Title: St. Louis Arch—Gateway to the West

Objective: Real world Quadratic! Imagine a building that stands more than 600 feet tall and can be modeled by a math equation!

Lets get started: Two video clips are provided. One of which gives background as to 'why' the St. Louis Arch was imagined and then built. This video lasts 4 minutes. The second video is collection of photos in the building of the St. Louis Arch which lasts 4.5 minutes.

Once videos are complete discuss the photo #1 provided in the materials and introduce some vocabulary: y intercept, end points, zeros, vertex, maximum, line of symmetry, shape opens downward, equation in standard form .

Symmetry—notice the scaffolding in the photo, what does the scaffold demonstrate as it is raised as the building progressed? Quadratics (parabolas) has symmetry

Three known coordinate points can be determined from the Arch. The base is 630 feet, and the top is 630 feet. From this we can discuss: maximum height (vertex is the point (315,630)), the zeros of the function or the base points (0,0) and (630,0)

With technology we can show students how are calculators can find the equation for the St. Louis Arch. Included in your instructional materials is the directions for entering the 3 data points and using quadratic regression to come up with the equation. Allow time to discuss the 3 variables: a,b, & c from the standard form. Once the students have the equation have them spend time actually drawing the arch, labeling the important points discussed, vertex, maximum, end points (zeros), line of symmetry, y intercept. A special note can be made about the fact that the arch opens downward and the negative in front of the first term. Also, discuss the final equation and the fact that the c term is zero (y intercept).

A set of PowerPoint slides are also provided, if technology is not working (yup, it happens sometime) use the stills provided to show students the building of the arch.

3 data points & equation:

$(0,0)$

$(315,630)$

$(630,0)$

$f(x) = -0.00635x^2 + 4.0x + 0$

$a = -0.0063$

$b = 4.0$

$c = 0.0$

Important items to label:

- Vertex
- Endpoints
- Line of symmetry
- Y intercept
- Equation in standard form
- Use Tails Plus!!!

Youtube video links:

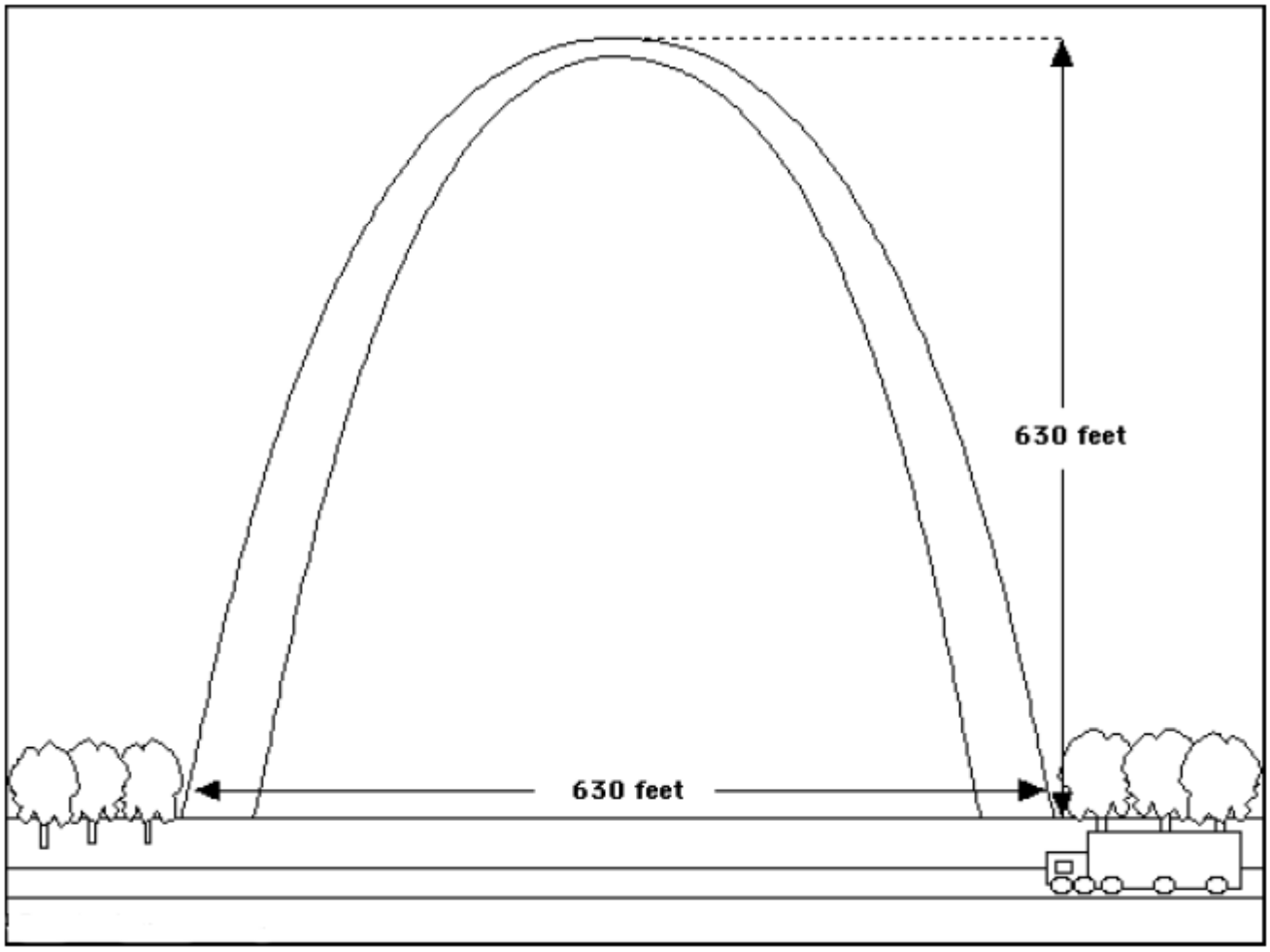
http://youtu.be/76Sdq6csrME

http://youtu.be/txQO3vxfinA

Wrap up: Have a contest with the drawings, by hanging the up, but before they hang them up, they must answer the following question: How long did it take to build the St. Louis Arch?

	Lesson Plan cover sheet (write on white board or document camera—consistent colors!)
	**Objective:** (student friendly language) **I can see quadratics in the Real World!** $f(x) = ax^2 + bx + c$
	**To Do:** (consistent procedures taught to students early in the school year) **Watch a video** **Using technology we will find the equation for the St. Louis Arch** **We can draw and label the important points of a quadratic shape!**
	**Lesson activity:** (again consistent procedures used throughout the school year) **Using technology we can generate a data table and draw the St. Louis Arch (curve—parabola) and a grid and then label the important points using proper vocabulary.**
 	**Closure:** (wrap-up activity-formative questions– where students demonstrate their level of understanding) **In the real world how long do you think it took to build the St. Louis Arch?**
	Homework: (lead in to tomorrows lesson and what students can do to prepare for tomorrow) **Turn in the Final drawings, teacher will give feedback and return the drawings for students to refer back to throughout the unit as a reference piece!**

Final drawing should resemble this. The key is to allow students time to label all the important points using proper vocabulary



Algebra 1
Unit 5 Quadratics
Introduction to Quadratics

Name: _____
Date: _____
Period: _____

Using Technology: Using a TI83/84

Enter the 3 data points: $(0,0)$ $(315,630)$ $(630,0)$

Step 1: Clear the memory

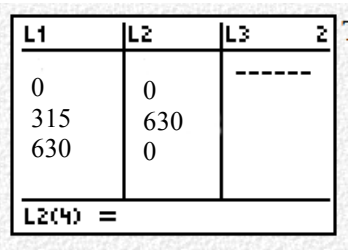
Press [2nd] [+] [712] [enter]

Step 2: Turn on stat plot

Press [2nd] [Y=] [enter] [on] [enter] [2nd] [mode]

Step 3: Enter the data points

Press [stat] [enter] [L1] [0] [315] [630] [→] [L2] [0] [630] [0]

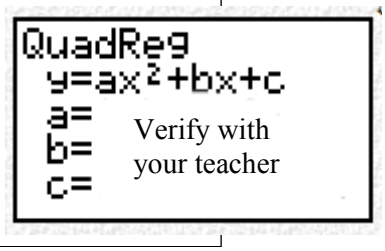


Step 4: generate the equation using quadreg (quadratic regression)

Press [stat] [→] [5] [enter] [2nd] [stat] [enter] [,] [2nd] [stat] [↓] [enter]

Your main screen should have
Quadreg L1,L2

[enter]

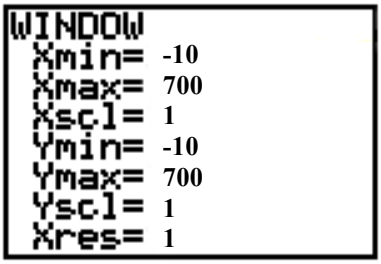


With the number generated from your calculator you can now fill in the table below and then use your calculator to graph the equation! Notice how the actual curve hits each of the data point you entered!! If this is the first time for students trying this, it can be confusing. After a couple of attempts, allow students to use the data given in the lesson plan to fill in the equation below and enter it into the y= and then graph.

$$f(x) = \_\_\_\_ \quad x^2 + \_\_\_\_ \quad x + \_\_\_\_$$

Step 5: adjust the window on your calculator, press and change it to look like the following:

Press [window]



Algebra 1	Name: _____
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Draw the St. Louis Arch, modeled by the equation we came up with using technology and the 3 known points! Label the important points and use Tails Plus!

$(0,0)$

$(315,630)$

$(630,0)$

Vertex
Endpoints
Line of symmetry
Y intercept
Equation in standard form
Use Tails Plus!!!