



Fall 2021 Pre-calculus Lesson 5.4

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students need calculator
Parabola
Vertex



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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. Convert (A) and (B) to standard (aka vertex) form.
2. Try to find factor (B)

$$A. f(x) = x^2 + 6x + 19$$

$$B. g(x) = x^2 + 3x + 2$$

class: pre-calculus goal: HOW find the x-intercepts for quadratic equations



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framing



- **what:** find x-intercepts for quadratic equations
- **why:** This skill helps us to sketch quadratics. Quadratic equations can be used to model things in science, engineering, and more!
- **where to:** Use quadratic functions to solve real world problems

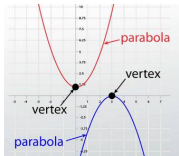
class: pre-calculus goal: HOW find the x-intercepts for quadratic equations



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Vocabulary

- **Vertex:** Minimum or maximum point of a quadratic function
- **Parabola:** The curve formed by the graph for a quadratic function.



class: pre-calculus goal: HDW find the x-intercepts for quadratic equations



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How do we graph this?

Find the x intercepts

$$g(x) = x^2 - 4x + 3$$

Yesterday we found that the k form is $(x - 2)^2 - 1$

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+ hdw find the vertex? convert to standard form? try on own, followed by turn & talk.

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

vertex is (2,-1). Sketch

+how do we make our sketch more precise? Let's find the the x-ints
+factor out the equation. find two numbers that multiply to +3 and add to -4
 $x^2 - 4x + 3 = 0$
 $(x - \underline{\quad})(x - \underline{\quad})$
 $(x-1)(x-3)$,

xints are 1 and 3



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How to find x-intercepts

For any quadratic $x^2 + bx + c$

- Find two numbers m and n that add up to b and multiply to c :
- $(x + m)(x + n) = x^2 + bx + c$
- Why are m and n the x-intercepts

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Convert to stand form. Find x-intercepts

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

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$$\text{SF: } (x-1)^2 - 9$$

$$\text{Factors: } (x+2)(x-4)$$



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Problem set

Be sure to:

- Work with your neighbors. Ask them for help before Dr. O'Brien
- Help students who come in late to get caught up!
- **Do work in your notebook**
- **Show all work**

class: pre-calculus goal: HDW find the x-intercepts for quadratic equations



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In Exercises 1-4 (a) find the standard form of the equation, (b) find the x-intercepts, and (c) use this information to sketch a graph:

1. $f(x) = x^2 - 6x + 8$

2. $x^2 - 2x - 15$

3. $h(x) = 4x^2 + 32x + 64$

4. $m(x) = x^2 - 4x + 20$

class: pre-calculus goal: HDW find the x-intercepts for quadratic equations

See answer key



5. 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 (6) and (7) 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:

6. $h(x) = \sqrt{x^2 - 4}$ 7. $h(x) = \frac{4}{(5x + 3)^2}$

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+how rewrite in standard form?check notes!

How identify composite functions? Find a simpler function in the bigger one



8. The path of a football is given by

$$y = -0.08x^2 + 1.8x + 3$$

Use the *how to solve it* method and figure out how high the football gets. **Hint:** draw a graph!



See answer key

+hdw rewrite in standard form? Factor out -0.08, then it's the same strategy as normal

+hdw know this graph will be a frowns face? It's what the path of a football should look like. Also when we rewrite in standard form the coefficient is -.

+how do you tell from a sketch the highest point? It's the vertex



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 $h(x) = x^2 - 2x - 12$ in **standard form**.
2. Find the x-intercepts then sketch a graph for the equation.

class: pre-calculus goal: HDW find the x-intercepts for quadratic equations

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

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

$$\text{vertex} = (1, 2)$$

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