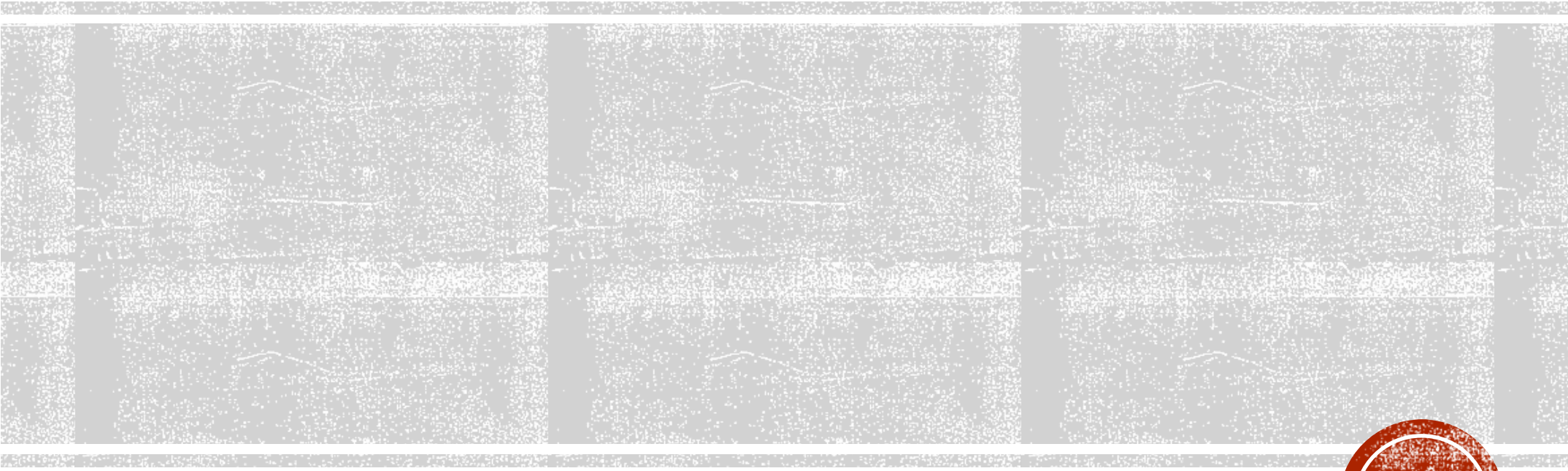


WARM UP U3 DAY 3

Solve for the points of intersections.

1. $y = x^2 + 2x - 4$

$y = 2x + 5$

$x^2 + \cancel{2x} - 4 = \cancel{2x} + \cancel{5}$

$-\cancel{2x} - 5 \quad -\cancel{2x} - \cancel{5}$

$\sqrt{x^2} - \sqrt{9} = 0$

$(x-3)(x+3) = 0$

$x - 3 = 0 \qquad x + 3 = 0$

$+3 \quad +3 \qquad -3 \quad -3$

$x = 3 \qquad x = -3$

$x = 3 \qquad x = -3$

$y = 2(3) + 5 \qquad y = 2(-3) + 5$

$y = 11 \qquad y = -1$

$(3, 11) \qquad (-3, -1)$

2. $x^2 + y^2 = 17$

$y = 4x$

$x^2 + (4x)^2 = 17$

$x^2 + 16x^2 = 17$

$\frac{\cancel{17}x^2}{\cancel{17}} = \frac{17}{17}$

$\sqrt{x^2} = \sqrt{1}$

$x = 1$

$y = 4$

$(1, 4)$

$x = -1$

$y = -4$

$(-1, -4)$

GRAPHING QUADRATIC EQUATIONS

GRAPHING A QUADRATIC EQUATION REVIEW

- The anatomy of a parabola:

