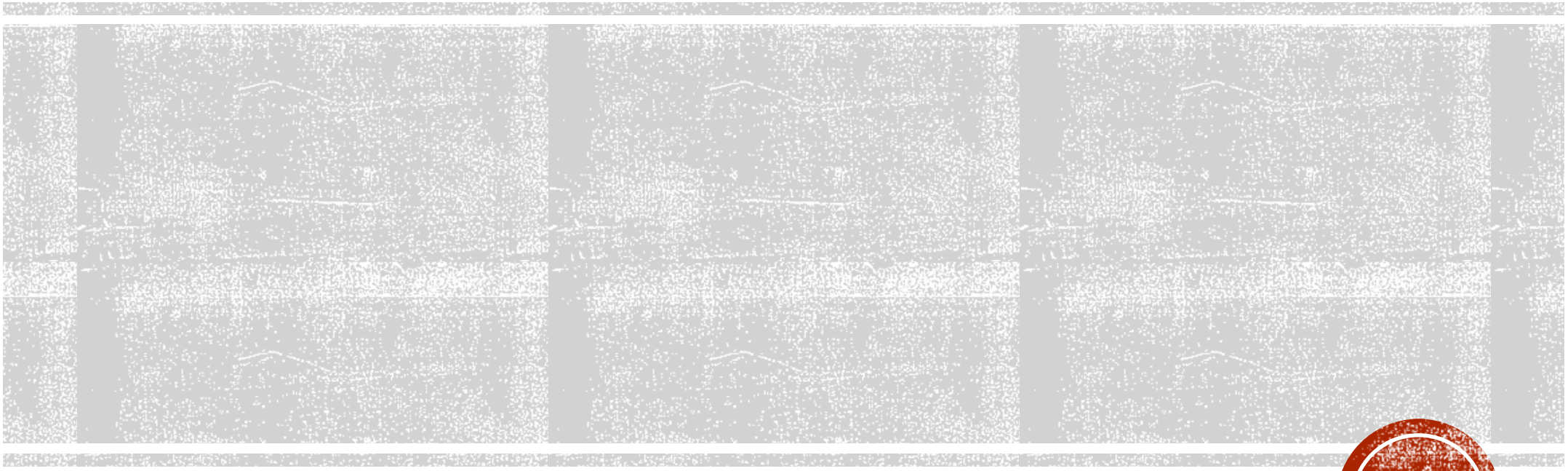


WARM UP U3 DAY 3

Solve for the points of intersections.

