Name

Alg I.

# 9.1 Graph $y=ax^2+c$

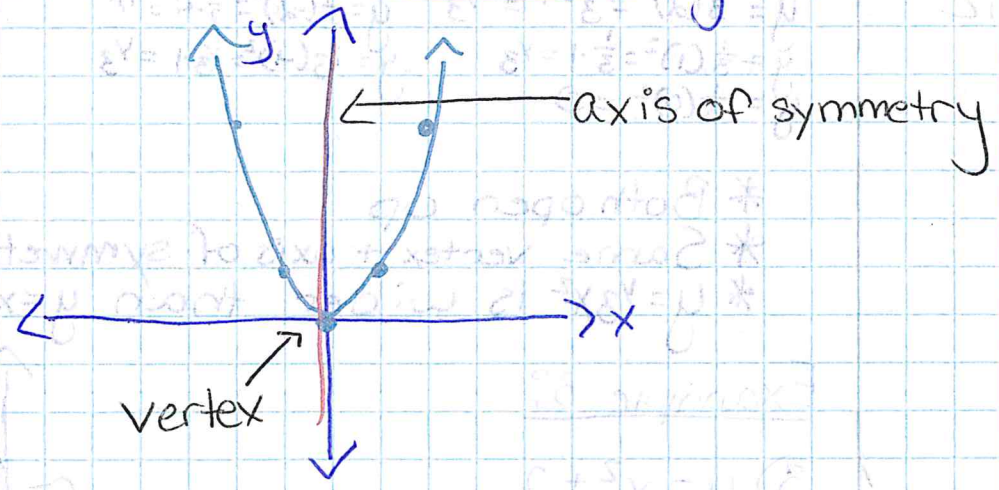
I can graph simple quadratic functions.

Ch. 9 Quiz

**Quadratic Function:** A nonlinear function that can be written in the standard form $y=ax^2+bx+c$

**Parabola:** U-shaped graph created from a quadratic function.

**Parent Quadratic Function:** $y=x^2$




**Vertex:** The lowest or highest point on a parabola

**Axis of symmetry:** The line that passes through the vertex and divides the parabola in half

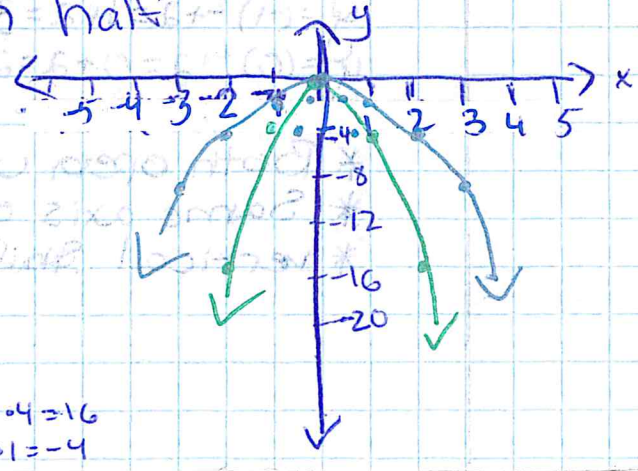
**Example 1:**

1) $y=-4x^2$

| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | -16 | -4 | 0 | -4 | -16 |

$-4(-2)^2=-4\cdot4=-16$ $-4(2)^2=-4\cdot4=16$

$-4(-1)^2=-4\cdot1=-4$ $-4(1)^2=-4\cdot1=-4$



Name

Alg I

# 9.1 Graph $y = ax^2 + c$

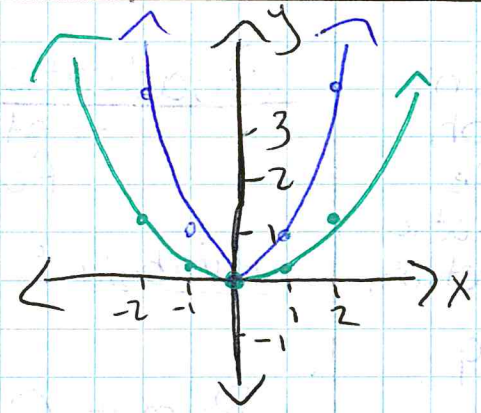
I can graph simple quadratic functions

Ch. 9 Quiz

## Example 2:

2) $y = \frac{1}{3}x^2$

| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | 4/3 | 1/3 | 0 | 1/3 | 4/3 |