Set y=0

x=-3, x=1

Zeros, Roots, Solution, x-intercepts

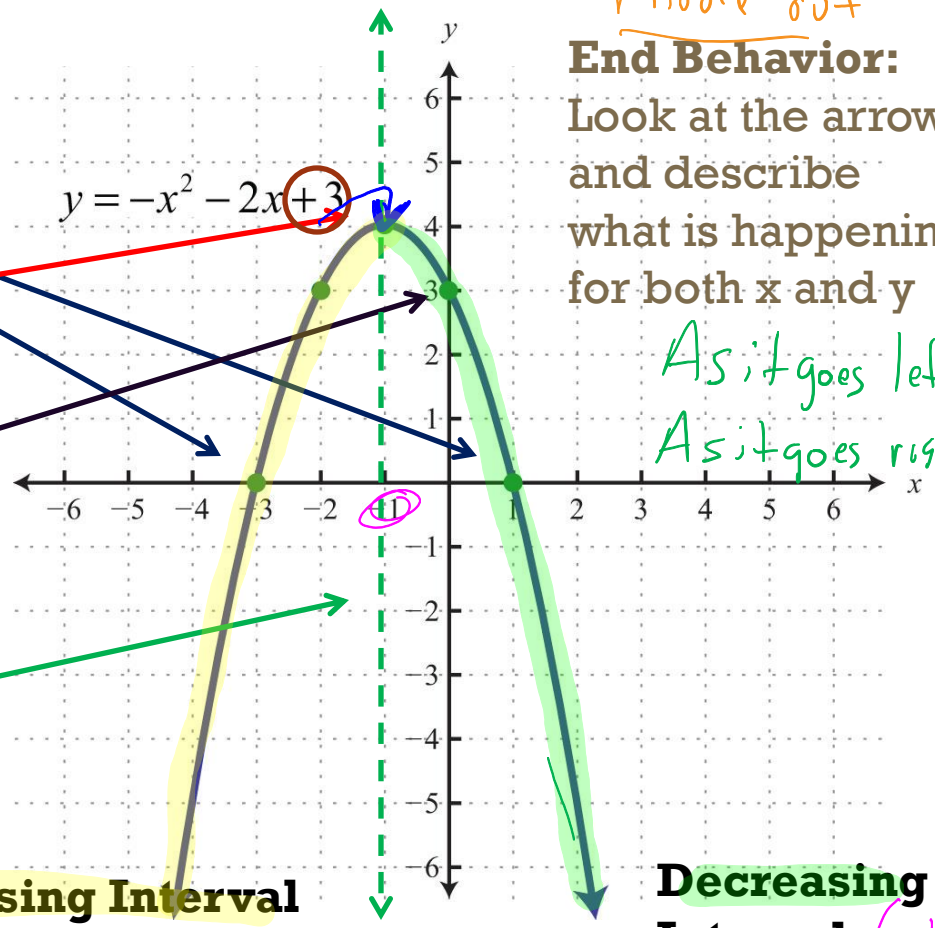
(1,0) point (-3,0)

Vertex

y-intercept

Set x=0

Axis of Symmetry



middle out

End Behavior: Look at the arrows and describe what is happening for both x and y

As it goes left, goes down

As it goes right goes down

Increasing Interval $(-\infty, -1)$

Left to Right

Decreasing Interval $(-1, \infty)$

GRAPHING QUADRATICS

$$y = ax^2 + bx + c$$

$$x = -\frac{b}{2a}$$

Step 1: Find the axis of symmetry

Step 2: **Substitute** the a.o.s. in for x to find y

Step 3: **Plot** the vertex (a.o.s., y found)

Make table with vertex in middle, use Calc to find 2pts above 2pts below

Step 5: **Reflect** this point over the a.o.s

Step 6: **Draw** a curve through your three points!

GRAPHING A PARABOLA

Finding the zeros, roots, solutions, and x-intercepts:

$y = 0$

Solve the equation by factoring.

$$y = x^2 - 6x + 8$$

$0 = x^2 - 6x + 8$

$0 = (x-4)(x-2)$

$x = 4 \qquad x = 2$

Solutions:
x = 4, x = 2

x-intercepts:
(4,0), (2, 0)

GRAPHING A PARABOLA

- Find the y-intercept of the quadratic.

$x = 0$

$$y = x^2 - 6x + 8$$

$y = (0)^2 - 6(0) + 8$

$y = 8$

$(0, 8)$

y-intercept:
(0, 8)

GRAPHING A PARABOLA

- Find the axis of symmetry of the quadratic.

$$y = x^2 - 6x + 8$$

- Hint: use $x = \frac{-b}{2a}$

$$\frac{6}{2(1)} = \frac{6}{2} = 3$$

$$x = 3$$

x = 3

GRAPHING A PARABOLA

- Solving for the vertex.

$$y = x^2 - 6x + 8$$

$x = 3$

$y = (3)^2 - 6(3) + 8$

$y = -1$

$(3, -1)$

Vertex is (3, -1)

GRAPHING A PARABOLA

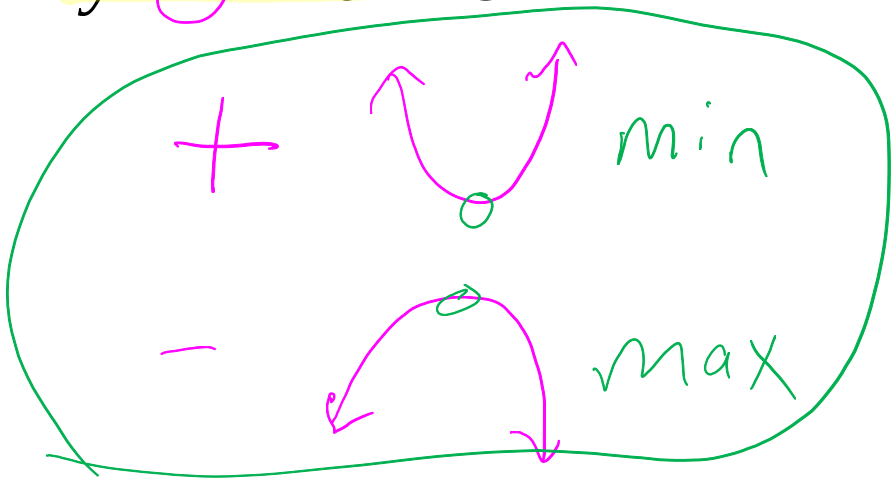
- Determine if the parabola has a maximum or a minimum and the value.

