Algebra II Classwork/Homework 11/9 or 11/12

Graphing Parabolas in Standard Form

Warm-up: If an object is thrown straight up from the top of a building h feet tall with an initial velocity of v feet per second, the height of the object as a function of time can be modeled by the function h(t) = –16t2 + vt + h, where h(t) is the height of the object (in feet) t seconds after it is thrown.

Say you sneak onto the roof of the Empire State Building, which is 1250 feet tall, and throw a ball straight up into the air with an initial speed of 32 feet per second. Make a table to show the height of the ball after 1, 2, 3, and 10 seconds. What shape will a graph of the ball’s motion be? How long will it take for the ball to hit the ground?

The faster way to graph quadratics: use **structure.** There is a pattern that applies for all parabolas! A quadratic function in **standard form** is written in the form f(x) = ax2 + bx + c.

If your quadratic function is in standard form, you will want to start by finding the axis of symmetry for the parabola. The vertex always falls on the axis of symmetry. It is unique on the parabola as the only point where there is only one solution to the function for a given value of y. One solution to a quadratic equation occurs when the discriminant is zero, so $x=\frac{-b}{2a}$ is the formula for the axis of symmetry.

As a class, we’ll do this for the warm-up. After that, you should find the equation for the axis of symmetry for each function below:

1. y = x2
2. y = x2 + 2
3. f(x) = x2 – 8x + 15
4. g(x) = 2x2 +12x + 13
5. Go back and check your homework. Do these equations match your graphs?

The fastest way to graph a quadratic function in standard form is first to find the axis of symmetry. To locate the vertex, plug the value you found for x for the axis of symmetry into the equation for the parabola. Again, we’ll do this for the warm-up.

1. Go back and identify the vertices for each of the functions in problems 1-4.
2. To finish your graph, you will need to find four other points. The parent function for all parabolas, y = x2, has a distinctive pattern you can use to build it. What is that pattern?

The pattern for any parabola is derived from the pattern for the parent function. When a = 1, you should use the original pattern. When a = 2, **double** the spacing between each adjacent point.

1. Graph y = -x2 + x + 12
2. Graph f(x) = -2x2 – 2
3. Graph y = $\frac{1}{2}x^{2}+3x- 2$

**Make sure you finish all ten of these questions as homework if not done in class.**

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/8th-linear-functions-modeling/a/modeling-with-tables-equations-and-graphs>

<http://www.mesacc.edu/~scotz47781/mat120/notes/projectile_motion/projectile_motion.html>

