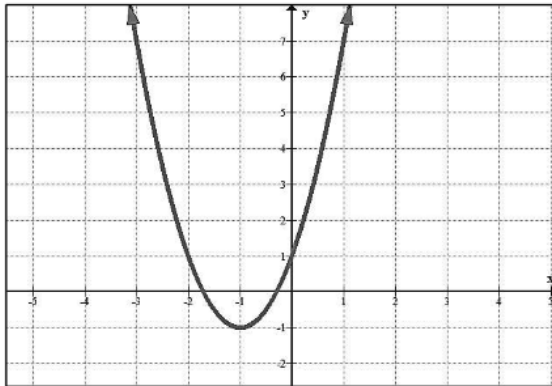


Good morning!

1. "Here"
2. Notes on converting between forms
3. Homework is on DeltaMath:)



Graphing in Vertex Form – Practice



1) Determine the equation for the function graphed on the left.

a) Domain:

b) Range:

c) Extrema:

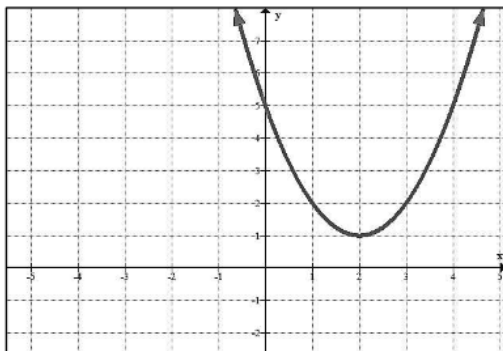
d) Axis of Symmetry:

e) Increasing:

f) Decreasing:

g) As $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$

h) AROC $-3 \leq x \leq -1$.



1) Determine the equation for the function graphed on the left.

a) Domain:

b) Range:

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e) Increasing:

f) Decreasing:

g) As $x \rightarrow -\infty, f(x) \rightarrow \underline{\hspace{2cm}}$

h) As $x \rightarrow \infty, f(x) \rightarrow \underline{\hspace{2cm}}$

i) AROC between $x = 1$ and $x = 4$.

Graphing and Characteristics of Quadratic Functions
[standard form]

To graph a quadratic function that is in standard form, follow these steps:

- ① Create an x-y table with 5 rows
- ② Find the vertex – this goes in the middle row

To find the x-value of the vertex: $x = \frac{-b}{2a}$

Then plug the x-value into the equation to get the y-value

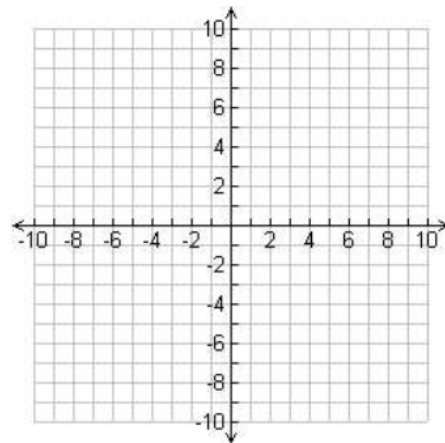
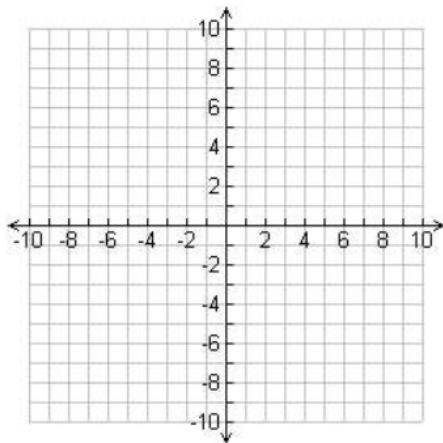
- ③ Fill out the two x-values before and after the vertex
- ④ Use your calculator to find the y-values and graph

****Note:** the y-intercept of a quadratic function in standard form is _____ ******

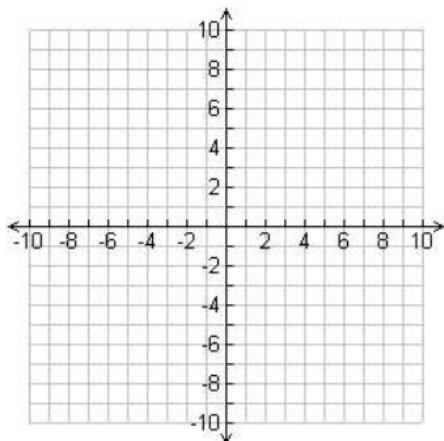
For the following problems, find the vertex and graph the function.

