

Algebra I

Notes Section 9.1

Graph $y = ax^2 + c$

Big Ideas

1. How to graph and compare other graphs to the parent function.
2. How to identify the vertex and classify it as a maximum or minimum point.

VOCABULARY

Quadratic Function: _____

Parabola: _____

Parent Quadratic Function: _____

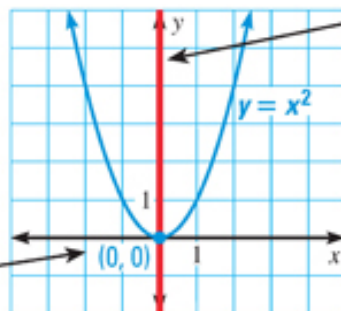
Vertex: _____

Axis of Symmetry: _____

Parent Quadratic Function

The most basic quadratic function in the family of quadratic functions, called the **parent quadratic function**, is $y = x^2$. The graph of $y = x^2$ is shown below.

The lowest or highest point on a parabola is the **vertex**. The vertex of the graph of $y = x^2$ is $(0, 0)$.



The line that passes through the vertex and divides the parabola into two symmetric parts is called the **axis of symmetry**. The axis of symmetry for the graph of $y = x^2$ is the y-axis, $x = 0$.

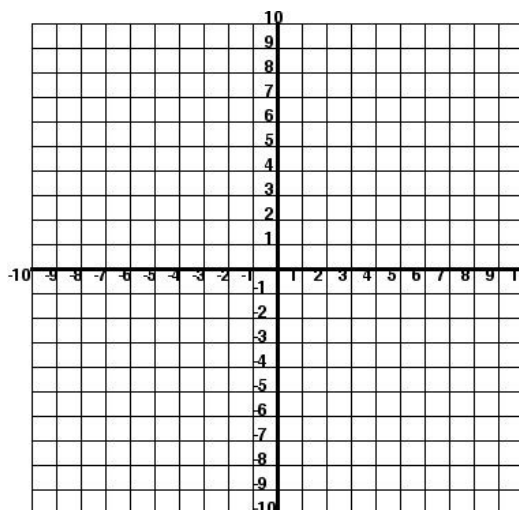
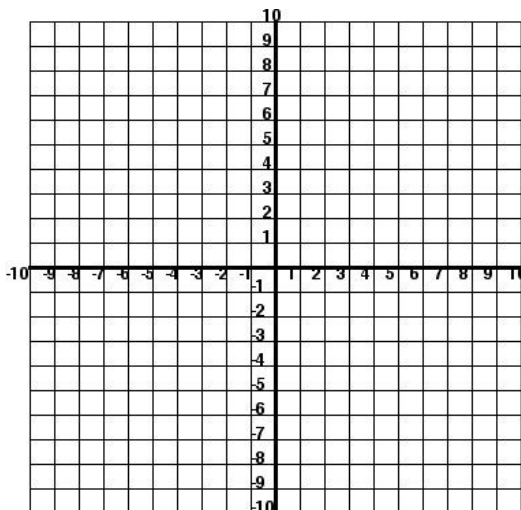
EXAMPLE 1 Make a table and graph the quadratic function.

a. $y = 3x^2$

b. $y = -4x^2$

x	_____
y	_____

x	_____
y	_____



EXAMPLE 2 Graph $y = -1/4x^2$. Compare to $y = x^2$.

