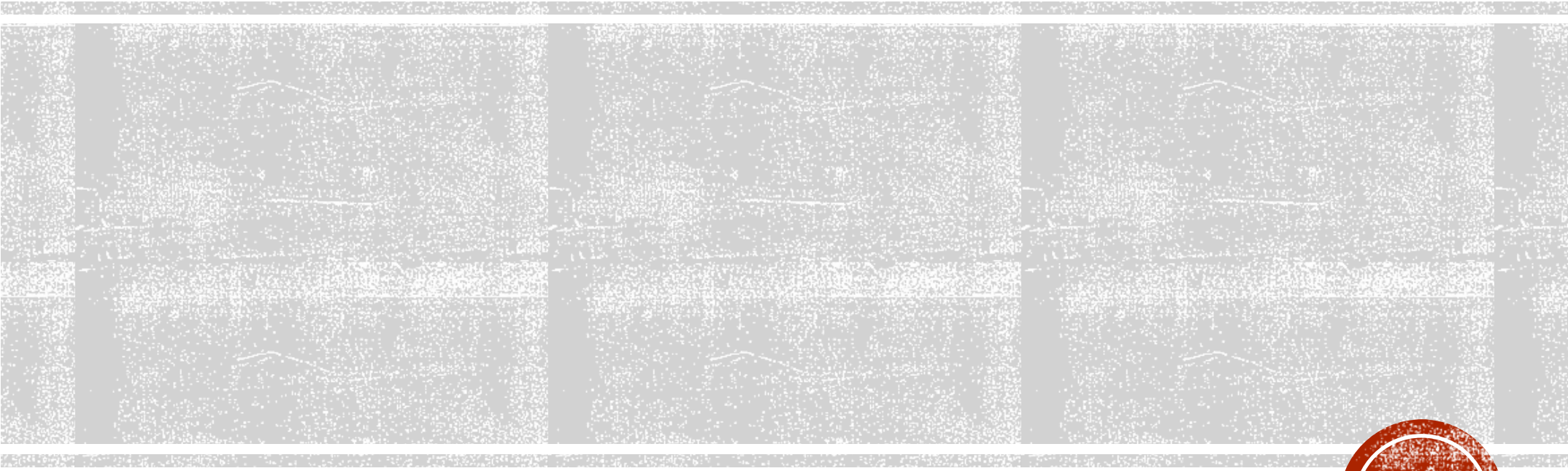


WARM UP U3 DAY 3

Solve for the points of intersections.

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

$y = 2x + 5$

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

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

$x^2 - 9 = 0$

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

$x = -3 \qquad x = 3$

$y = -1 \quad (-3, -1) \qquad (3, 11)$

$y = 2(3) + 5$

$y = 11$

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

$y = 4x$

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

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

$17x^2 = 17$

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

$x = 1$

$y = 4$

$(1, 4)$

$x = -1$

$y = -4$

$(-1, -4)$

GRAPHING QUADRATIC EQUATIONS

GRAPHING A QUADRATIC EQUATION REVIEW

- The anatomy of a parabola:

as it goes left it goes down

as it goes right it goes down

Y=0

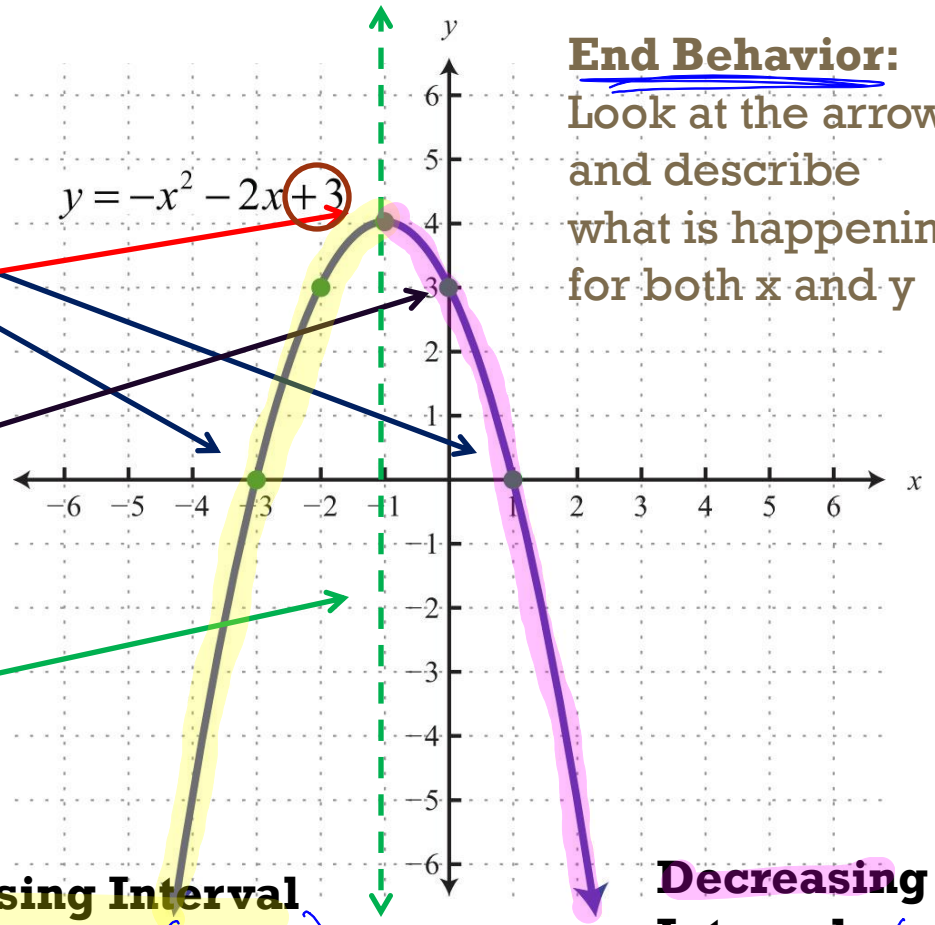
Zeros, Roots, Solution, x-intercepts

Vertex

y-intercept

X=0

Axis of Symmetry



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

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

Decreasing Interval $(-1, \infty)$
x values

GRAPHING QUADRATICS

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

Standard form

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

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)

[redacted]

make a table with vertex in middle
calculate 2 pts above or below 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.

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

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

$$(x-4)(x-2)$$

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

Solutions:
x = 4, x = 2

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

GRAPHING A PARABOLA

- Find the y-intercept of the quadratic.

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

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

$y = 8$

y-intercept:
(0, 8)

GRAPHING A PARABOLA

- Find the axis of symmetry of the quadratic.

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

- Hint: use

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

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

$$\boxed{x = 3}$$

$6/(2(1))$

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

$(1)^2 - 6(1) + 8$

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

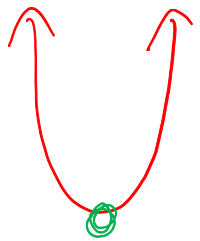
Vertex is (3, -1)

