**Rocket Activity**

**Instructions:** After reading the problem, open the GSP file and complete the worksheet.

**Problem**: The equation y = 20x − 0.5x2 describes the trajectory of a toy rocket, in which x is the number of feet the rocket moves horizontally from the launch, and y is the corresponding number of feet from the rocket to the ground. The rocket has a sensor that causes a parachute to be deployed when activated by a laser beam.

**Part 1**: If the laser is aimed along the line y = 5x, at what altitude will the parachute open?

**Part 2**: At what slope could the laser be aimed to make the parachute open at 100 feet?

Part 1

1. Sketch the graph on your paper. Circle where you think the parachute will be activated by the laser. Estimate the altitude at this point. Answers may vary, but the graph should look similar to the graph in GSP. Also, the intersection should be indicated.



2. Push the "Animate Rocket" button. Do you still agree with your answer in #1? If not, draw a square around your new answer and estimate the new altitude at which the parachute will open. Answers may vary.

3. Push the "Show Objects" button. How close was your estimate to the exact height? Answers may vary.

Part 2

4. Plot a point P on the rocket's path to estimate when the rocket will hit 100 feet on its way down. Construct a line with the origin and this point to represent the laser beam. Sketch your line and the parachute’s path below. The point P should be at approximately (34.14, 100) and the line should connect the origin and this point.



5. Select the line and then go to Measure 🡪 Slope. Write down your estimate of the slope. Approximately 2.9.

6. To check your answer, solve algebraically. First find the exact coordinates of your point P. Then use the origin and point P to solve for the slope.

Coordinates: (34.14, 100)

$$\frac{100-0}{34.14-0}= \frac{100}{34.14}≈2.929$$

7. If your estimate is not close to your answer in #6, explain why you think they are different.