Quadratic Functions in Real Life

**Motivation:** Graphing a parabola given an equation of a quadratic function is a topic covered in most algebra courses. But, where do parabolas exist in real life and how do we find their equations?

**Objectives**: Students will generate or observe parabolas in real life (projectiles) and model these by finding the equations of the quadratic functions from observed data points.

**Materials**:

1. Tennis ball
2. Yard Stick / Tape measure
3. Post-it note pad
4. Cell phone / ipad
5. Computer
6. Quad graphing paper
7. Clear plastic sheets (for tracing from a computer or iPad)
8. Markers

**Activity 1**: Groups Design the Experiment

1. Brainstorm on how to create a parabola with the materials provided.
2. Assign roles for the experiment – who does what?
3. Determine what data to collect and who will record it.
4. Get the instructor’s ok for your idea.

**Activity 2**: Groups Conduct the Experiment

1. Create a parabola
2. Record the data

**Activity 3**: Repeat the experiment to get a second parabola

1. Create a second parabola
2. Record the data

**Activity 4**: Final Group Discussion

1. With the data collected, find the quadratic functions that model the 2 parabolas.
2. List important aspects of the functions: vertex and intercepts.
3. Theorize what factors determine the differences in the functions that result.
4. Work together to complete the worksheet.

Videos (sample experiments)

 Throwing a ball: <https://www.youtube.com/watch?v=qMP7yd-bwWI>

Football example: <https://www.youtube.com/watch?v=HB4ws7RoA3M>

Basketball example: <https://www.youtube.com/watch?v=0ISx0445xXc>