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

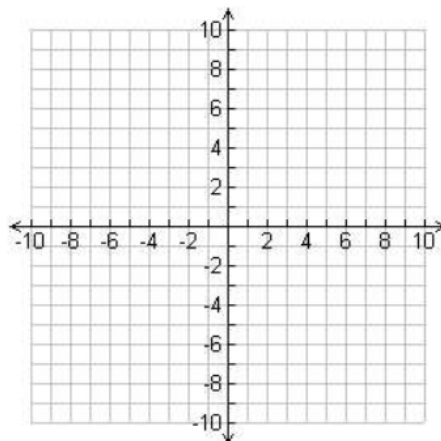
2) $y = 3x^2 - 6x$



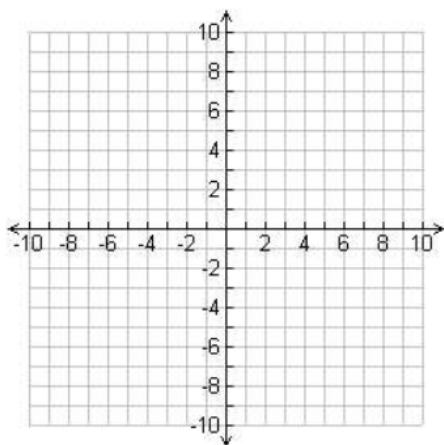
3) $f(x) = -x^2 + 6x - 9$



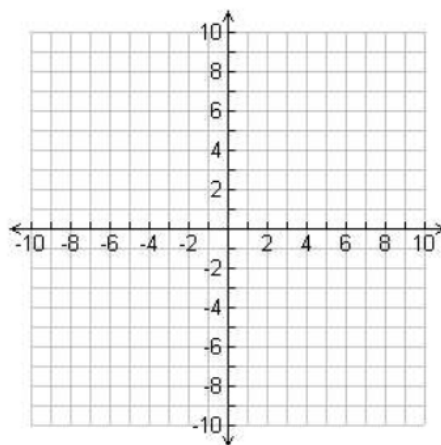
4) $y = \frac{1}{2}x^2 + 2x - 6$



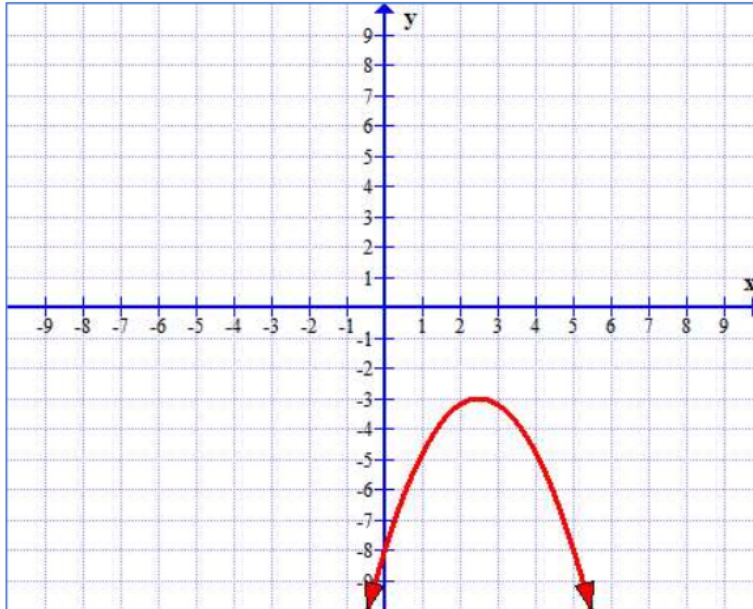
5) $f(x) = -1.2x^2 + 8$



6) $y = 2x^2 - 10x + 3$



For the graphs below, find the characteristics listed.