GRAPHING A PARABOLA

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

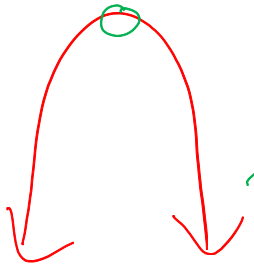
$$y = x^2 - 6x + 8$$

+



min

−



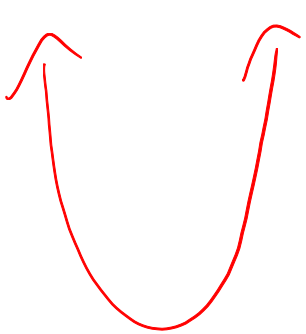
max

Minimum, -1

y value of vertex

GRAPHING A PARABOLA

- Determine the end behavior of the graph



1

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

2

go left, goes up

go right, goes up

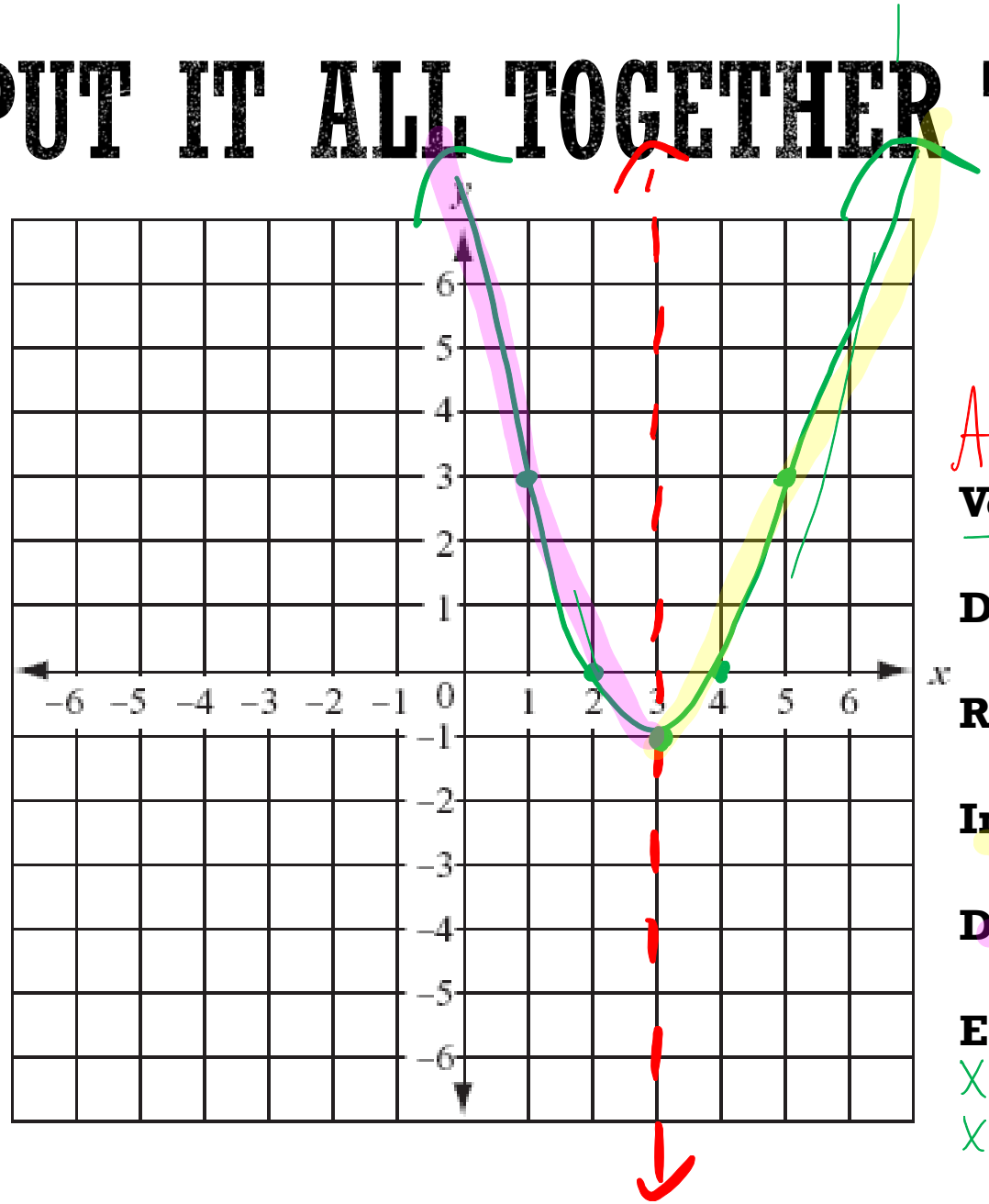
3

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

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

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

PUT IT ALL TOGETHER TO GRAPH



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

AOS $x = 3$

Vertex: $(3, -1)$

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

Range: $[-1, \infty)$

Increasing Interval: $(3, \infty)$

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

End Behavior:

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

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

1	3
2	0
3	-1
4	0
5	3

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

$y=0$

- 1. solution
- 2. x-intercepts
- 3. y-intercept

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

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

$x=3, x=1$

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

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

$y=3$

$(0,3)$

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

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

$x=2$

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

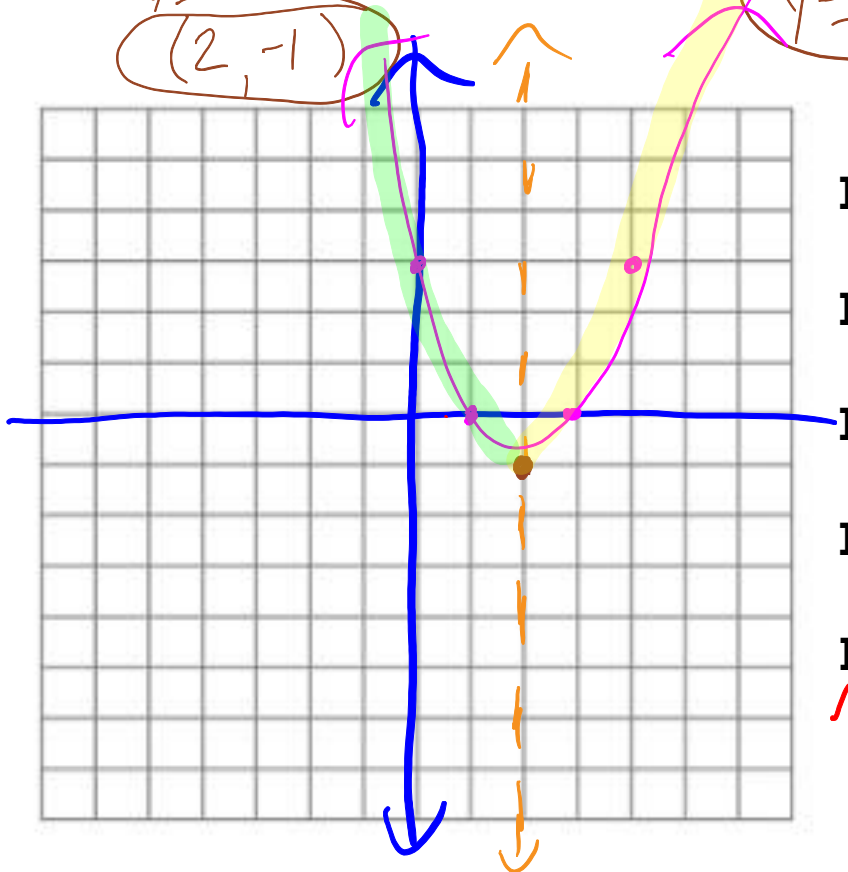
$y=-1$

$(2,-1)$

$y=-1$

- 7. Graph:

x	y
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

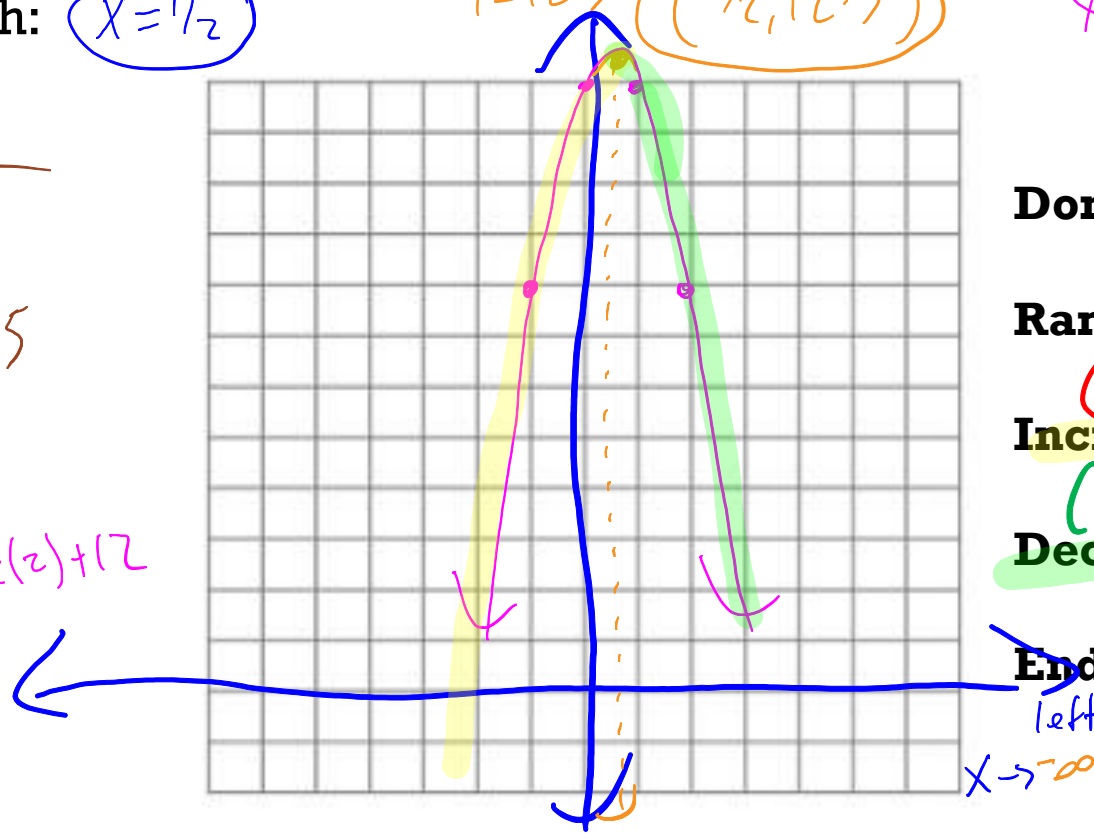
$x \to -\infty \quad y \to \infty$

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

- For the equation $y = -2x^2 + 2x + 12$ find the:
- 1. solution
  $0 = -2x^2 + 2x + 12$
  $x = 3 \quad x = -2$
- 2. x-intercepts
  $(3,0)\ (-2,0)$
- 3. y-intercept $x = 0$
  $y = -2(0)^2 + 2(0) + 12$
  $y = 12$
  $(0,12)$
- 4. AOS
  $x = \frac{-b}{2a} = \frac{-2}{2(-2)} = \frac{-2}{-4}$
  $x = 1/2$
- 5. vertex
  $y = -2(1/2)^2 + 2(1/2) + 12$
  $y = 12.5$
  $(1/2, 12.5)$
- 6. max/min
  $y = 12.5$
- 7. Graph:

-1	8
0	12
$\frac{1}{2}$	12.5
1	12
2	8

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



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

Range: $(-\infty, 12.5]$

Increasing Interval: $(-\infty, 1/2)$

Decreasing Interval: $(1/2, \infty)$

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

$x(15x+1) = 0$

$x = 0 \quad x = -1/15$

- 2. x-intercepts

$(0,0) \quad (-1/15, 0)$

- 3. y-intercept

$x = 0 \quad 15(0)^2 + 0$

$y = 0$

$(0,0)$

- 4. AOS

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

- 5. vertex

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

$y = -1/60$

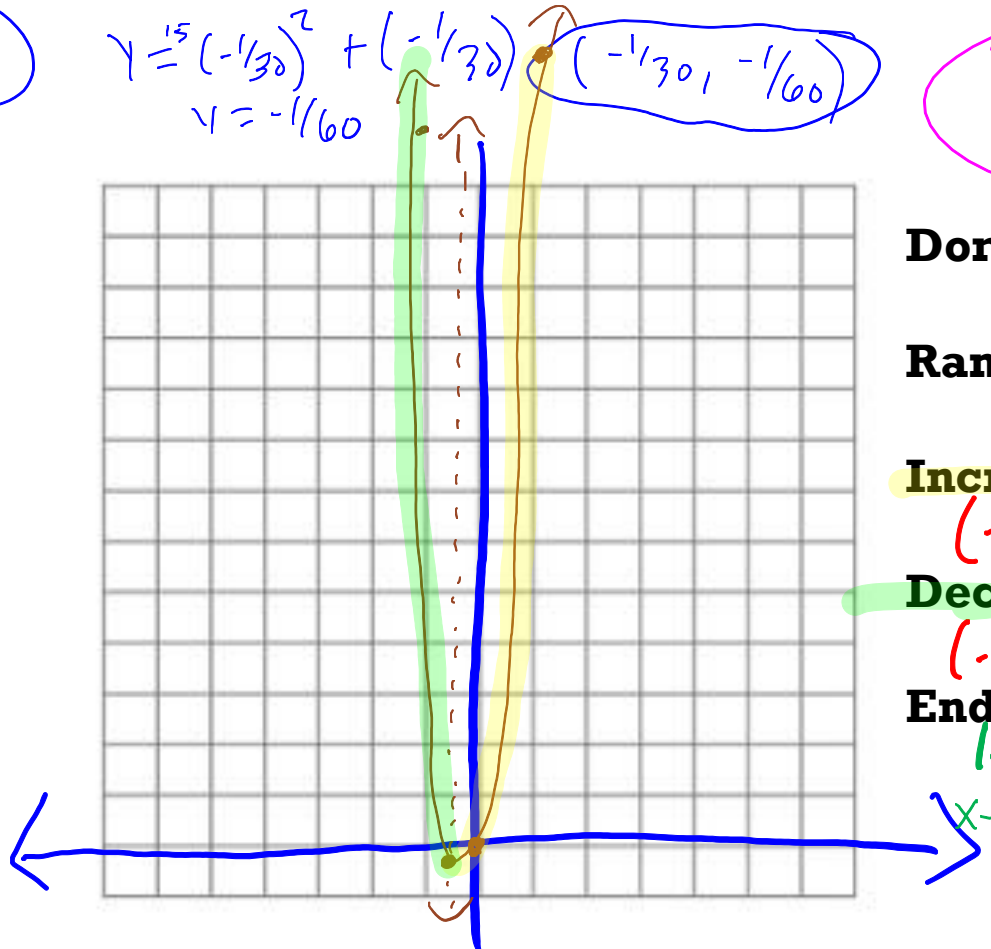
$(-1/30, -1/60)$

- 6. max/min

$y = -1/60$

- 7. Graph:

-2	58
-1	14
$-1/30$	$-1/60$
0	0
1	16



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

Range: $[-1/60, \infty)$

Increasing Interval:

$(-1/30, \infty)$

Decreasing Interval:

$(-\infty, -1/30)$

End Behavior:

left, rise $\quad x \to -\infty \quad y \to \infty$

right, rise $\quad x \to \infty \quad y \to \infty$

- For the equation $y = 4x^2 - 9$ find the:
- 1. solution
- 2. x-intercepts
- 3. y-intercept