$$y = x^2 - 6x + 8$$

Max or min is ALWAYS the y value of vertex

y = -1

min

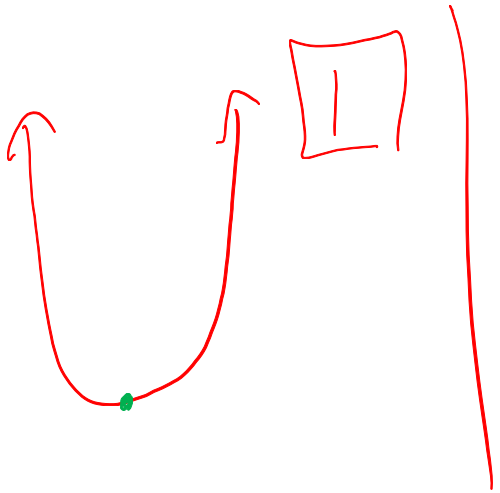


Minimum, -1

GRAPHING A PARABOLA

- Determine the end behavior of the graph

$$y = x^2 - 6x + 8$$



1

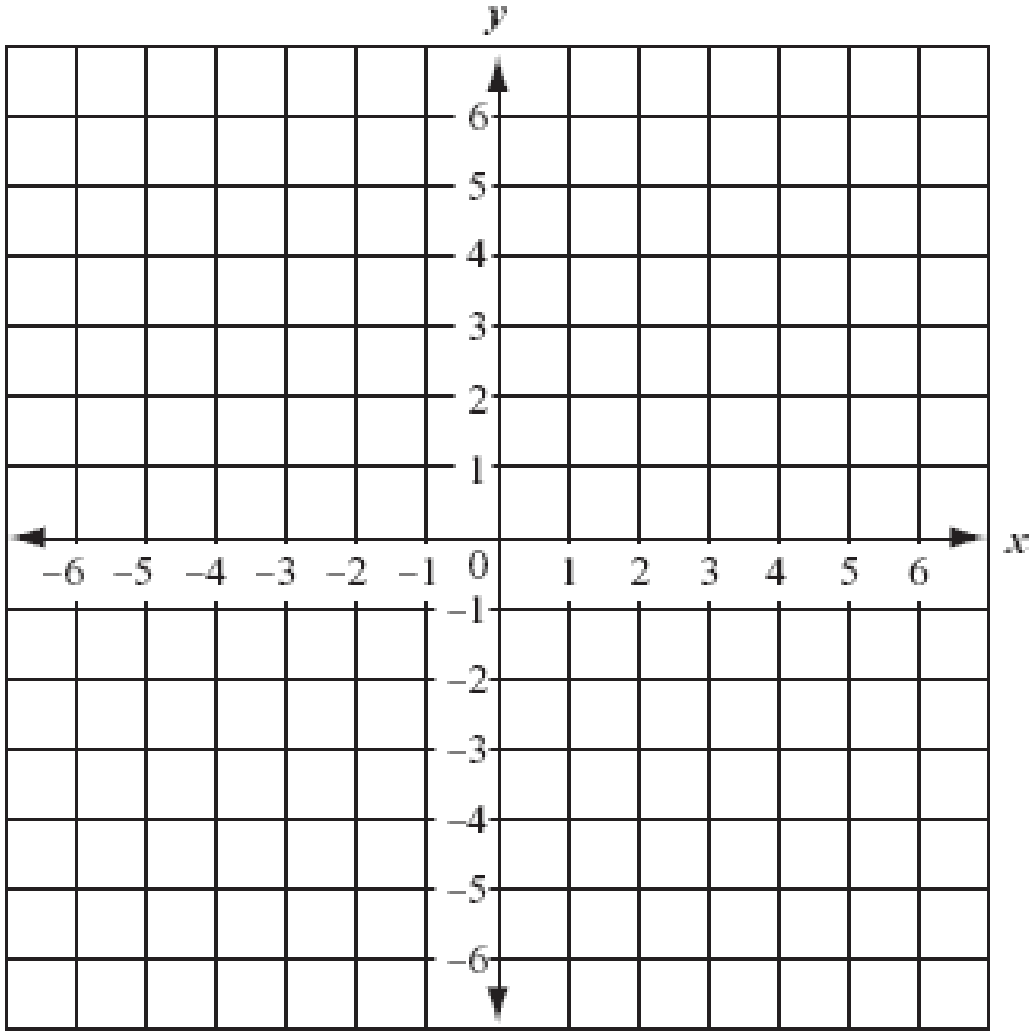
2

As it goes left, it goes up

As it goes right, it goes up

[redacted]

