Shootout

Quadratics in the Real World

GAMERS QUEST 2 ALGEBRA II

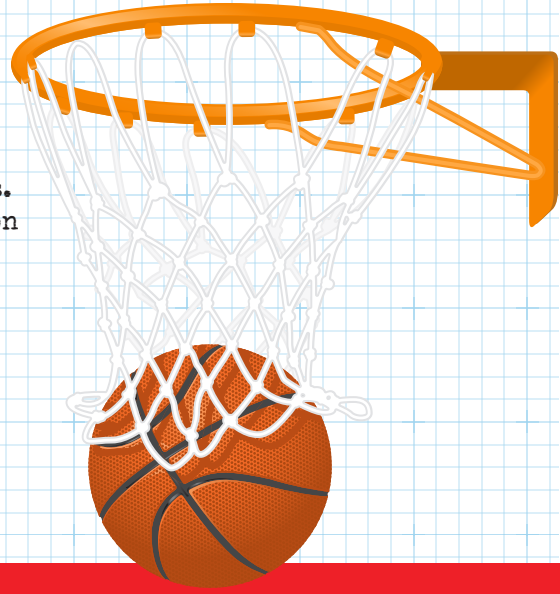
STATE FAIR OF TEXAS CURRICULUM

Quadratic Functions are everywhere in our world. As we study quadratic functions and their attributes, you will get a chance to see them in a new light. When a basketball is shot, it follows a parabolic arc. The Fair has many games and several basketball challenges for you to experience creating those arcs.

★ ★ ★ ★ ★

During this Gamer Quest, you will:

- ★ Illustrate games at the State Fair using graphs.
- ★ Explain and graph parts of a quadratic function using the State Fair data.



Learning Standards

- ★ Math Algebra II TEKS: A2.4.D; A2.4.B
- ★ Art TEKS: Art I: 1B; 4A, Art II: 1B
- ★ ELAR TEKS: E3(11)(B)
- ★ Career Development TEKS: PS.1.C, PS.1.F, PS.1.H, PS.2.B

Before You Go – 45 minutes teaching time

★Create notes for the students including:

1. Attributes of quadratic functions (vertex, minimum/maximum, axis of symmetry, direction of opening, domain/range, and increasing/decreasing sections)
2. Converting from vertex form $f(x) = a(x - c)^2 + d$ & standard form $f(x) = ax^2 + bx + c$
3. Writing a quadratic function in vertex form given a point, direction of opening, and the vertex

Invitation

- ★ Attend the Fair with a friend for a basketball competition. Keep score to decide who makes more baskets.

Plan Your Route

- ★ Go to the Midway
- ★ Find a basketball shootout game

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STATE FAIR MAP

Optional Materials to Bring

- ★ Pen or Pencil
- ★ Tape measure (small and easy to carry)
- ★ Notebook or Paper
- ★ Smartphone or Tablet, with "Stopwatch" function on

While You're There

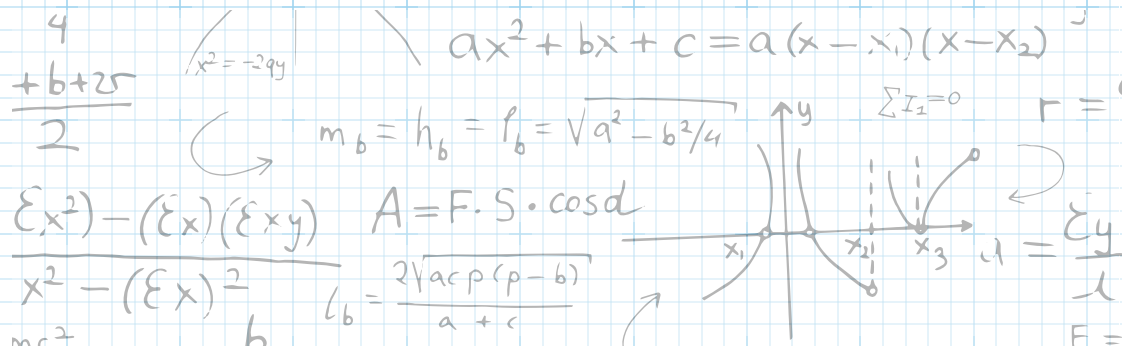
The objective of your visit is to get the attributes of your quadratic function from your shootout competition.

