Name:_____

Leprechaun's Golden Parabola

Objective: I will solve a real-world problem involving properties of quadratic functions.

Problem Setup:

A mischievous leprechaun launches his pot of gold from one end of a rainbow while hiking the Great Sugar Loaf mountain. The pot follows the rainbow's colorful, arching path, tracing a perfect parabola as it travels to the other end. The height of the pot (in feet) can be modeled by the quadratic function:

$$h(t) = -16t^2 + 64t + 144$$

Where t is the time in seconds since the pot was thrown, and h(t) is the height of the pot above the ground.

Questions:

1. What was the initial height of the rainbow when the leprechaun threw the pot?

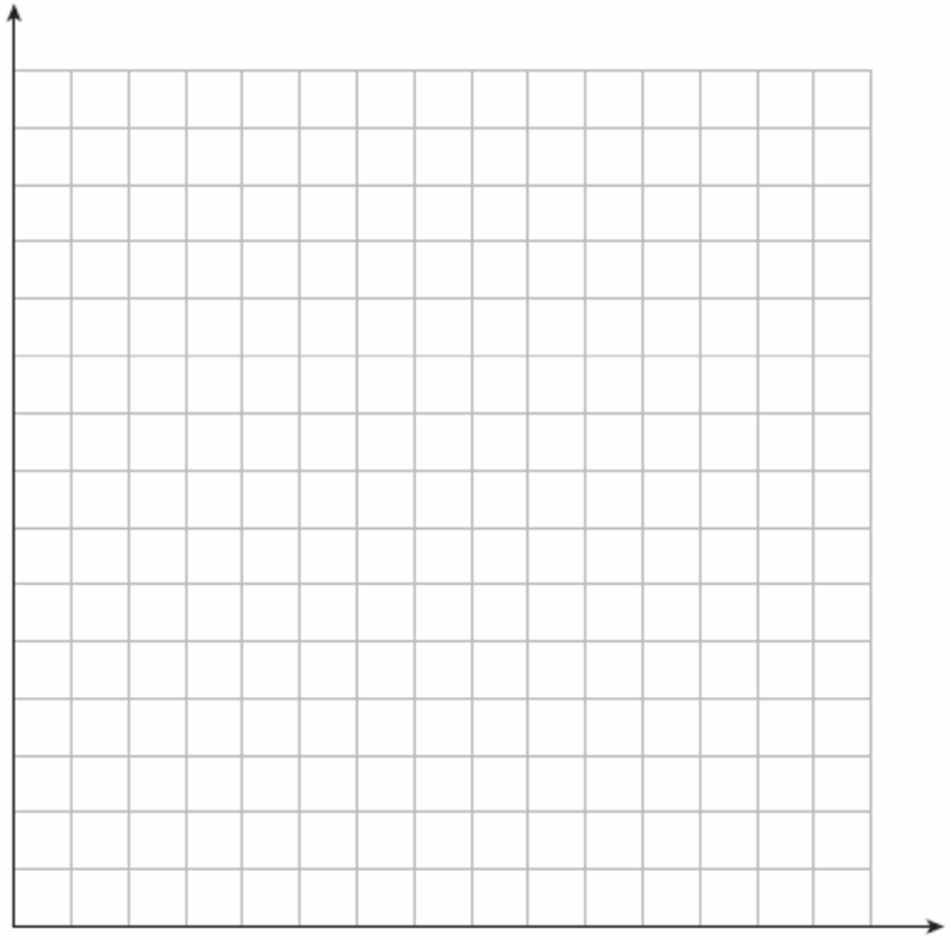
2. How long will it take for the pot to reach the ground? Round to the nearest hundredth.

3. At what time does the pot reach its maximum height?

4. What is the maximum height the pot reaches during its flight?

5. If a lucky student wants to catch the pot at exactly 100 feet above the ground, at what time should they attempt to catch it? Round to the nearest hundredth.

6. Sketch the graph of this parabola, labeling key points (initial height, maximum height, and where it hits the ground).



Extension:

7. If the leprechaun wants the pot to land exactly 50 feet away from the other base of the rainbow, what initial horizontal velocity (in feet per second) should he give the pot?