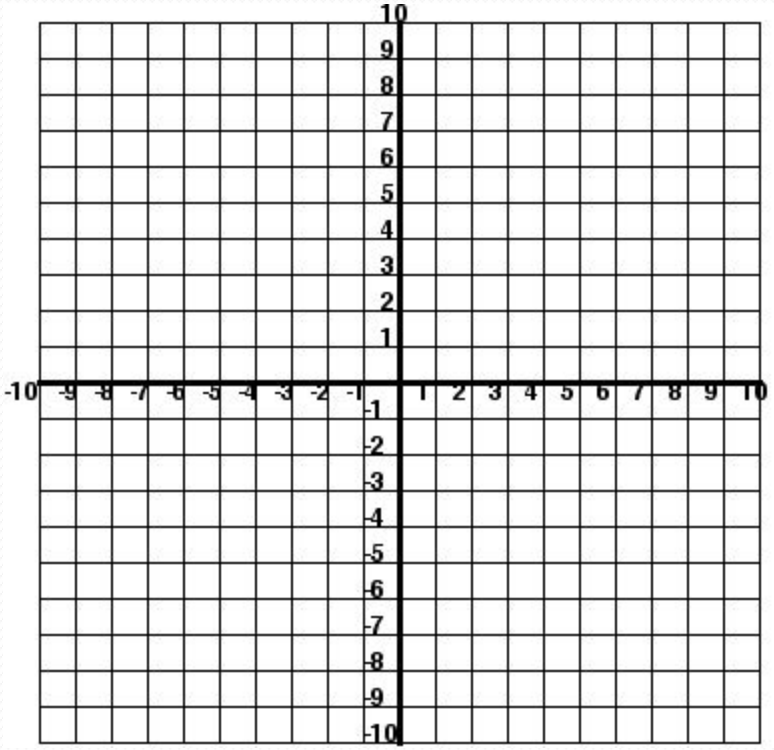
- Graph: $y = -2x^2$



- Graph: $y = x^2 - 4$



- Graph: $y = -2x^2 - 1$

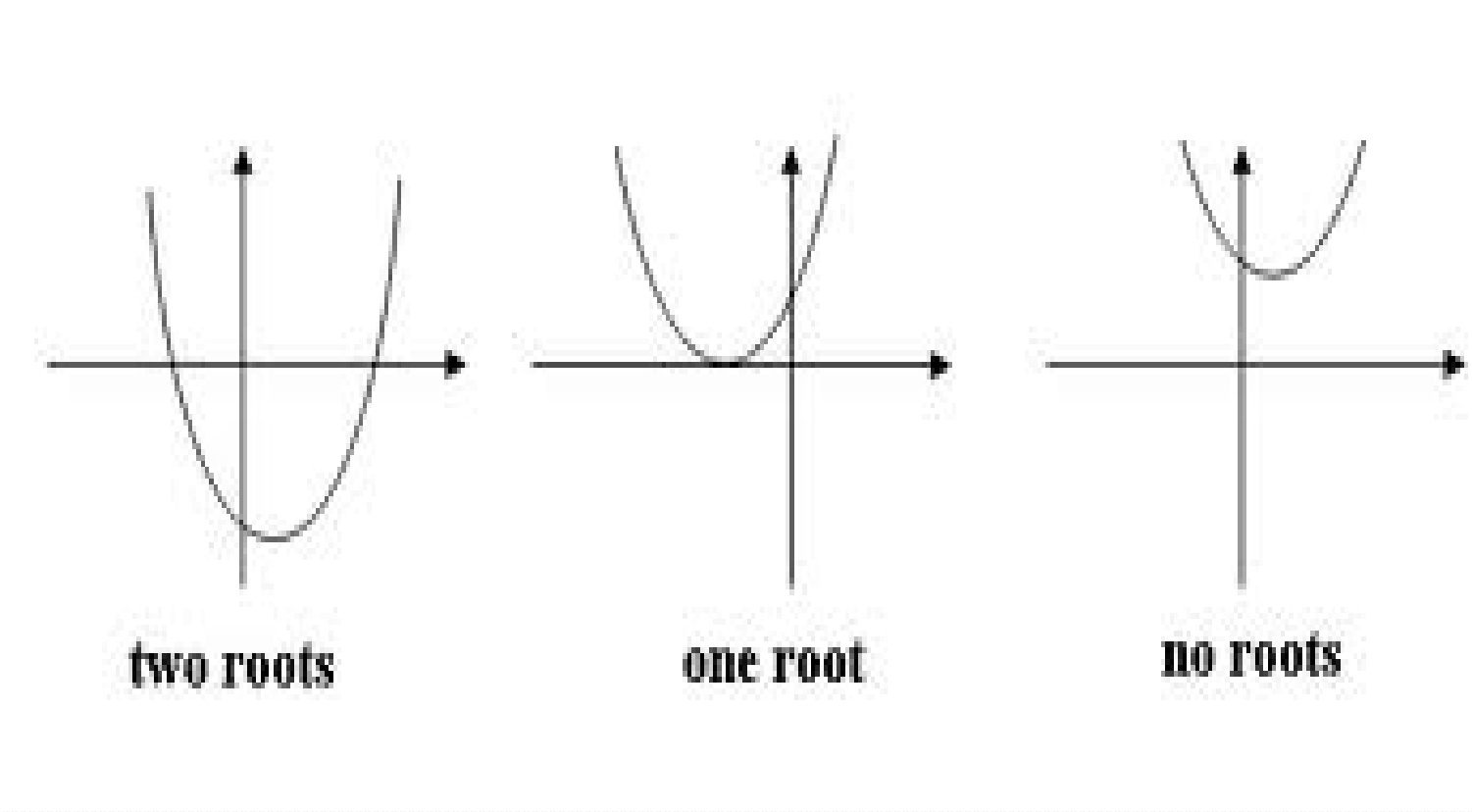


9.3
Solve Quadratic Equations by Graphing

To solve by graphing:

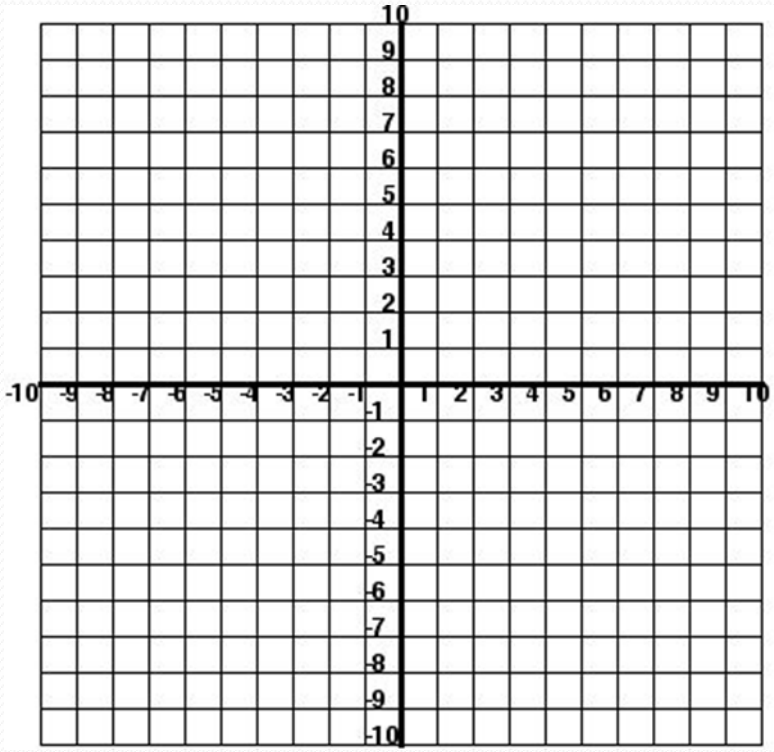