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

$y = 2x + 5$

$x^2 + 2x - 4 = 2x + 5$

$-2x \quad -5 \qquad -2x \quad -5$

$x^2 - 9 = 0$

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

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

$x=-3 \qquad x=3$

$x=-3$

$y=2(-3)+5$

$-6+5$

$y=-1$

$(-3,-1)$

$x=3$

$y=2(3)+5$

$6+5$

$y=11$

$(3,11)$

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

$y = 4x$

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

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

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

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

$x=1$

$y=4(1)$

$y=4$

$(1,4)$

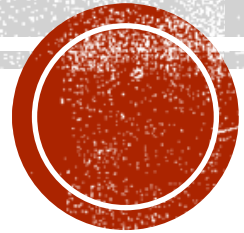
$x=-1$

$y=4(-1)$

$y=-4$

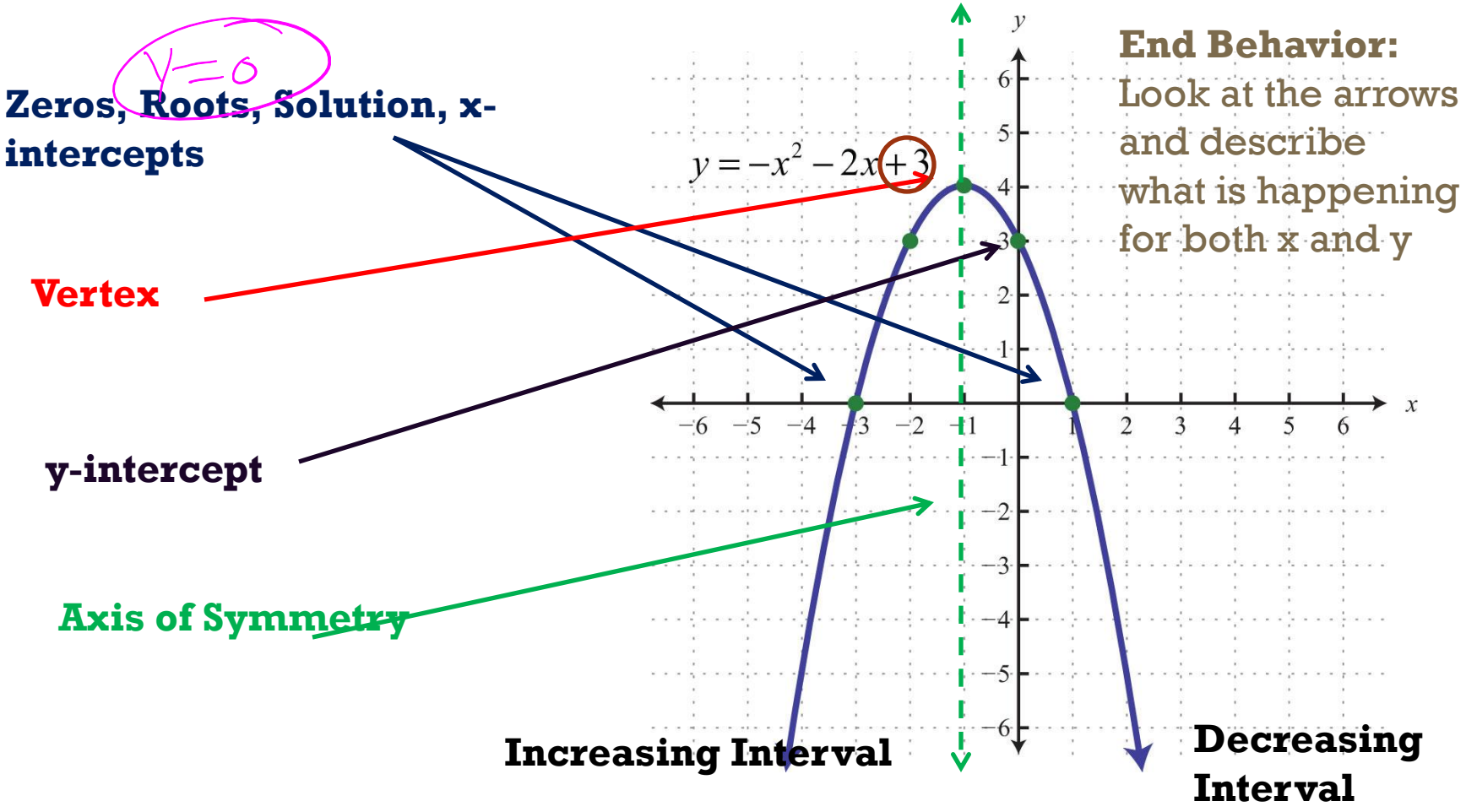
$(-1,-4)$

CRAPHINC QUADRATIC EQUATIONS



GRAPHING A QUADRATIC EQUATION REVIEW

- The anatomy of a parabola:



GRAPHING QUADRATICS

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

Step 1: Find the axis of symmetry $x = -\frac{b}{2a}$

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

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

~~Step 4: Plug in y intercept (0, c)~~ Plug in two x values close to vertex

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

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

GRAPHING A PARABOLA

Finding the zeros, roots, solutions, and

x-intercepts:

Solve the equation by factoring.

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

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

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

$x - 4 = 0$ $\quad$ $x - 2 = 0$

$+4 \quad +4$ $\quad$ $+2 \quad +2$

$x = 4$ $\quad$ $x = 2$

Solutions:
x = 4, x = 2

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

GRAPHING A PARABOLA

- Find the y-intercept of the quadratic.

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

$x = 0$

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

$y = 8$

y-intercept:

(0, 8)

GRAPHING A PARABOLA

- Find the axis of symmetry of the quadratic.

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

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

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

$x = 3$

x = 3

GRAPHING A PARABOLA

- Solving for the vertex.

