Mon. Feb 13, 2017

Unit 5: Quadratic Relations

Day 7: The Quadratic Relationship $y=ax^2 + c$

Today we will...

1. Relate the graph of $y=ax^2 + c$ to the parts of a parabola.

Example 1: Find the Maximum or Minimum

Using Desmos, find the coordinates of the maximum or minimum of each of the following graphs.

(a) $y = 3x^2$

Maximum or minimum

Value: 0

(b) $y = x^2 - 9$

Maximum or minimum

Value: -9

(c) $y = -2x^2 + 32$

Maximum or minimum

Value: 32

In $y = ax^2 + c$, c represents the maximum or minimum value. This is also the vertex: (0, c)

Recall: Given a quadratic equation of the form $y = ax^2$, describe the effect of a on the graph of $y = x^2$.

- if a is negative, the graph.... opens down

- if a is between 0 and 1 (ie. decimal or fraction), the graph... is wider and flatter
→ compressed

- if a is greater than 1, the graph...
is taller and skinnier
→ stretched

Example 2: Narrowest to Widest

Without graphing, order the parabolas in each set from narrowest to widest.

(a) $y = \frac{1}{3}x^2 - 7$ $y = x^2 - 7$ $y = 3x^2 - 7$

$y = 3x - 7$; $y = x^2 - 7$; $y = \frac{1}{3}x^2 - 7$

(b) $y = -4x^2 - 7$ $y = -\frac{1}{2}x^2 - 7$ $y = -0.75x^2 - 7$

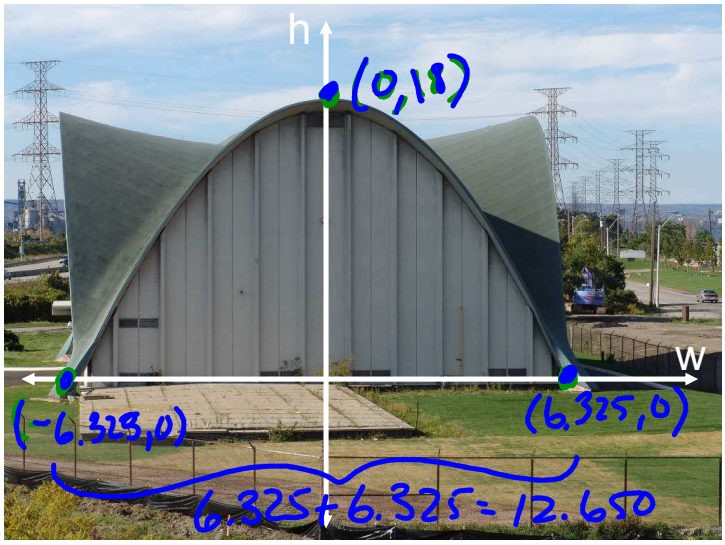
$y = -4x^2 - 7$; $y = -0.75x^2 - 7$; $y = -\frac{1}{2}x^2 - 7$

Example 2: Interpret the Zeros of a Quadratic Relation

This building contains the equipment that pumps water from Lake Ontario to the Woodward Avenue Water Treatment Facility. A cross-section of the building is in the shape of a parabola.

It's shape can be modelled by the quadratic relation

$h = -0.45w^2 + 18$, where h represents the height in metres and w represents the horizontal distance in metres.



(a) Use Desmos to graph the relation. $Y = -0.45x^2 + 18$

(b) Find the height of the building.

18m

(c) Find the width of the building at ground level.

6.325+6.325=12.650 m

Homework:

Section 8.3 Homework