- ★ **SHOOTOUT:** Compete against your friend to see who can make more baskets.
  - o Record start height of the basketball in your hand. (all data for each player)
  - o Measure the height the basketball hits before headed back down (rough estimate)
  - o Measure the distance from you to the hoop
  - o Time the "flight" of the basketball's air time
  - o You can use the table on the right to record your results:

Basketball Shootout Person 1	DATA	UNIT
Start Height		feet
Total Time of Flight		seconds
Time of Maximum Height		seconds
Finish Height		feet
Total Distance (from you to the hoop)		feet

Basketball Shootout Person 2	DATA	UNIT
Start Height		feet
Total Time of Flight		seconds
Time of Maximum Height		seconds
Finish Height		feet
Total Distance (from you to the hoop)		feet

- ★ **ILLUSION OF MOTION** (Art Portion): While you are working on your Algebra II lesson, take a moment to make some sketches of your friends shooting the basketball.
  - o Think about some of the techniques that you practiced before, and apply them to these sketches.
  - o Make as many as possible so that you can use them later for a reference.



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After the Fair – 1 day project

When you return to class following your State Fair visit, you will:

- ★ Plot your data on a graph
- ★ Label the attributes of the quadratic function:
  1. Vertex and Minimum or Maximum
  2. Axis of Symmetry
  3. Domain and Range of the scenario
  4. Part of the graph that is increasing and part that is decreasing in interval notation
  5. x-intercepts and explain what each represents to your scenario
- ★ Use your vertex and a point from your graph to write your function rule in vertex form (show ALL work)
- ★ Identify a,c, and d
- ★ Transform vertex form into standard form algebraically (show ALL work)
- ★ Identify a, b, and c

ART PORTION

Before You Go

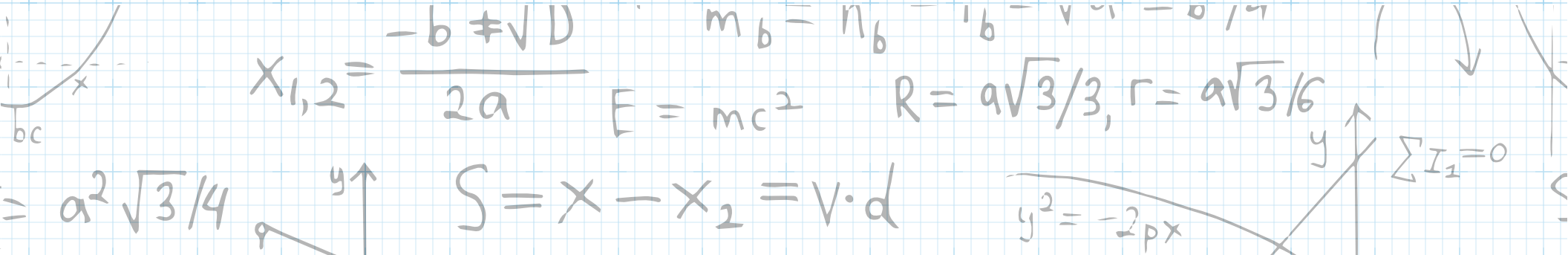
How do you create a drawing that gives the illusion of motion? There are a few different techniques that you can utilize in order to give the illusion of motion in a drawing such as repetition, locating and focusing on the line of action, implied line, etc.

Below is a link to a website that contains various pages on different techniques used to draw motion. Take a moment to look at these, and practice a few of them. Ask a classmate or a family member to be your model and have them move around while practicing some of these techniques.

http://www.drawinghowtodraw.com/drawing-lessons/drawing-faces-lessons/running-walking-action-motion.html

While You're There

See the main portion of the lesson (While You're There) for instructions.



After the Fair

When you get back to class:

- ★ Grab a large sheet of paper and recreate one of your sketches from the State Fair.
- ★ Working large can oftentimes add stronger emphasis for the viewer, especially if you are portraying motion.
- ★ The choice of medium is up to you.
- ★ When you are finished, present your work to the class and discuss why you chose the technique that you did to portray motion in your work.
- ★ *Another variation of this project would be to draw one of your classmates performing some activity and when you're finished, invite your peers to try and guess what they are doing.

ENGLISH PORTION

Every year, basketball teams and individuals from all over the country compete in various types of shootout contests. How does your shootout contest at the Fair compare with other shootout contests?

- ★ Using the Internet, research a shootout contest reported in the news, the website of a sports team, a school website, etc., and compare/contrast the shootout to the one you held with your classmates at the Fair.
  - o How were the shootouts similar?
  - o How were they different?
  - o Imagine that you are a sports reporter and write a newspaper article comparing and contrasting the two shootouts.
  - o Make sure that you include a thesis statement, evidence, and use MLA citation to cite your sources in your article.