PUT IT ALL TOGETHER TO GRAPH



$$y = x^2 - 6x + 8$$

Vertex:

Domain:

Range:

Increasing Interval:

Decreasing Interval:

End Behavior:

- For the equation $y = x^2 - 4x + 3$ find the:

- 1. solution $y=0$ 2. x-intercepts 3. y-intercept $x=0$

$0 = x^2 - 4x + 3$

$(x-3)(x-1)$

$x=3, x=1$

$(3,0)\ (1,0)$

$y = (0)^2 - 4(0) + 3$

$y = 3$

$\boxed{(0,3)}$

- 4. AOS 5. vertex 6. max/min

$x = \frac{-b}{2a} = \frac{4}{2(1)} = \frac{4}{2} = 2$

$x=2$

$x=2 \quad y=(2)^2-4(2)+3$

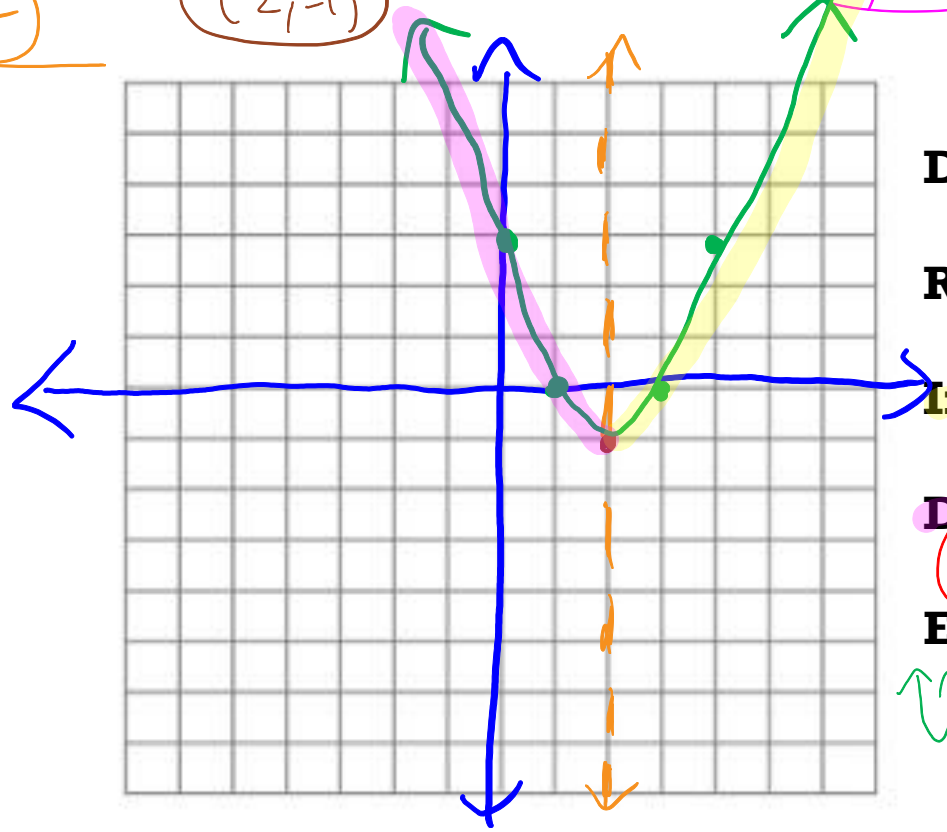
$y=-1$

$(2,-1)$

$y=-1$

- 7. Graph:

0	3
1	0
2	-1
3	0
4	3



Domain: $(-\infty, \infty)$

Range: $[-1, \infty)$

Increasing Interval: $(2, \infty)$

Decreasing Interval: $(-\infty, 2)$

End Behavior:

left, up

right, up

- For the equation $y = -2x^2 + 2x + 12$ find the:
- 1. solution 2. x-intercepts 3. y-intercept

