Terms of Use

Thank you for your purchase!

You MAY:

- Use free and purchased items for your own classroom students, or your own personal use.
- Reference this product in blog posts, at seminars, professional development, workshops, or other such venues, ONLY if credit is given to Inspired By Math as the author.

You MAY NOT:

- Claim this work as your own, alter the files in any way, or remove copyright.
- Sell the files or combine them into another unit for sale/free.
- Post this document for sale/free elsewhere on the internet (this includes Google Doc links on blogs).

Making copies of purchased items to share with others is strictly forbidden and is a violation of the terms of use.

Thank you for abiding by universally accepted codes of professional ethics while using this product. If you encounter an issue with your file, notice an error, or are in any way experiencing a problem, please contact us and we will be more than happy to help sort it out. You can email us at chill@inspiredbymath.net

Thank You! Cassidy and Chloe - Inspired By Math

Inspired By Math

Name:______________________

Leprechaun's Golden Parabola

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

Problem Setup:

While hiking the Great Sugar Loaf Mountain, a mischievous leprechaun launches his pot of gold from one end of a rainbow. 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:

$$\boldsymbol{h(t) = -16t^2 + 64t + 144}$$

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 leprechaun's initial height where he threw the pot?

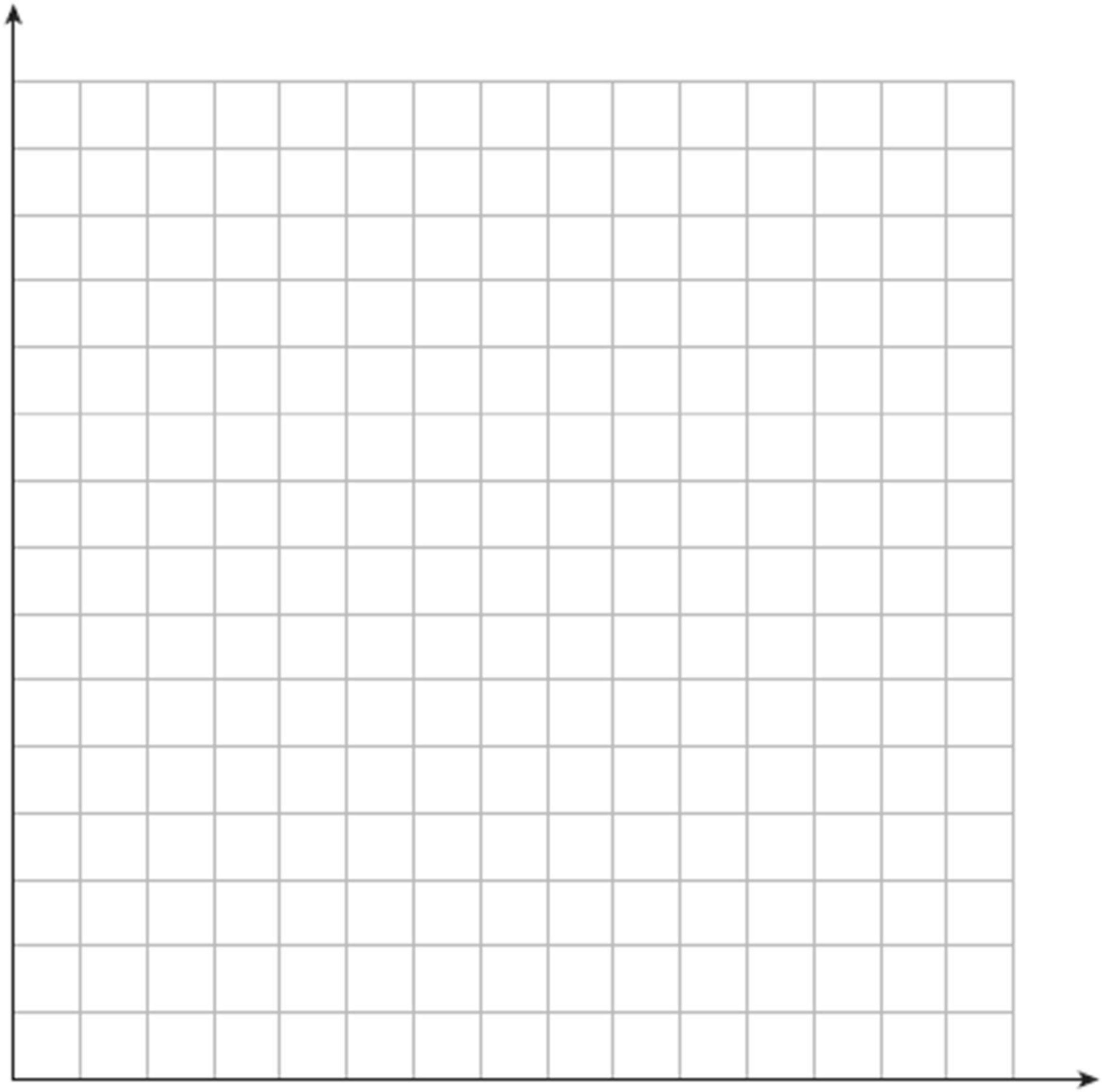
2. How long will it take for the pot to reach the ground? Round to the nearest hundredth.

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).



Key

Leprechaun's Golden Parabola

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

Problem Setup:

While hiking the Great Sugar Loaf Mountain, a mischievous leprechaun launches his pot of gold from one end of a rainbow. 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:

$$\boldsymbol{h(t) = -16t^2 + 64t + 144}$$

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 leprechaun's initial height where he threw the pot?

h(0)=**144 ft**

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

$$0 = \boldsymbol{-16t^2 + 64t + 144}$$

$$\boldsymbol{t = \frac{-64 \pm \sqrt{(64)^2 - 4(-16)(144)}}{2(-16)}}$$

$$\boldsymbol{t = \frac{-64 \pm \sqrt{4096 + 9216}}{-32}}$$

$$\boldsymbol{t = \frac{-64 \pm \sqrt{13312}}{-32}}$$

$$\boldsymbol{t \approx -1.61 \text{ or } 5.61}$$

5.61 seconds

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

$t = -\frac{b}{2a} = -\frac{64}{2(-16)} = \frac{64}{32} = 2$

2 seconds

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

$\boldsymbol{h(2) = -16(2)^2 + 64(2) + 144}$

$\boldsymbol{h(2) = 208}$

208 ft

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.

100=$\boldsymbol{-16t^2 + 64t + 144}$

0=$\boldsymbol{-16t^2 + 64t + 44}$

$\boldsymbol{t = \frac{-64 \pm \sqrt{(64)^2 - 4(-16)(44)}}{2(-16)}}$

$\boldsymbol{t = \frac{-64 \pm \sqrt{4096 + 2816}}{-32}}$

$\boldsymbol{t = \frac{-64 \pm \sqrt{6912}}{-32}}$

$\boldsymbol{t \approx -0.59 \; or \; 4.60}$

4.60 seconds

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

This function was graphed using www.desmos.com