Algebra One Name:
"Fireworks" Task #12 Date:
Period:

Process Standards:

Students will be able to:

- Interpret results in ways that are meaningful for the given context.
- Effectively communicate their mathematical knowledge.
- Exhibit characteristics of a cooperative learner.
- Organize class materials so that they are easily accessible and able to be used as an additional resource in problem solving situations.

Content Standards:

Students will be able to:

- Select and apply appropriate computational strategies to problem solving and life situations.
- Use technology to assist in data collection and interpretation of functions.
- Perform operations and transformations on functions, polynomials, and other mathematical entities.
- Recognize equivalent forms of an expression, equation, function or relation.
- Generate equivalent forms of an expression, equation, function or relation.

In this activity, your task is to discover how to find the exact vertex of a quadratic equation written in vertex form.

1. a. Graph the quadratic function $f(x) = (x - 2)^2$ on a graphing calculator.

   b. Find the vertex for this graph.

   c. Explain how you can be certain that you have the exact vertex.

2. Go through the steps from Question 1 for each of these functions.

   a. $g(x) = (x + 4)^2$ b. $h(x) = (x - 3)^2 + 2$

   c. $k(x) = (x + 5)^2 - 7$ d. $r(x) = 3(x + 1)^2 + 16$

   e. $s(x) = -2(x - 4)^2 + 9$

3. Explain how you could find the vertices for functions like those in Questions 1 and 2 without using your graphing calculator.

4. Give some other examples of quadratic functions whose vertices are easy to find. Make your examples as varied as you can.

5. a. Verify that the expression $(x - 3)^2 + 2$ (from Question 2b) can be written in standard form as $x^2 - 6x + 11$.

   b. Which expression is easier to use, $(x - 3)^2 + 2$ or $x^2 - 6x + 11$, in looking for the vertex of this function? Explain your answer.

6. How can you tell by looking at the algebraic expression for a quadratic function whether its vertex is a minimum or a maximum?