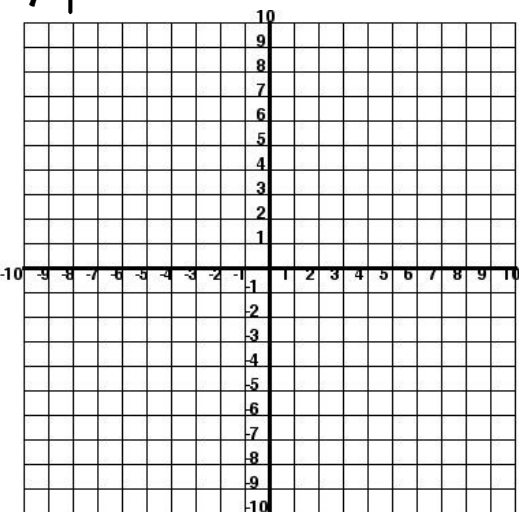
$y = -1/4x^2$

$y = x^2$

x	_____
y	_____

x	_____
y	_____

Comparison:



EXAMPLE 3 Graph $y=x^2 + 5$. Compare to $y = x^2$.

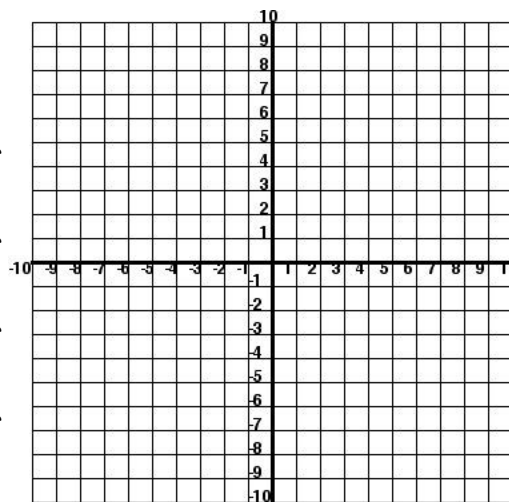
$y = x^2 + 5$

x	_____
y	_____

$y = x^2$

x	_____
y	_____

Comparison:



EXAMPLE 4 Graph $y=1/2x^2 - 4$. Compare to $y = x^2$.

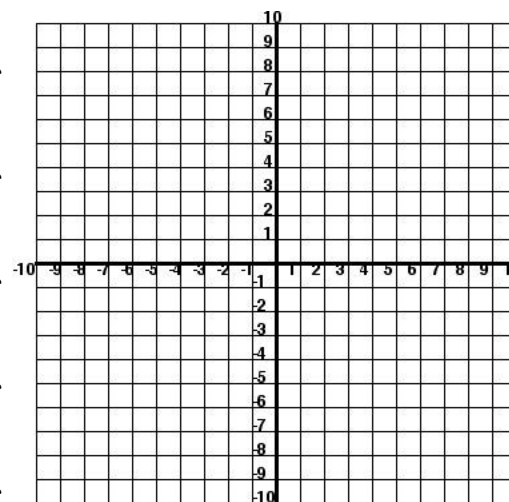
$y = 1/2x^2 - 4$

x	_____
y	_____

$y = x^2$

x	_____
y	_____

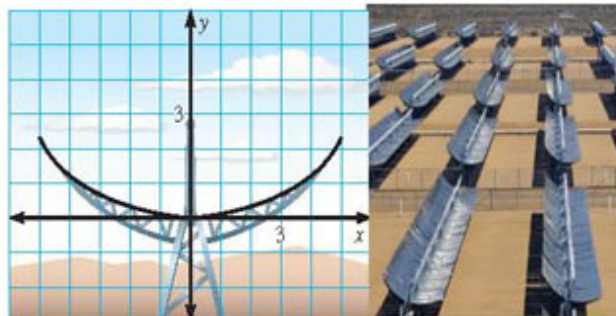
Comparison:



EXAMPLE 5 How would the graph of $y = x^2 + 6$ be affected if the function were changed to $y = x^2 + 2$.

EXAMPLE 6 A solar trough has a reflective parabolic surface that is used to collect solar energy. The sun's rays are reflected from the surface toward a pipe that carries water. The heated water produces steam that is used to produce electricity.

The graph of the function $y = 0.09x^2$ models the cross section of the reflective surface where x and y are measured in meters. Use the graph to find the domain and range of the function in this situation.



a) Find the domain: _____

b) Find the range: _____