- 1) Get the equation in _____ set equal to _____.
- 2) _____ the corresponding function.
- 3) The _____on the graph are the _____ to the equation.

Number of Solutions:

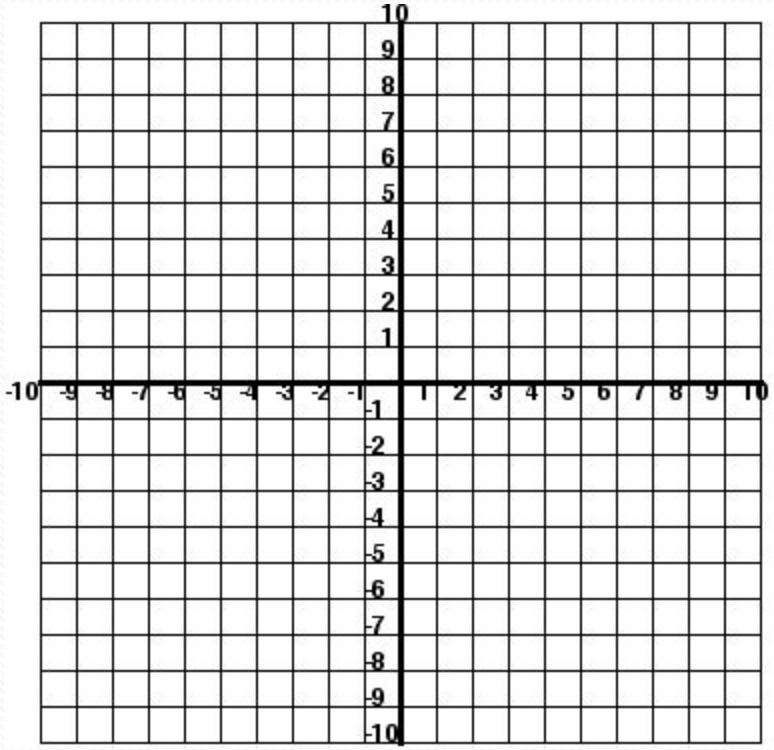


EX: Solve the equation by graphing.