$y = \frac{1}{3}(2)^2 = \frac{1}{3} \cdot 4 = 4/3$ $y = \frac{1}{3}(-2)^2 = \frac{1}{3} \cdot 4 = 4/3$

$y = \frac{1}{3}(1)^2 = \frac{1}{3} \cdot 1 = 1/3$ $y = 1/3(-1)^2 = 1/3 \cdot 1 = 1/3$

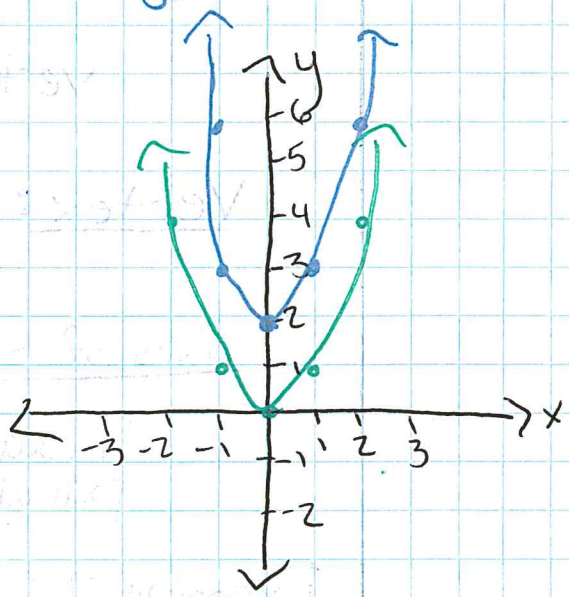
$y = \frac{1}{3}(0)^2 = 0$

* Both open up
* Same vertex + axis of symmetry
* $y = 1/3x^2$ is wider than $y = x^2$

## Example 3:

3) $y = x^2 + 2$

| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | 6 | 3 | 2 | 3 | 6 |




$y = (-2)^2 + 2 = 4 + 2 = 6$

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

$y = (0)^2 + 2 = 0 + 2 = 2$

* Both open up
* Same axis of symmetry
* vertical translation up 2 units.

Name

Alg I

# 9.1 Graph $y = ax^2 + c$

I can graph simple quadratic functions.

Ch. 9 Quiz

## Example 4:

4) $y = 3x^2 - 6$

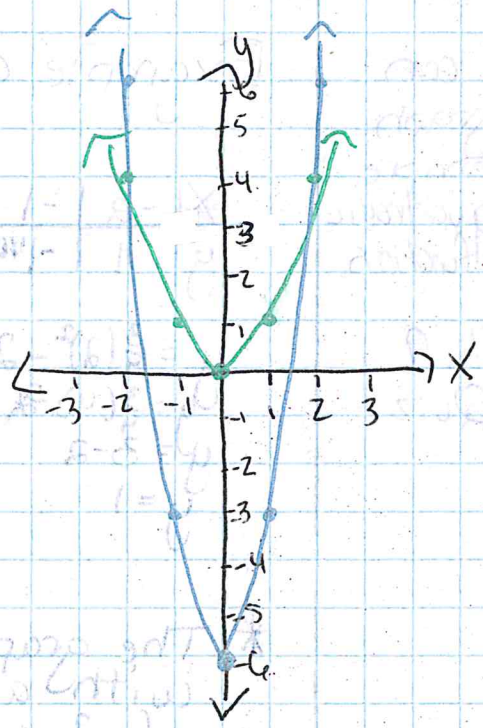
| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | 6 | -3 | -6 | -3 | 6 |

