

Lesson 28: Function Notation, Vertex of a Parabola, Solving Quadratics

By the end of the lesson, you will be able to:

- ~ Evaluate functions with function notation
- ~ Find the vertex of a parabola
- ~ Solve quadratics on your calculator

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~New notation~

$$\underline{f(x)=y}$$

example: $y=x+2$ can also be written as $f(x)=x+2$

So if we were wanting to find out what y is when $x=50$, we can re-write this as $f(50)=50+2$. therefore, $f(50)=52$ or when $x=50$, $y=52$. $\underline{f(50)=52}$

~So we know that $(50, 52)$ is a solution to $y=x+2$ ~

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Example 1: if $f(x) = 6x - 4$, what is $f(2)$?

$$\begin{aligned} f(2) &= 6(2) - 4 \\ &= 12 - 4 \end{aligned}$$

$$\boxed{f(2) = 8}$$

What is $f(10)$?

$$\begin{aligned} f(10) &= 6(10) - 4 \\ &= 60 - 4 \end{aligned}$$

$$\boxed{f(10) = 56}$$

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Example 2: If $f(x) = 4x + 5$ & $g(x) = x^2 - 3x$

What is $f(\underline{n-2})$?

$$\begin{aligned} f(n-2) &= 4(n-2) + 5 \\ &= 4n - 8 + 5 \end{aligned}$$

$$\boxed{f(n-2) = 4n - 3}$$

What is $g(\underline{5w})$?

$$g(5w) = (5w)^2 - 3(5w)$$

$$\boxed{g(5w) = 25w^2 - 15w}$$

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Example 3: If $h(x) = \frac{x^2 + 5x - 6}{x + 3}$

What is $h(3)$?

$$h(3) = \frac{(3)^2 + 5(3) - 6}{3 + 3}$$

$$= \frac{9 + 15 - 6}{6}$$

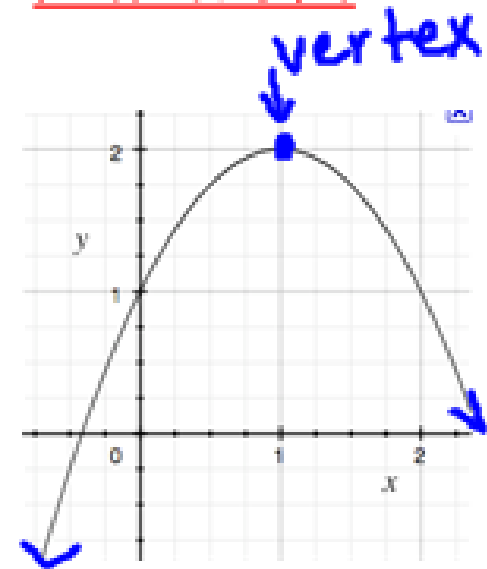
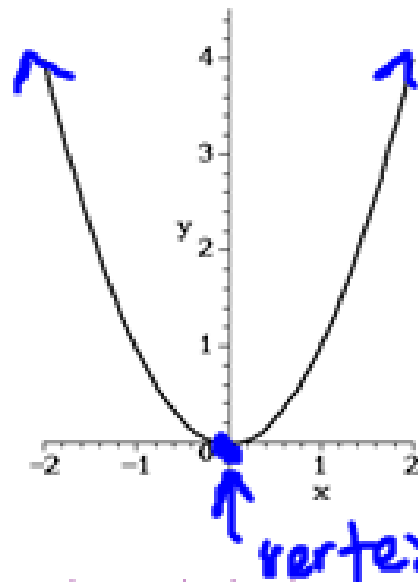
$$= \frac{18}{6}$$

$$h(3) = 3$$

Quadratics!

The graph of a quadratic is called a Parabola.

It looks like this:



The lowest point (or the highest point) is called the Vertex of the parabola.