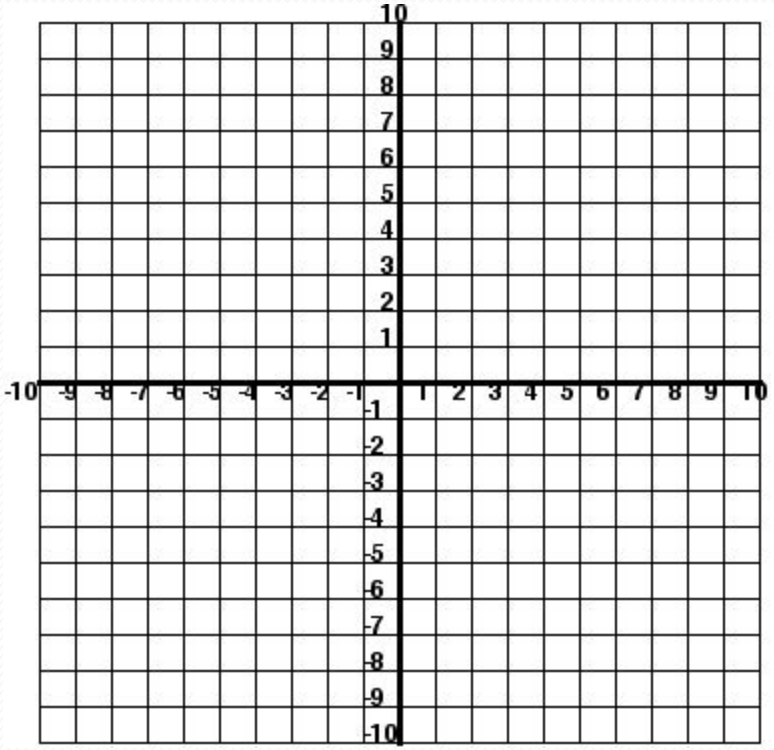
- $x^2 + x = -1$



- $-x^2 + 6x = 9$



- $\frac{1}{2}x^2 + 2x = 6$



EX:

- A baseball player throws a ball into the air with an initial vertical velocity of 32 feet per second. The ball is released at a height of 5 feet.
  - Write an equation that models the height h (in feet) of the ball as a function of the time t (in seconds) after it is thrown.
  - Use the equation to find the time that the ball is in the air if the player lets the ball drop to the ground.

9.4
Use Square Roots to Solve Quadratic Equations

Square Root Method

- NOTE: You can only use this method if the quadratic equation is in the form of _____
  - No _____
- 1) _____ on _____ of the equation.
- 2) Take the _____ of _____ of the equation.
  - Positive number:
  - Zero:
  - Negative number:

NOTEBOOK EXAMPLE #1

EX: Solve the equation.

- $c^2 - 25 = 0$
- $5x^2 + 12 = -8$
- $2x^2 + 11 = 11$
- $9m^2 = 100$

NOTEBOOK EXAMPLE #2

EX: Solve the equation.

- Round the solutions to the nearest hundredth.
- $x^2 + 4 = 14$
- $2p^2 - 7 = 2$

NOTEBOOK EXAMPLE #3
EX: Solve the equation.

- Round the solutions to the nearest hundredth if necessary.
- $2(x - 2)^2 = 18$
- $\frac{3}{2}(n + 1)^2 = 33$

EX:

- You drop a towel from a balcony 18 feet above your pool deck onto a table that is 3 feet above the ground. How long is the towel in the air? Round your answer to the nearest hundredth.

9.6
Solve Quadratic Equations by the Quadratic Formula

Quadratic Formula

- The solutions of the quadratic equation $\mathbf{a}x^2 + \mathbf{b}x + \mathbf{c} = 0$ can be found using the quadratic formula:

- NOTE: _____
- NOTE: The quadratic formula can be used to solve _____ quadratic equation.

NOTEBOOK EXAMPLE #4

EX:

- Use the quadratic formula to solve the equation. Round your solutions to the nearest hundredth, if necessary.
- $4x^2 = 7x + 2$
- $7n + 5 = -3n^2 + 2$

EX:

- For the period 1990 – 2003, the number of book titles published by a small publishing company can be modeled by the function $y=0.5x^2 + 4x + 19$, where x is the number of years since 1990. In what year did the company publish 80 books?