

Section 2.2: Graphing Quadratic Equations

For each Quadratic Equation below,

- A) Determine the orientation of the graph (direction of opening)
- B) Find the vertex and determine whether the vertex is a maximum or minimum
- C) Create a table of values (put the vertex in the middle and take two points to the left of the vertex and two points to the right of the vertex).
- D) Graph the function with its base function $y = x^2$. As well, draw the axis of symmetry for each function on the graph and state its equation. A.O.S. $x = x\text{-coordinate of the vertex}$
- E) Complete the statement indicated.
- F) Find the domain and range.
- G) Determine whether the graph is wider or narrower than the base graph $y = x^2$.

i) $y = 2x^2 - 4x + 3$

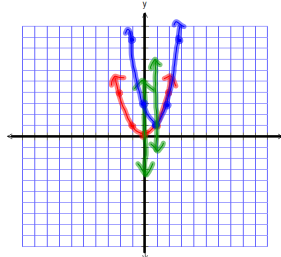
A) Orientation up (b/c a is +) U

B) Vertex and Type minimum
 $x = \frac{-b}{2a} = \frac{4}{2(2)} = 1$
 $y = 2(1)^2 - 4(1) + 3 = 2 - 4 + 3 = 1$
 Vertex: $(1, 1)$

C) Table of Values

x	$y = x^2$	x	$y = 2x^2 - 4x + 3$
-2	4	-1	9
-1	1	0	3
0	0	1	1
1	1	2	3
2	4	3	9

D) Graph



Equation of AOS for each graph

i) $x = 0$ ii) $x = 1$

E) y has a minimum value of $y = 1$ and it occurs at $x = 1$

Vertex minimum $(1, 1)$
 When the min/max occurs. \rightarrow minimum/maximum value of y

F) Domain

$\{x | x \in \mathbb{R}\}$

"The domain is the set of all numbers 'x' such that x belongs to the real numbers".

Ans: $\{x | x \in \mathbb{R}\}$ or The set of all real numbers.

Range

Vertex - minimum $(1, 1)$
 this is the lowest value of y

$\{y | y \geq 1, y \in \mathbb{R}\}$

The range is the set of all numbers greater than or equal to 1.

G) narrower.

if "a" is a number greater than 1 or less than -1, the graph is narrower

$y = ax^2 + bx + c$
 $-2, -3, \dots$ or $2, 3, 4, \dots$

ii) $y = -3x^2 + 6x$

A) Orientation **down (a is negative)** 

B) Vertex and Type **maximum**


$$x = \frac{-b}{2a} = \frac{-6}{2(-3)} = \frac{-6}{-6} = 1 \rightarrow y = 3$$

$(1, 3)$

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

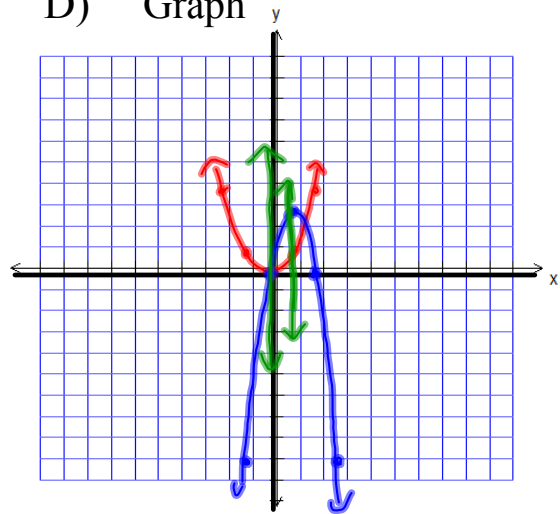
$$y = -3(1) + 6$$

C) Table of Values

Base 

x	$y = x^2$	x	$y = -3x^2 + 6x$
-2	4	-1	-9
-1	1	0	0
0	0	1	3
1	1	2	0
2	4	3	-9

D) Graph



(x, y) \rightarrow max/min value of y.
When it occurs

Equation of AOS for each graph

i) $x = 0$ ii) $x = 1$

E) y has a **maximum** value of $y = 3$ and it occurs at $x = 1$

F) Domain

$\{x | x \in \mathbb{R}\}$

Range

$\{y | y \leq 3, y \in \mathbb{R}\}$

G)

narrower (b/c $a < -1$)

iii) $y = -0.5x^2 - 4$

$y = ax^2 + bx + c$

A) Orientation *down* 

B) Vertex and Type *maximum*

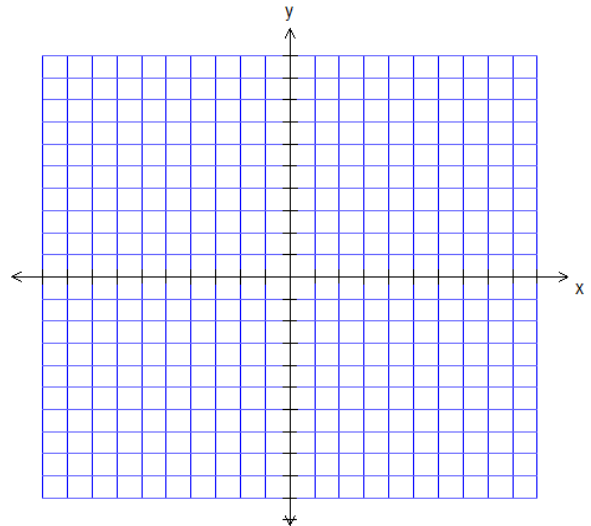
$x = \frac{-b}{2a} = \frac{0}{2(-0.5)}$
 $x = 0$

$y = -0.5(0)^2 - 4$
 $y = 0 - 4$
 $y = -4$

C) Table of Values

D) Graph

x	$y = x^2$	x	$y = -0.5x^2 - 4$
-2	4	-2	-6
-1	1	-1	-4.5
0	0	0	-4
1	1	1	-4.5
2	4	2	-6



Equation of AOS for each graph

E) y has a _____ value of $y =$ _____ and it occurs at $x =$ _____

F) Domain _____ Range _____

G)