$y = 3(2)^2 - 6$ $y = 3(1)^2 - 6$ $y = 3(0)^2 - 6$

$y = 3(4) - 6$ $y = 3(1) - 6$ $y = 3(0) - 6$

$y = 12 - 6$ $y = 3 - 6$ $y = 0 - 6$

$y = 6$ $y = 3$ $y = -6$




* The graph is a vertical stretch with a vertical translation of 6 units down

5) $y = -5x^2 + 1$

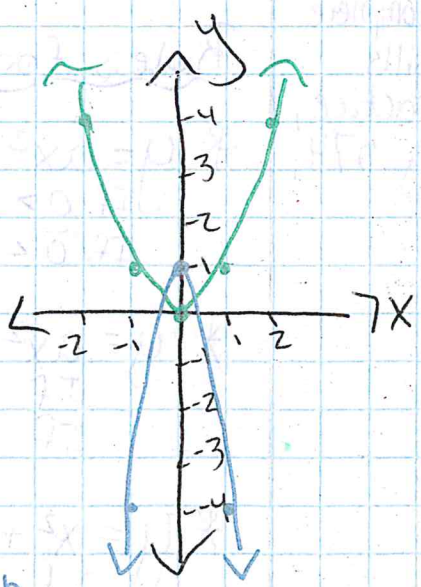
| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | -19 | -4 | 1 | -4 | -19 |

$y = -5(2)^2 + 1$ $y = -5(1)^2 + 1$ $y = -5(0)^2 + 1$

$y = -5(4) + 1$ $y = -5(1) + 1$ $y = -5(0) + 1$

$y = -20 + 1$ $y = -5 + 1$ $y = 0 + 1$

$y = -19$ $y = -4$ $y = 1$




* The graph is a vertical stretch with a vertical translation of 1 unit. It is also a reflection.

Name 9.1

Alg I.

# Graph $y=ax^2+c$

I can graph simple quadratic functions.

Ch. 9 Quiz

* Complete Skills Practice, pg. 574, #

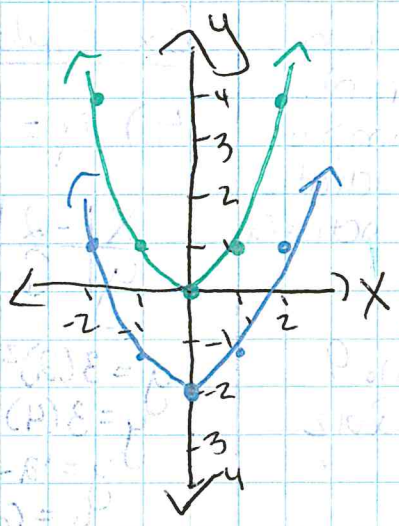
(6) $y=\frac{3}{4}x^2-2$

| x | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| y | 1 | $-1\frac{1}{4}$ | -2 | $-1\frac{1}{4}$ | 1 |

$y=\frac{3}{4}(2)^2-2$
$y=\frac{3}{4}(4)-2$
$y=3-2$
$y=1$

$y=\frac{3}{4}(1)^2-2$
$y=\frac{3}{4}(1)-2$
$y=\frac{3}{4}-\frac{2}{1}\times\frac{4}{4}$
$y=\frac{3}{4}-\frac{8}{4}=\frac{-5}{4}$
$y=-1\frac{1}{4}$

$y=\frac{3}{4}(0)^2-2$
$y=\frac{3}{4}(0)-2$
$y=0-2$
$y=-2$




* The graph is a vertical shrink with a vertical translation of 2 units down.

## Rules for $y=ax^2+c$:

* $y=ax^2$ when $a>0$
  If $a>1$: Vertical Stretch
  If $0<a<1$: Vertical Shrink

* $y=ax^2$ when $a<0$
  If $a<-1$: Vertical Stretch + Reflection
  If $-1<a<0$: Vertical Shrink + Reflection

* $y=x^2+c$
  If $c>0$: Upward vertical Translation
  If $c<0$: Downward Vertical Translation

## Example 5:

7) $y=x^2+2 \rightarrow y=x^2-2$ $\quad 2+2=4$

* A vertical translation of 4 units down.