Fall 2021 Pre-calculus Lesson 5.2

Dr. O'Brien
Lehman High School
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students need calculators
no new vocab

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do now

be sure to: Get out your **binder**. Copy **goal** and answer **do now** questions below. Show all work or write a complete sentence for each answer:

1. What's the parent function for $f(x)$?
2. How's $f(x)$ being transformed from its parent function?
3. Sketch a graph for $f(x)$.

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

class: pre-calculus **goal:** HDW write quadratic equations in standard form?

1. The basic quadratic is x**2.
2. It's being shifted 3 right and 2 up.
3. Sketch on board. Upward facing with vertex at (3,2)

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framing

- **what:** write quadratic equations in standard form
- **why:** The quadratic equation can be used to model things in science, engineering, and more!
- **where to:** Identifying x-intercept of a quadratic

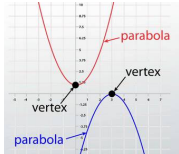**class:** pre-calculus **goal:** HDW write quadratic equations in standard form?

the plan: We'll go through one of the Pset #5 word problems together.
You'll work with a partner to solve some other word problems

Vocabulary

Vertex: Minimum or maximum point of a quadratic function

parabola
vertex
vertex
parabola

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definition of quadratic function

Let a, b, and c be real numbers with $a \neq 0$. The function:

$f(x) = ax^2 + bx + c$

is called a quadratic function.

Write in notes.

Example

- Trajectory of a rocket :

$h(x) = 16t^2 + 256t + 4$

Draw picture on board, h(x) is the height of the rocket at any time t

The problem

If you write your equation like this:

$$f(x) = ax^2 + bx + c$$

How can you figure out how it's being shifted from the parent function?

In other words how do we identify the vertex?

$f(x) = x^2 + 4x + 7$

How can we rewrite this in a form where we can identify the vertex?
f(x) = 2x2 + 8x + 7
f(x) = 2(x**2 + 4x) + 7

Use box method to show x sq plus 4x is part of x**2 + 4x + 4 -4)

= (x +2)**2 + 3

This is the same as the equation from the do now

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standard form for quadratic equation

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

(h,k) denotes the vertex
If a is less than 0 frown
If a is > 0 smile!

Another example

$$g(x) = 2x^2 + 8x - 9$$

Problem set

Be sure to:
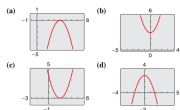- Work at a volume 0 **first 4 minutes**
- Then you can check in with a **neighbor**
- **Do work in your notebook**
- **Show all work**

In Exercises 1-4 match the quadratic function with its graph:

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

For 3 and 4, sketch the graph of the function

5. $y = -x^2$

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

In (7-9) describe the graph of the function and identify the vertex.

7. $f(x) = 20 - x^2$ **8.** $f(x) = (x + 3)^2 - 4$

9. $h(x) = x^2 - 2x + 1$

10. For $f(x) = 2x^2$, $g(x) = x + 4$, (a) $f \circ g$, (b) $g \circ f$, and (c) try to find $(f \circ g)(0)$.

For (11) and (12) below, find two functions f and g such that $(f \circ g)(x) = h(x)$. There are many right answers, explain in a complete sentence why yours is correct:

11. $h(x) = \sqrt{x^2 - 4}$ **12.** $h(x) = \dfrac{4}{(5x + 3)^2}$

class: pre-calculus **goal:** HDW write quadratic equations in standard form?

+how rewrite in standard form?check notes!
How identify composite functions? Find a simpler function in the bigger one

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exit ticket
be sure to: Answer on a sheet of loose leaf paper. Show all work or write a complete sentence for each answer:

1. Rewrite $h(x) = x^2 - 2x + 1$ in **standard form**.

2. Sketch a graph for the equation, identifying the vertex.

class: pre-calculus **goal:** HDW write quadratic equations in standard form?

(x^2 - 2x - 1) + 1 + 1

(x - 1)^2 + 2

vertex = (1,2)

2. sketch an upward facing quadratic with vertex at (1,2).