Domain:

Range:

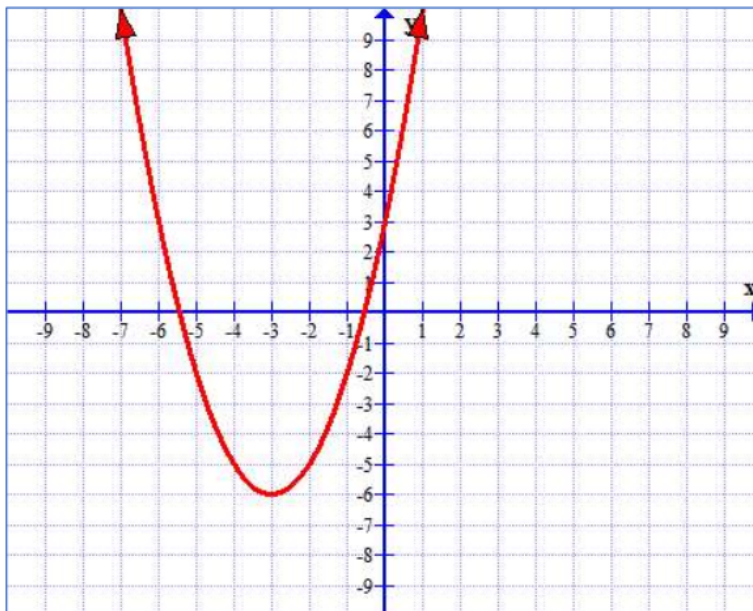
Zeros:

Y-Intercepts:

Interval of Increase:

As $x \rightarrow \infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$

Extrema:



Range:

X-Intercepts:

Max or Min:

As $x \rightarrow \infty$, $f(x) \rightarrow \underline{\hspace{2cm}}$

Interval of Increase:

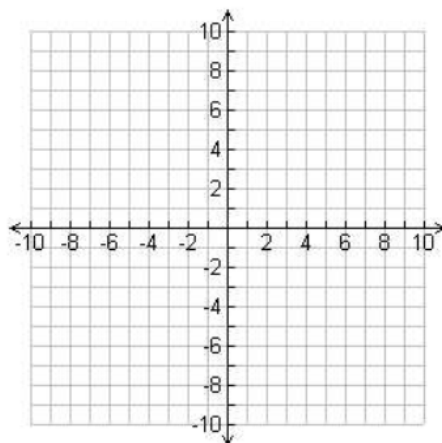
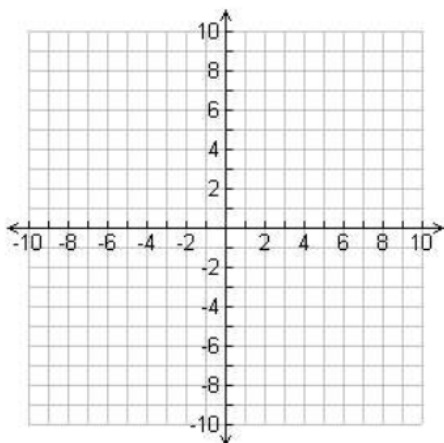
Interval of Decrease

Graphing in Standard Form – Practice

Graph the following.