$0 = 4x^2 - 9$

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

$x = 3/2$

$x = -3/2$

$(3/2, 0)$ $(-3/2, 0)$

$(0, -9)$

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

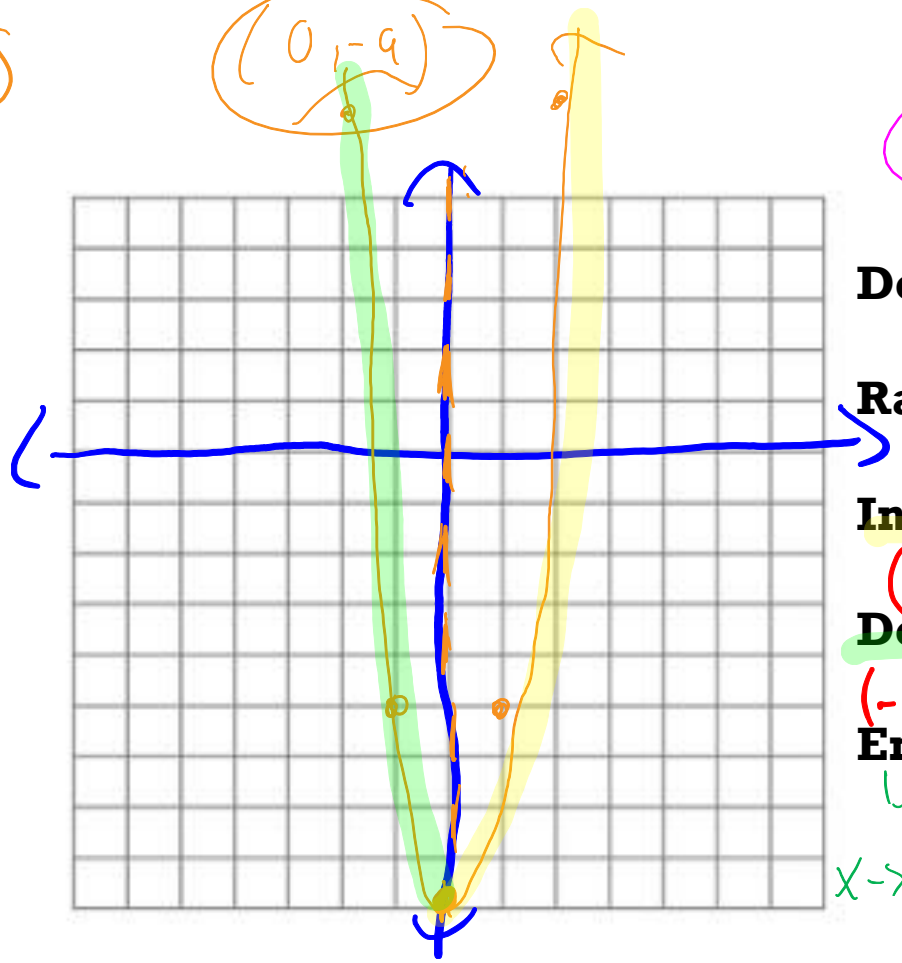
$x = \frac{-0}{2(4)}$ $x = 0$

$(0, -9)$

$y = -9$

- 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:

$(-\infty, 0)$

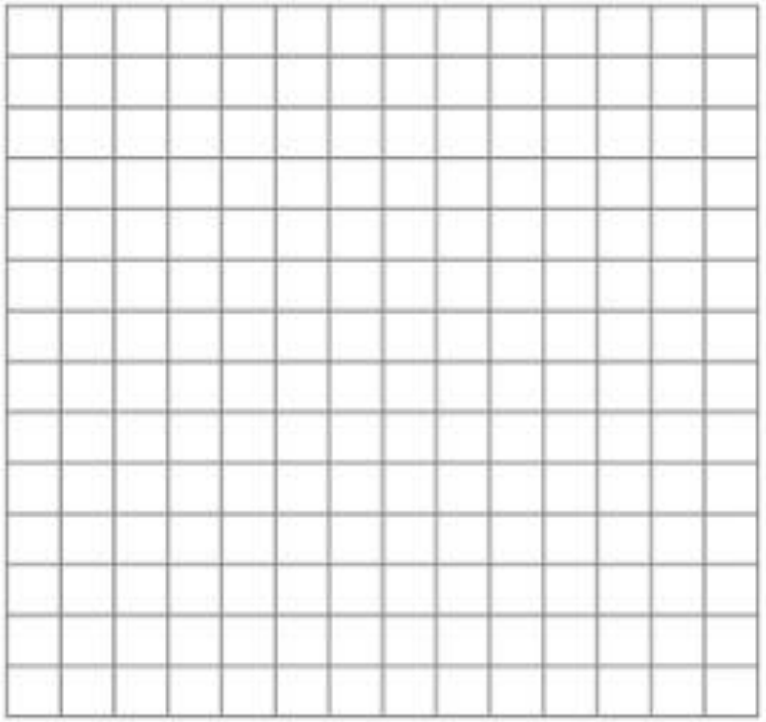
End Behavior:

left rise | right rise

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

- 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:

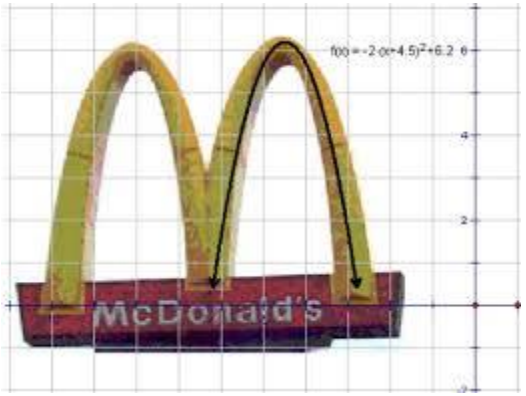
Increasing Interval:

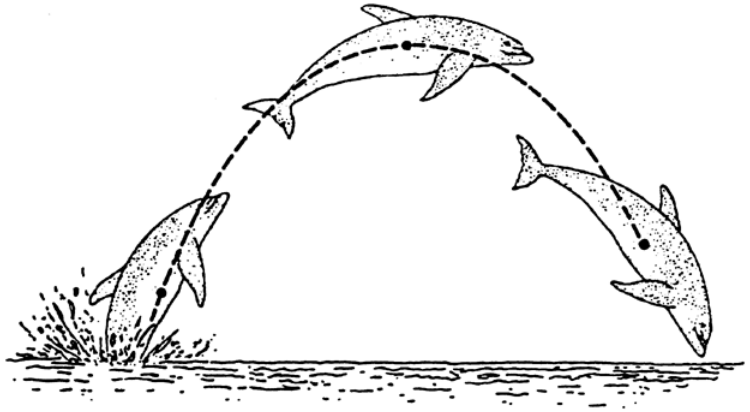
Decreasing Interval:

End Behavior:

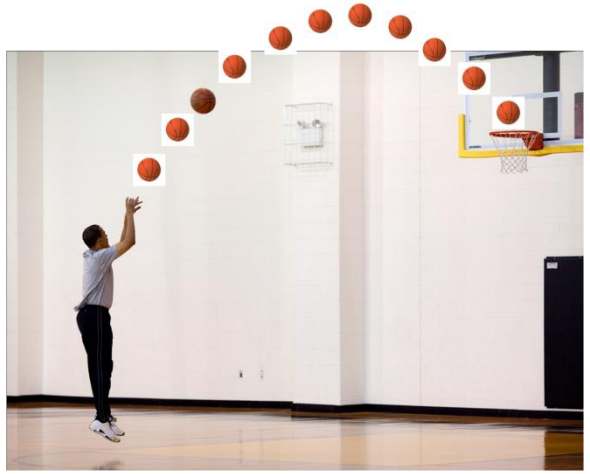
LET'S SEE WHERE QUADRATICS COME INTO PLAY IN THE REAL WORLD…

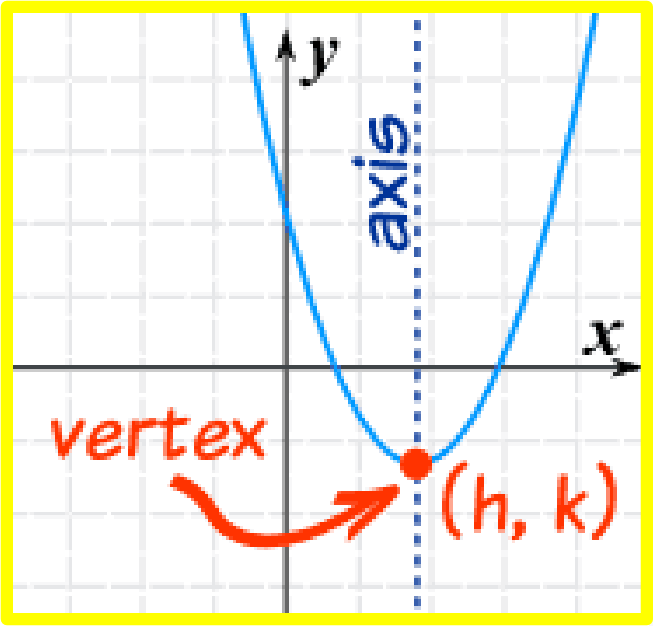
- https://www.youtube.com/watch?v=lbMir1UAO4I
- https://www.youtube.com/watch?v=ReHwNtoRMrY

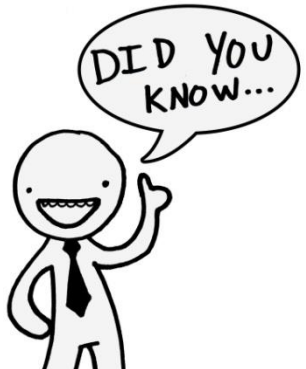

McDonald's



B
C
c
A




y
axis
x
vertex
(h, k)


DID YOU KNOW...