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

$X = 3$

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

$9 - 18 + 8$

$Y = -1$

$(3, -1)$

1	3
2	0
3	-1
4	0
5	3

$Y = (2)^2 - 6(2) + 8 \quad Y = 0$

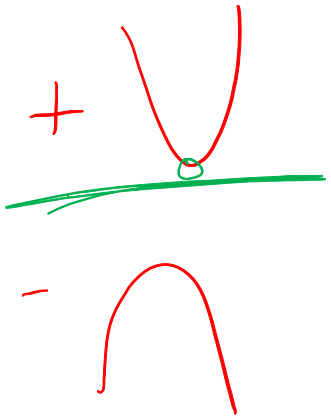
$Y = (1)^2 - 6(1) + 8 \quad Y = 3$

Vertex is (3, -1)

GRAPHING A PARABOLA

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

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



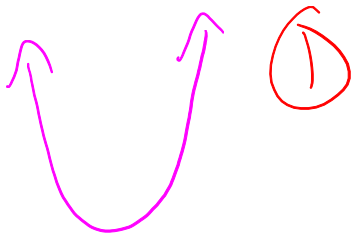
Minimum

max or min is ALWAYS
y value of vertex

Minimum, -1 = y

GRAPHING A PARABOLA

- Determine the end behavior of the graph



1

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

2 rise, rise

left ↑ right ↑

left it rises

$x \to -\infty, y \to \infty$

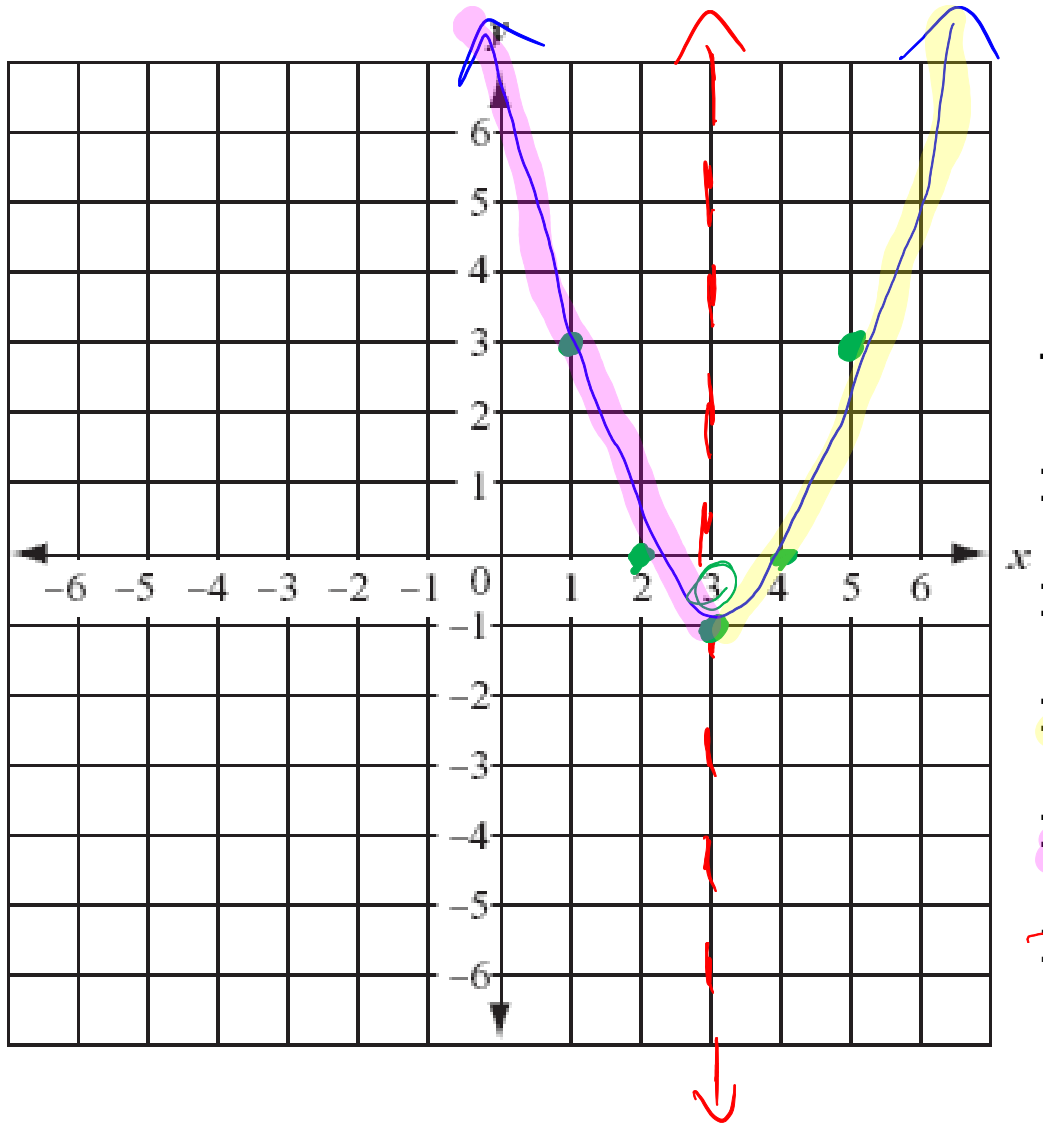
right it rises

$x \to \infty \quad y \to \infty$

As x [illegible] ∞.

As [illegible] ∞.

PUT IT ALL TOGETHER TO GRAPH