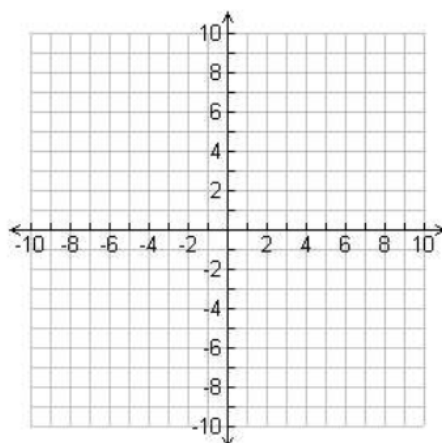
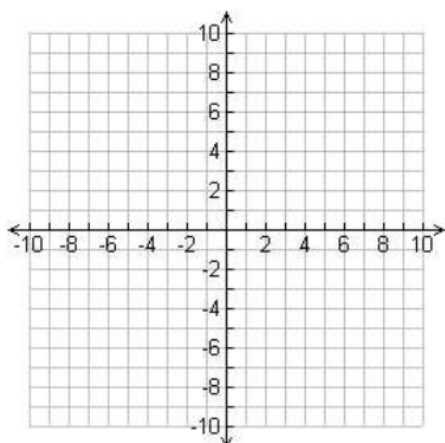
1) $y = 2x^2 + 6x + 3$

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



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

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



Converting Between Vertex and Standard Form

Converting From Standard Form to Vertex Form

- 1) Identify a , b , and c from the equation
- 2) Find the x -value of the vertex by using $x = \frac{-b}{2a} \rightarrow h$
- 3) Find the y -value of the vertex by plugging in the x -value from step #2 $\rightarrow k$
- 4) Plug a (from original equation), h (the x -value of vertex), and k (the y -value of the vertex) into vertex form

$$1) y = x^2 + 12x + 32$$

$$a = 1 \quad b = 12 \quad c = 32$$

$$h = \frac{-b}{2a} = \frac{-12}{2(1)} = -6$$

$$k = (-6)^2 + 12(-6) + 32$$

$$= 36 - 72 + 32$$

$$k = -4$$

$$y = 1(x + 6)^2 - 4$$

$$2) f(x) = x^2 - 8x - 9$$

$$a = 1 \quad b = -8 \quad c = -9$$

$$h = \frac{-b}{2a} = \frac{-(-8)}{2(1)} = 4$$

$$k = (4)^2 - 8(4) - 9$$

$$= 16 - 32 - 9$$

$$k = -25$$

$$y = 1(x - 4)^2 - 25$$

$$3) f(x) = x^2 + 10x - 3$$

$$a = 1 \quad b = 10 \quad c = -3$$

$$h = \frac{-b}{2a} = \frac{-10}{2(1)} = -5$$

$$k = (-5)^2 + 10(-5) - 3$$

$$= 25 - 50 - 3$$

$$k = -28$$

$$y = 1(x + 5)^2 - 28$$

$$4) y = x^2 - 6x + 15$$

$$a = 1 \quad b = -6 \quad c = 15$$

$$h = \frac{-b}{2a} = \frac{-(-6)}{2(1)} = 3$$

$$k = (3)^2 - 6(3) + 15$$

$$= 9 - 18 + 15$$

$$k = 6$$

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

$$2) f(x) = x^2 - 8x - 9$$

$$a=1 \quad b=-8 \quad c=-9$$

$$h = \frac{-b}{2a} = \frac{-(-8)}{2(1)} = 4$$

$$k = (4)^2 - 8(4) - 9$$

$$k = 16 - 32 - 9$$

$$k = -25$$

$$y = 1(x-4)^2 - 25$$

$$y = x^2 - 8x - 9$$

$$0 = x^2 - 8x - 9$$

$$\begin{array}{r} +9 \qquad \qquad +9 \\ \hline x^2 - 8x + 16 = 9 + 16 \end{array}$$