$0 = -2x^2 + 2x + 12$

$x = 0$

$y = -2(0)^2 + 2(0) + 12$

$y = 12$

$(0, 12)$

- 4. AOS

$x = \frac{-b}{2a} = \frac{-2}{2(-2)} = \frac{-2}{-4} = \frac{1}{2}$

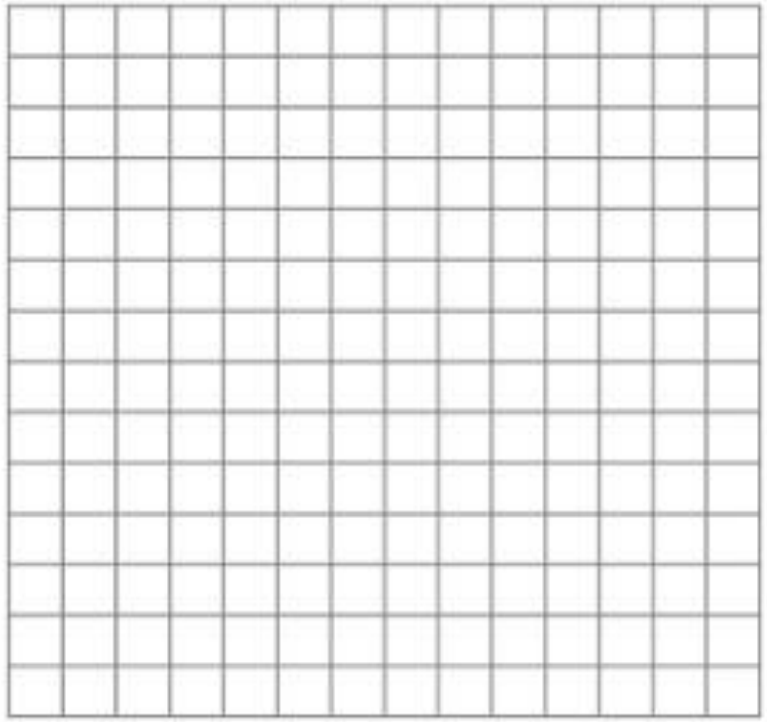
$x = \frac{1}{2}$

5. vertex

$y = -2\left(\frac{1}{2}\right)^2 + 2\left(\frac{1}{2}\right) + 12$

6. max/min

- 7. Graph:



Domain:

Range:

Increasing Interval:

Decreasing Interval:

End Behavior:

- For the equation $y = 15x^2 + x$ find the:
- 1. solution
- 2. x-intercepts
- 3. y-intercept