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Finding the Vertex of the Parabola:

Get out your TI-84. Turn it on and:

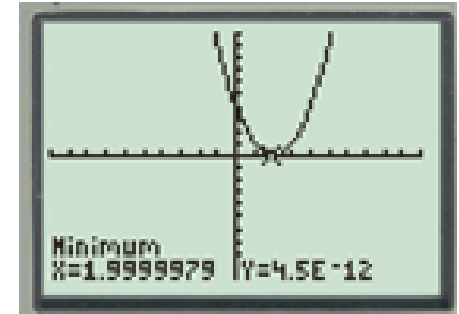
1. Press the "Y=" button.
2. Clear out anything that is the Y= spot.
3. Enter your equation.
4. Press "Graph". (You may need to change your window so you can see the high or low point.)
5. Now push "2nd" "Trace". (This is the Calculate screen.)
6. Go down to #3 "minimum" to find the lowest point. OR go down to #4 "maximum" for the highest point.
7. You will need to find a Left Bound Guess, a Right Bound Guess, and a Guess. Press "Enter" after every guess.
8. Write your answer as "(__ , __)" for the Vertex.



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Example 4: Graph and find the Vertex. Round to two decimal places

$$g(x) = x^2 - 4x + 4$$



(2, 0)

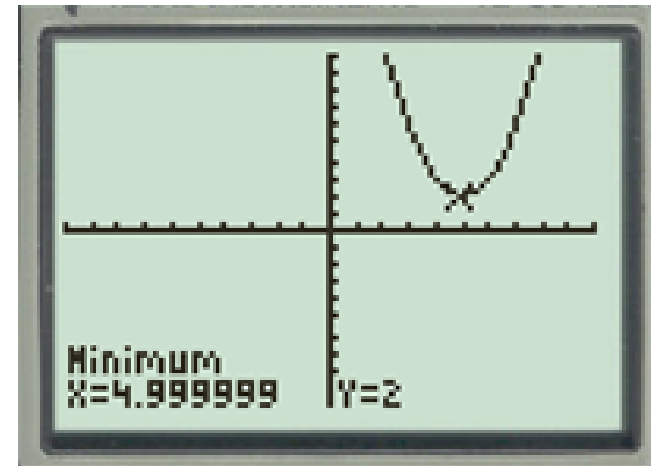
$$x=2 \quad y=0$$

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Example 5: Graph and find the Vertex.

$$h(x) = x^2 - 10x + 27$$

(5, 2)



$$x=5 \quad y=2$$

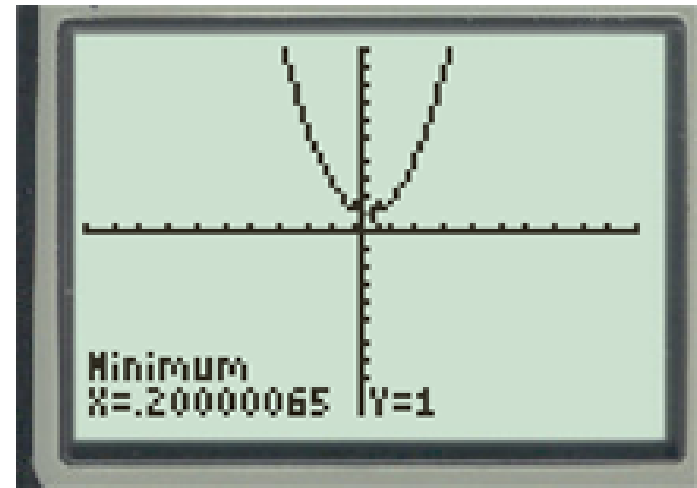
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Round to 2 decimal places

Example 6: Graph and find the Vertex.