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

AOS $x = 3$

Vertex: $(3, -1)$

1	3
2	0
3	−1
4	0
5	3

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

Range: $[-1, \infty)$

Increasing Interval: $(3, \infty)$

Decreasing Interval: $(-\infty, 3)$

X values

middle out

End Behavior:

$x \to -\infty, y \to \infty$

$x \to \infty, y \to \infty$

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

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

$0 = (x-3)(x-1)$

$x = 3 \quad x = 1$

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

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

$y = 3$ $(0,3)$

- 4. AOS $x = \frac{-b}{2a}$

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

- 5. vertex

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

$y = 4 - 8 + 3$

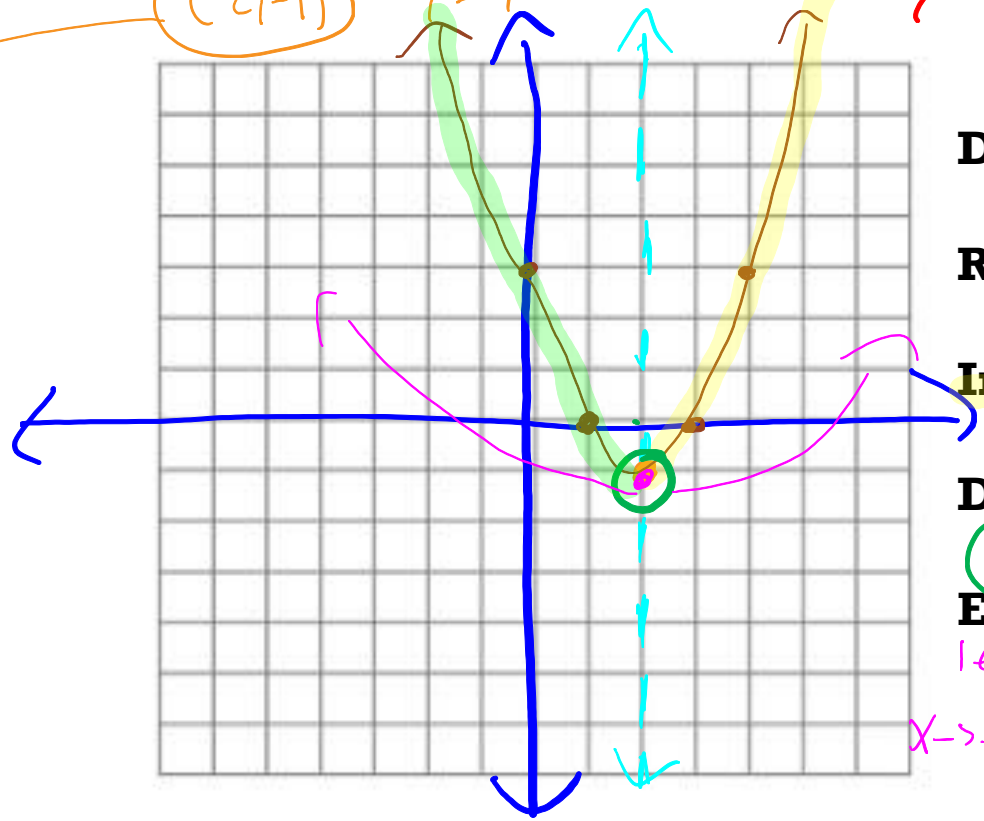
$y = -1$ $(2,-1)$

- 6. max/min

$y = -1$

- 7. Graph:

0	3
1	6
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

$x \to -\infty \quad y \to \infty$ | $x \to \infty \quad y \to \infty$

- For the equation $y = -2x^2 + 2x + 12$ find the:
- 1. solution 2. x-intercepts 3. y-intercept
- 4. AOS 5. vertex 6. ~~max~~/min
- 7. Graph:

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

$-2(x^2 - x - 6)$

$-3, 2$

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

$x = 3 \quad x = -2$

(3,0) (-2,0)

$x = 0$

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

$y = 12$

(0,12)

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

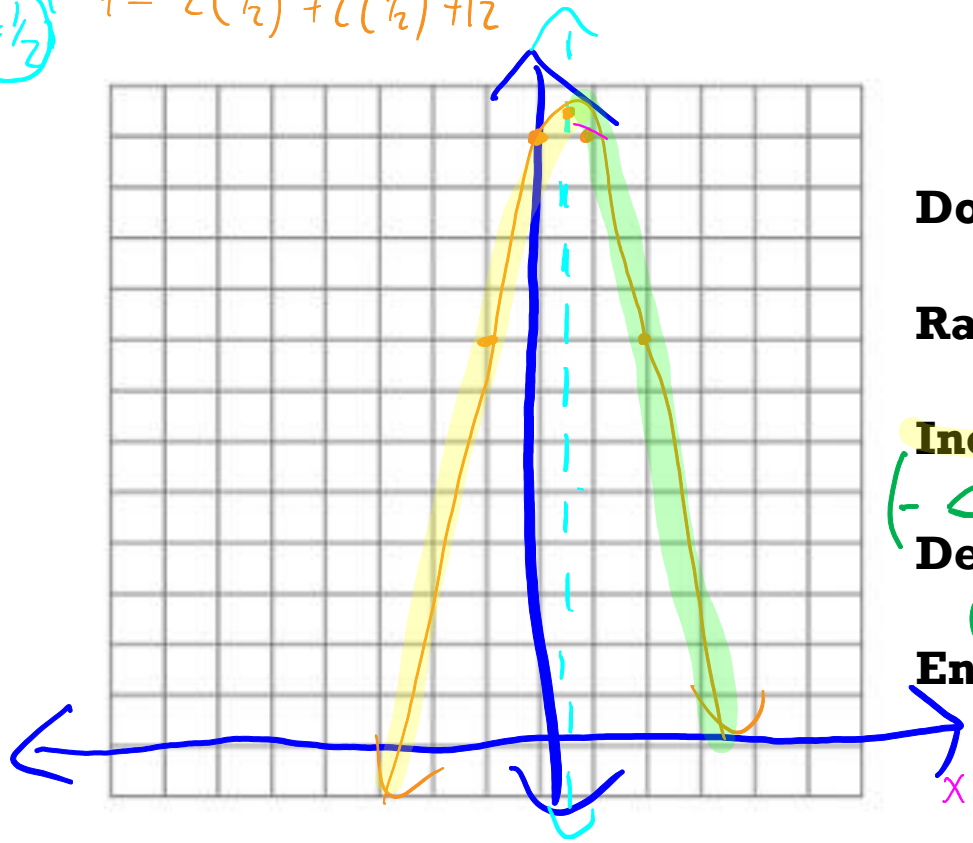
$x = \frac{1}{2}$

$(\frac{1}{2}, 12.5)$

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

y value of vert: $y = 12.5$

x	y
-1	8
0	12
1/2	12.5
1	12
2	8



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

Range: $(-\infty, 12.5]$

Increasing Interval: $(-\infty, \frac{1}{2})$

Decreasing Interval: $(\frac{1}{2}, \infty)$

End Behavior:

left, down: $x \to -\infty \quad y \to -\infty$

right, down: $x \to \infty \quad y \to -\infty$

- For the equation $y = 15x^2 + x$ find the:
- 1. solution
- 2. x-intercepts
- 3. y-intercept
- 4. AOS
- 5. vertex
- 6. max/min
- 7. Graph:

-2	58
-1	14
$-1/30$	$-1/60$
1	16
2	62

Domain:

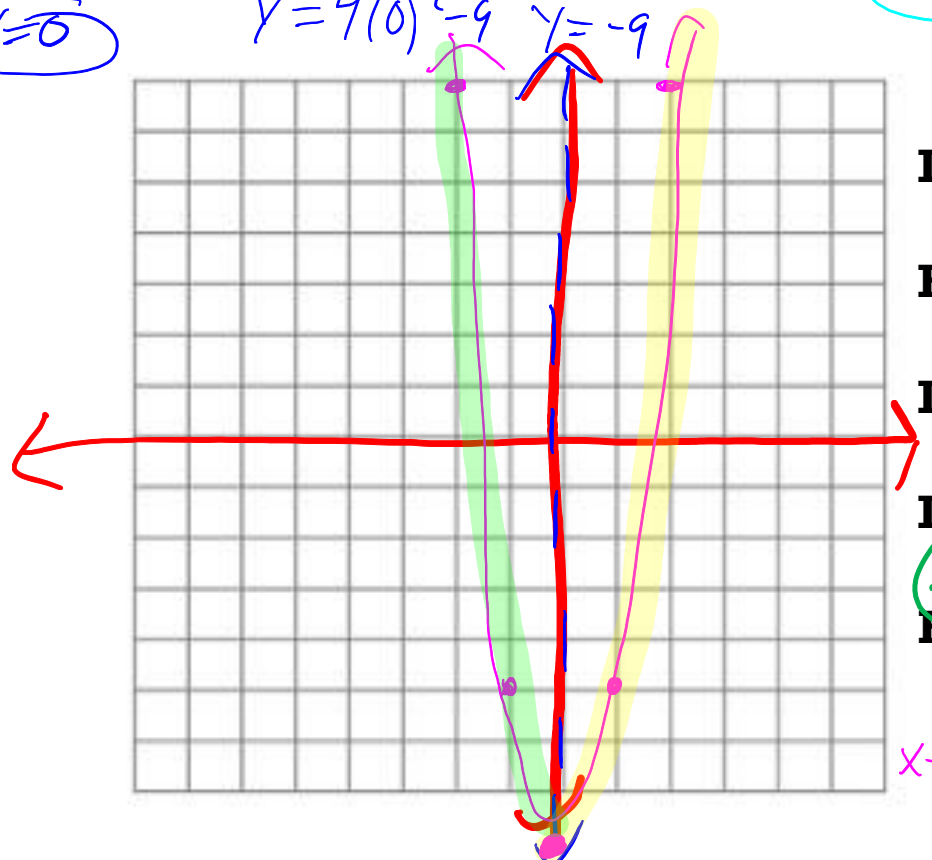
Range:

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:



x	y
-2	7
-1	-5
0	-9
1	-5
2	7

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

Range: $[-9, \infty)$

Increasing Interval: $(0, \infty)$

Decreasing Interval: $(-\infty, 0)$

End Behavior:

left, up

$x \to -\infty \quad y \to \infty$

right, up

$x \to \infty \quad y \to \infty$

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

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

- 7. Graph:

Teacher Note: Use if needed

Domain:

Range:

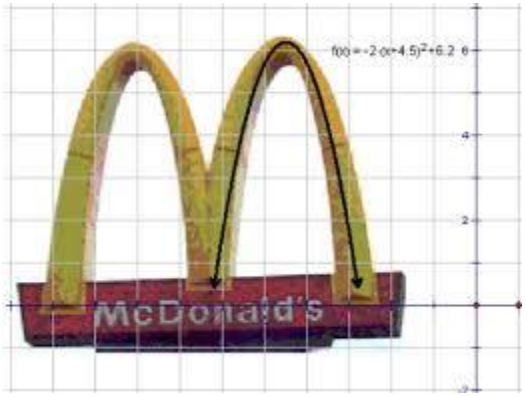
Increasing Interval:

