

Algebra One
"Fireworks" Task #1
Period:

Name:
Date:

Process Standards:

Students will be able to:

- 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:

- Use technology to assist in data collection and interpretation of functions.
- Interpret and describe classes of functions through rules, tables and graphs.
- Interpret situations that involve variable quantities.
- Model a wide range of phenomena using a variety of functions.
- Interpret intercepts, local extreme values, and asymptotic behavior of functions in given contexts.
- Select and produce appropriate graphical representations.

Unit Problem:

The Naperville Central freshman football team has just won their DVC tournament. To celebrate the school is putting on a fireworks display and the team is helping with the planning.

The fireworks will use rockets launched from the top the tower near the school which is 160 feet off the ground. The mechanism will launch the rockets so that they are initially rising 96 feet per second.

The team members want the fireworks from each rocket to explode when the rocket is at the top of its trajectory. They need to know how long it will take the rocket to reach the top so that they can set the timing mechanism. The team members would also like to inform spectators of the best place to stand and see the fireworks so that they need to know how high the rocket will go.

The rockets will be aimed to an empty field and shot at an angle of 65° above the horizontal. The team members want to know how far the rocket will land from the base of the tower so that they can fence off the area with a fence in advance.

Ricky is on the varsity football team and a member of the National Honor Society and has volunteered to help plan the fireworks display. Because he is in AP Physics, Ricky knows that there is a function $h(t)$ that will give the rocket's

height off the ground in terms of t , time elapsed since the launch: $h(t) = 160 + 96t - 16t^2$.

Ricky also says that the team can find the horizontal distance the rocket travels with this function: $d(t) = \frac{96t}{\tan 65^\circ}$ again t is the number of seconds since the rocket was launched and $d(t)$ is the distance in feet.

Your task is to help the football team in planning the fireworks display. Work with your group members to summarize what we know so far.

1. Draw a sketch of the situation.
2. Write a clear statement of the questions the football team wants answered.
3. Describe how you might use Ricky's functions to help answer the questions you stated in Question 2.
4. Answer any of the questions you can using your background knowledge and your group members.