$$f(x) = x^2 - \frac{2}{5}x + \frac{26}{25}$$

$$(0.2, 1)$$

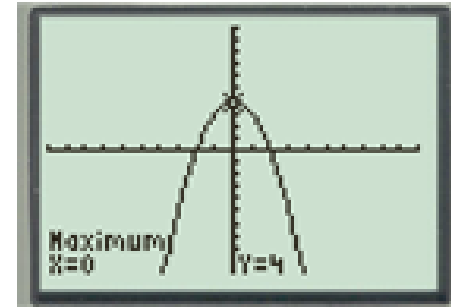


$$X=0.2 \quad y=1$$

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Example 7: Graph and find the Vertex.

$$f(x) = -x^2 + 4$$



(0, 4)

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Solve the quadratic by graphing:

↳ $x = \underline{\hspace{2cm}}$

We do the same thing we did in Lesson 27.

* Refer to the handout for Lesson 27 -
Solving or Finding Zeros.

Lesson 27: Solving Equations on your Calculator

We can solve for x on our calculator. Here's how:

"Solve on Your Calculator" or "Finding Zeros":

Get out your TI-84. Turn it on and:

1. Press the "Y=" button.
2. Clear out anything that is the Y= spot.
3. Enter your equation.
4. Press "Graph".
5. Now push "2nd" "Trace". (This is the Calculate screen.)



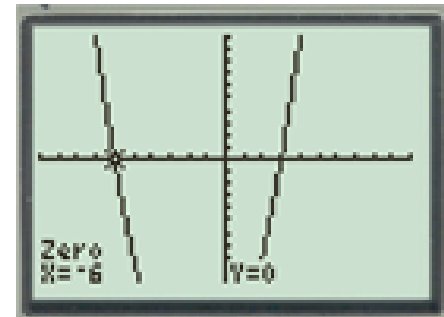
"Solve on Your Calculator" or "Finding Zeros": Cont.

6. Go down to #2 "Zero". (This will find where the graph crosses the x-axis.)
7. You will need to find a *Left Bound Guess*, a *Right Bound Guess*, and a *Guess*. Press "Enter" after every guess.
8. Write you answer as "x= _____".
9. You may need to repeat steps 5-8 if there is more than one spot the graph crosses the x-axis.

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Example 8: Solve by graphing $x^2 + 3x - 18 = 0$

$$x = -6$$
$$x = 3$$



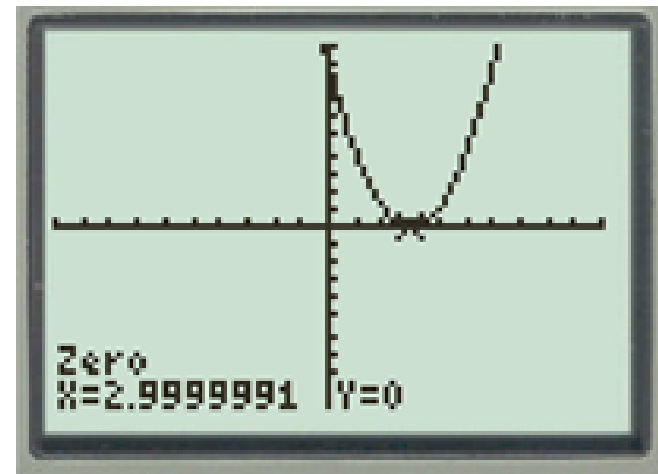
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Example 9: Solve by graphing $x^2 - 6x = -9$

$$\begin{array}{r} +9 \quad +9 \\ \hline \end{array}$$

$$x^2 - 6x + 9 = 0$$

$$x = 3$$



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Example 10: Solve by graphing $m^2 + 3m = 28$

$$m^2 + 3m - 28 = 0$$

$$\begin{array}{l} m = -7 \\ m = 4 \end{array}$$

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By the end of the lesson, you will be able to:

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- ~ Find the vertex of a parabola (,)
- ~ Solve quadratics on your calculator

↳ $x = \underline{\quad}$

Can you?

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Homework:

Assignment 28