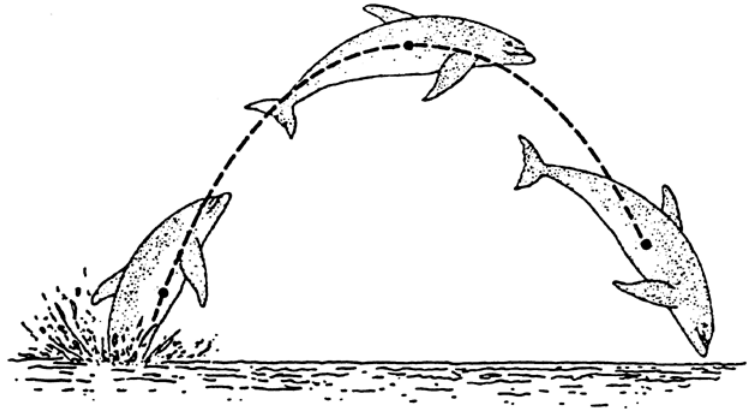
Decreasing Interval:

End Behavior:

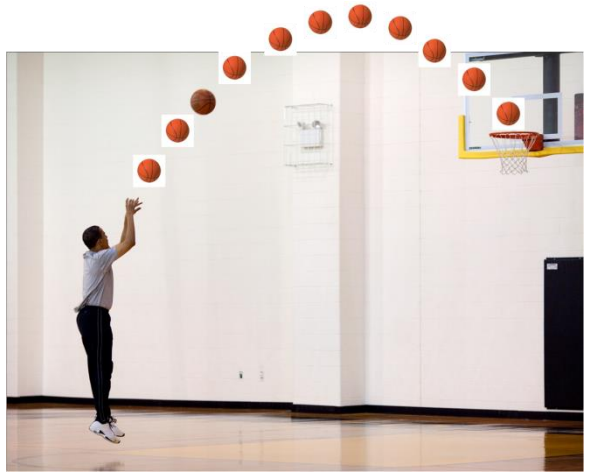
LET'S SEE WHERE QUADRATICS COME INTO PLAY IN THE REAL WORLD...

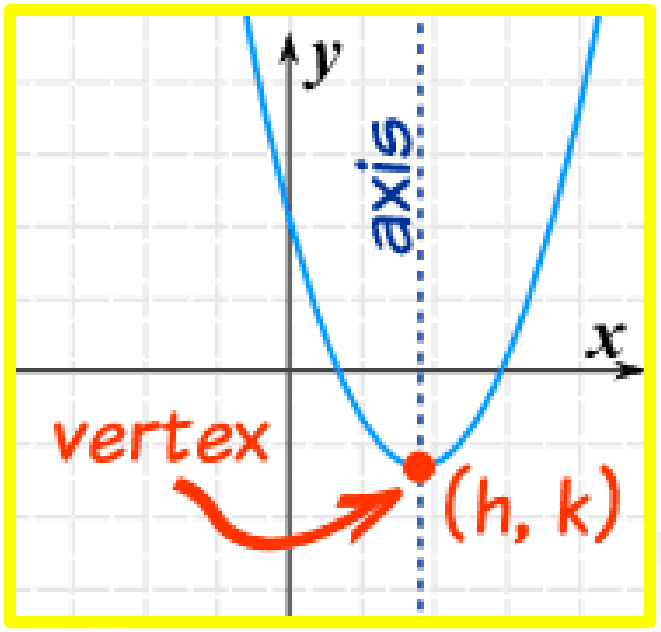
- https://www.youtube.com/watch?v=lbMir1UAO4I
- https://www.youtube.com/watch?v=ReHwNtoRMrY

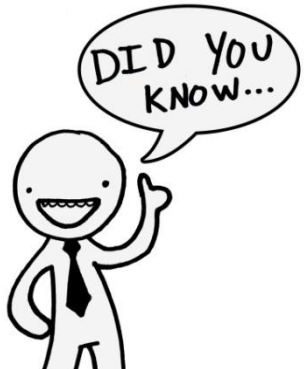

McDonald's



B
C
c
A




y
axis
x
vertex
(h, k)


DID YOU KNOW...