

Get GREEN worksheet from front table

Algebra 2 Name _____
 Chapter 4: Analyzing Graphs of Quadratic Functions Period: _____ Date: _____

1.) Sandi, Carlos and Eddie are building a catapult for an engineering competition. A catapult is a medieval siege weapon that uses gravity to launch an object through the air. When the counterweight at one end of the throwing arm drops, the other end rises and a projectile is launched through the air.



The path the projectile takes through the air is modeled by a parabola. To win the competition, the teams must build their catapult according to the competition specifications to launch a small projectile as far as possible.

After conducting experiments that varied the projectile's mass and launch angle, the team discovered that the ball they were launching followed the path given by the quadratic equation:

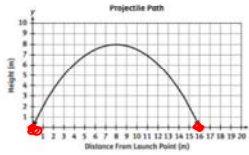
$$y = -\frac{1}{8}x^2 + 2x$$

a.) How far does the ball land from the launching point?

16m

b.) What is the maximum height of the ball?

8m



c.) What are the x-coordinates of the points where the ball is on the ground?

0 & 16

d.) Verify that $x = 0$ and $x = 16$ are solutions (x-intercepts) to this equation.

$$y = -\frac{1}{8}(0)^2 + 2(0) \quad y = -\frac{1}{8}(16)^2 + 2(16)$$

$$y = 0 \quad y = 0$$

e.) Without the graph, could you determine these solutions? Explain.

$$0 = -\frac{1}{8}x^2 + 2x$$

$$0 = -\frac{1}{8}x(x-16)$$

$$-\frac{1}{8}x = 0 \quad \text{or} \quad x - 16 = 0$$

$$x = 0 \quad \text{or} \quad x = 16$$

2.) A student throws a bag of chips to her friend. Unfortunately, her friend does not catch the chips, and the bag hits the ground. The distance from the ground (height) for the bag of chips is modeled by the function

$$h(t) = -16t^2 + 32t + 4$$

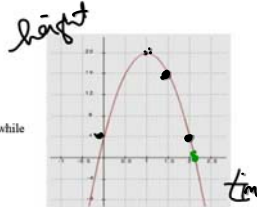
where h is the height (distance from the ground in feet) of the chips, and t is the number of seconds the chips are in the air.

a.) From what height are the chips being thrown?

4 ft

b.) What is the maximum height the bag of chips reaches while airborne?

20 ft.



c.) How many seconds after the bag was thrown did it hit the ground

just over 2 sec. $0 = -16t^2 + 32t + 4$

d.) What is the average rate of change for the interval from 1.5 to 2 sec.?

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{(16 - 4)}{(1.5 - 2)} = -24$$

Practice in Workbook:

p. 100: prob. 4

Worksheet:

Finish **BLUE** worksheet from Friday