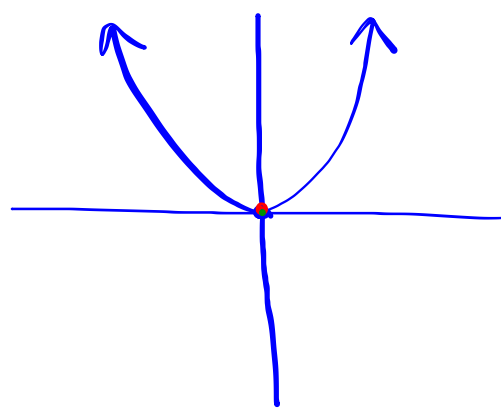
$$(x-4)^2 = 25$$

$$\begin{array}{r} -25 \quad -25 \\ \hline (x-4)^2 - 25 = 0 \end{array}$$

$$y = (x-4)^2 - 25$$

Standard form

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



Vertex form

$$y = a(x-h)^2 + k$$

P
E
E
M
D
S
A

Converting from Vertex Form to Standard Form

- 1) Re-write the binomial squared as the product of a binomial multiplied by itself
- 2) Use the distributive property to multiply
- 3) Distribute the coefficient, if there is one
- 4) Combine like terms

1) $f(x) = 2(x-5)^2 + 8$

$$\begin{aligned} & (x-5)(x-5) \\ & x^2 - 5x - 5x + 25 \\ & 2(x^2 - 10x + 25) + 8 \\ & 2x^2 - 20x + 50 + 8 \end{aligned}$$

$$f(x) = 2x^2 - 20x + 58$$

2) $y = -3(x+1)^2 + 4$

$$\begin{aligned} & (x+1)(x+1) \\ & -3(x^2 + 2x + 1) + 4 \\ & -3x^2 - 6x - 3 + 4 \end{aligned}$$

$$y = -3x^2 - 6x + 1$$

vertex (0,1)
a < 0
vertex
5 + 6 = 11
6 + 5 = 11

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

$$\begin{aligned} & (x-6)(x-6) \\ & \frac{3}{2}(x^2 - 12x + 36) - 2 \\ & \frac{3}{2}x^2 - 18x + 54 - 2 \end{aligned}$$

$$y = \frac{3}{2}x^2 - 18x + 52$$

4) $f(x) = -0.75(x+16)^2 - 12$

$$\begin{aligned} & (x+16)(x+16) \\ & -0.75(x^2 + 32x + 256) - 12 \\ & -0.75x^2 - 24x - 192 - 12 \end{aligned}$$

$$f(x) = -0.75x^2 - 24x - 204$$

one $\sqrt{\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$

2) $y = -3(x+1)^2 + 4$
 $(x+1)(x+1)$
 $-3(x+2x+1) + 4$
 $-3x^2 - 6x - 3 + 4$

$y = -3x^2 - 6x + 1$ y int $(0, 1)$

$a = -3$ $b = -6$ $c = 1$

Quadratic Form

$$0 = -3(x+1)^2 + 4$$

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

$$\sqrt{\frac{4}{3}} = \sqrt{(x+1)^2}$$

$$\frac{\sqrt{4} \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{+2\sqrt{3}}{3} = \frac{x+1}{-1}$$

$$x = -1 \pm \frac{2\sqrt{3}}{3}$$

$$2\sqrt{12}$$

$$\sqrt{4 \cdot 3}$$

$$2\sqrt{3}$$

Converting Between Forms Practice

Part One: Convert from standard form to vertex form.

1) $y = x^2 - 8x + 15$

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

Standard

$$3) y = 2x^2 + 12x + 7$$

$$a = 2 \quad b = 12 \quad c = 7$$

$$h = \frac{-b}{2a} = \frac{-12}{2(2)} = -3$$

$$k = 2(-3)^2 + 12(-3) + 7$$

$$18 - 36 + 7$$

$$-18 + 7$$

$$k = -11$$

$$y = 2(x + 3)^2 - 11$$

4) $y = 2x^2 - 8x + 17$

Part Two: Convert from vertex form to standard form.

5) $y = (x + 4)^2 + 5$

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

$\begin{array}{|c|c|} \hline x & +3 \\ \hline +3 & 9 \\ \hline \end{array}$

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

$$-(x^2 + 6x + 9) - 2$$

$$-x^2 - 6x - 9 - 2$$

$$y = -x^2 - 6x - 11$$

7) $y = 2(x - 2)^2 - 3$

8) $y = \frac{1}{2}(x + 8)^2 + 6$