$0 = 15x^2 + x \Rightarrow 0 = x(15x+1)$

$\boxed{x=0}$

$15x+1=0$

$x = -1/15$

$(0,0)$

$(-1/15, 0)$

$y = 15(0)^2 + 0$

$y = 0$

$(0,0)$

- 4. AOS
- 5. vertex
- 6. max/min

$x = \frac{-1}{2(15)} = -1/30$

$x = -1/30$

$y = 15(-1/30)^2 + -1/30$

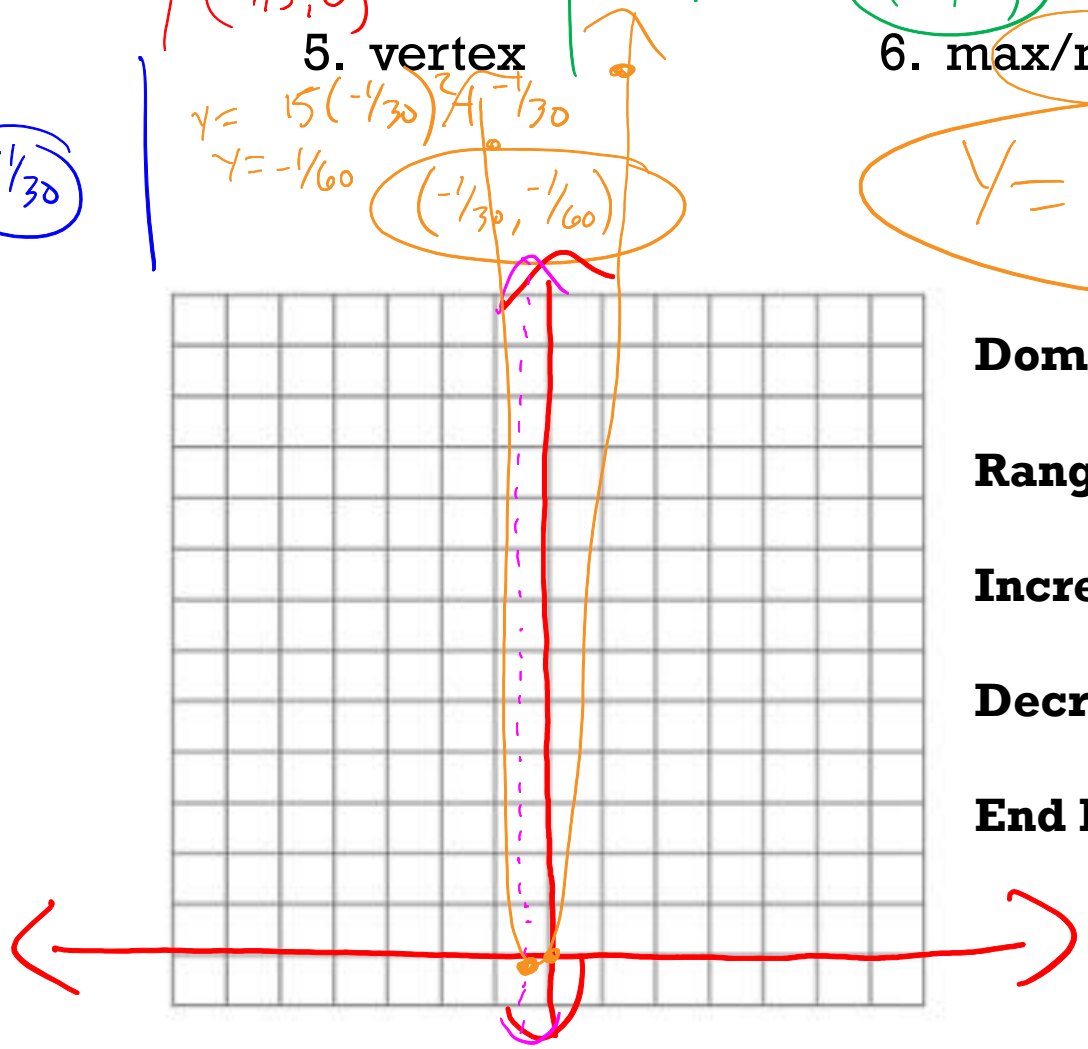
$y = -1/60$

$(-1/30, -1/60)$

$y = -1/60$

- 7. Graph:

x	y
-2	58
-1	14
-1/30	-1/60
0	0
1	16



Domain:

Range:

Increasing Interval:

Decreasing Interval:

End Behavior:

- For the equation $y = 4x^2 - 9$ find the:
- 1. solution
- 2. x-intercepts
- 3. y-intercept
- 4. AOS
- 5. vertex
- 6. max/min
- 7. Graph:

$0 = 4x^2 - 9$

$(2x-3)(2x+3)$

$x = \frac{3}{2}$

$x = -\frac{3}{2}$

$\left(\frac{3}{2}, 0\right)$

$\left(-\frac{3}{2}, 0\right)$

$x = 0$

$y = -9$

$(0, -9)$

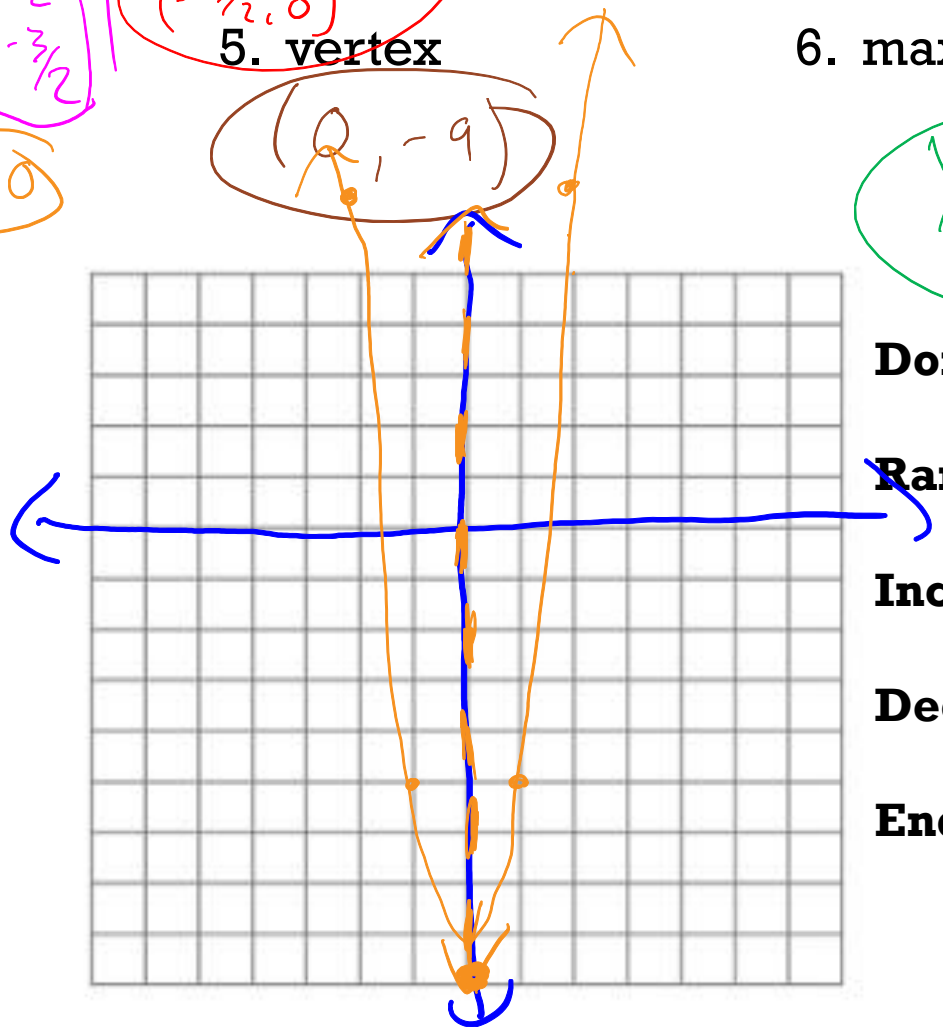
$x = \frac{-b}{2a} = \frac{-0}{2(4)}$

$x = 0$

$(0, -9)$

$y = -9$

-2	7
-1	-5
0	-9
1	-5
2	7



Domain:

Range:

Increasing Interval:

Decreasing Interval:

End Behavior:

- For the equation $y = 2x^2 + 3x + 1$ find the:
- 1. solution 2. x-intercepts 3. y-intercept

$2x+1=0$
$-1 \quad -1$
$2x=-1$
$x=-1/2$

$0=2x^2+3x+1$
$(2x+1)(x+1)$
$x+1=0$
$x=-1$

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

$x=0$
$y=2(0)^2+3(0)+1$
$y=1$
$(0,1)$

- 4. AOS 5. vertex 6. max/min

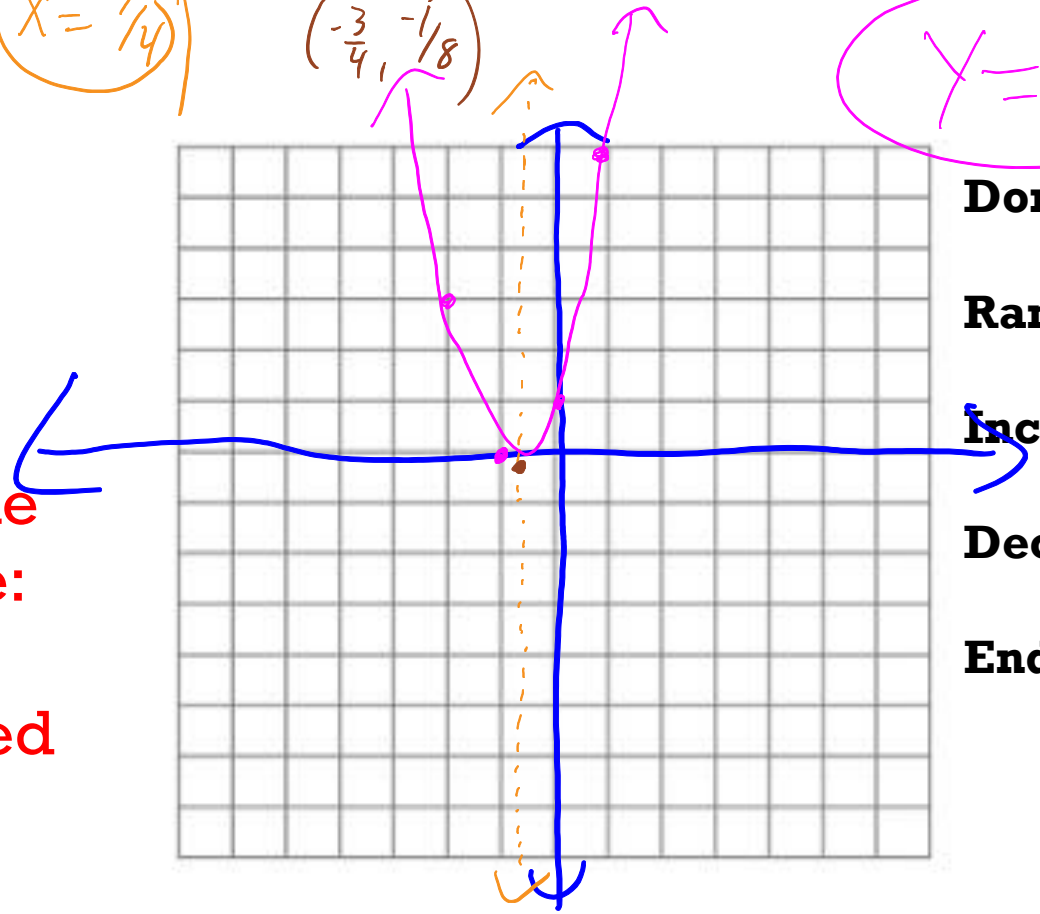
$x=\frac{-b}{2a}=\frac{-3}{2(2)}=\frac{-3}{4}$
$x=-3/4$

$y=2(\frac{-3}{4})^2+3(\frac{-3}{4})+1$
$(\frac{-3}{4}, -1/8)$

$y=-1/8$

- 7. Graph:

-2	3
-1	0
-3/4	-1/8
0	1
1	6



Domain:

Range:

Increasing Interval:

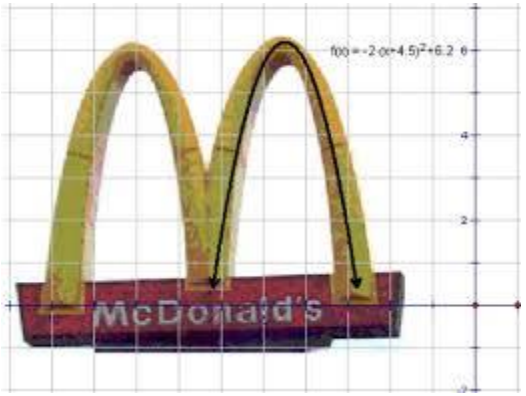
Decreasing Interval:

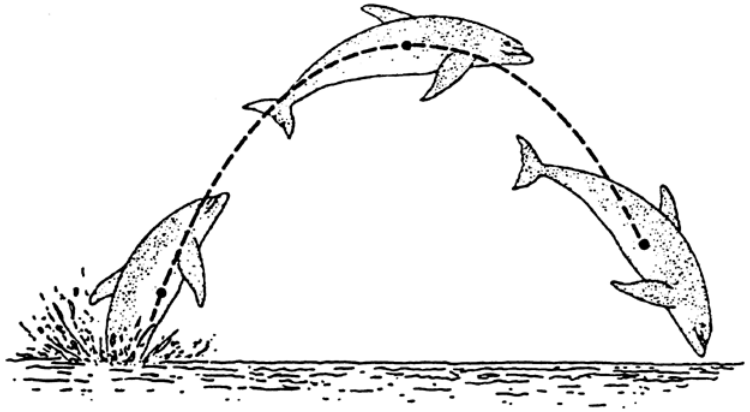
End Behavior:

Teacher Note: Use if needed

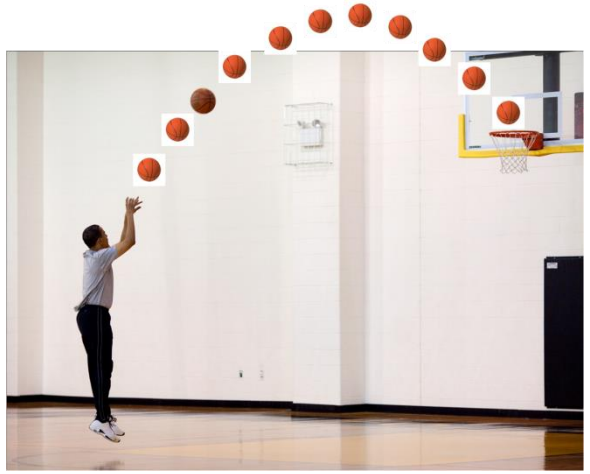
LET'S SEE WHERE QUADRATICS COME INTO PLAY IN THE REAL WORLD…

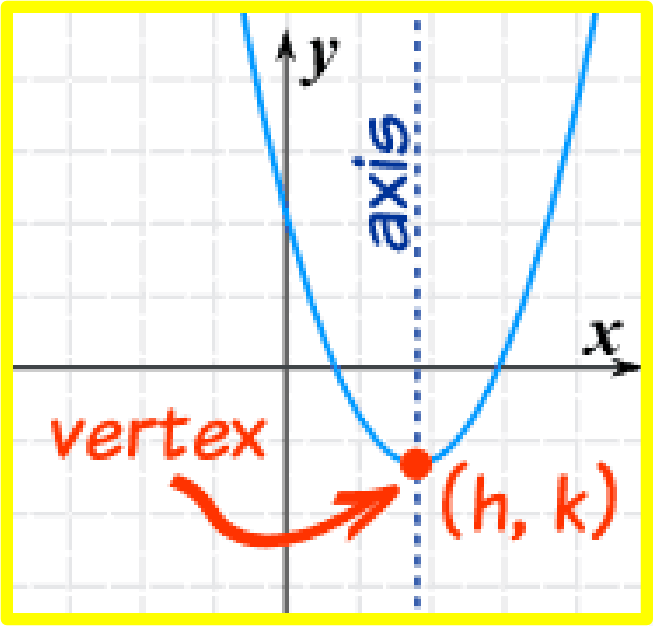
- https://www.youtube.com/watch?v=lbMir1UAO4I
- https://www.youtube.com/watch?v=ReHwNtoRMrY

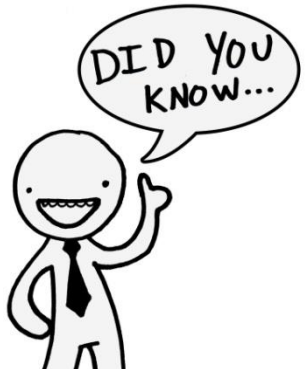

McDonald's



B
C
c
A




y
axis
x
vertex
(h, k)


DID YOU KNOW...