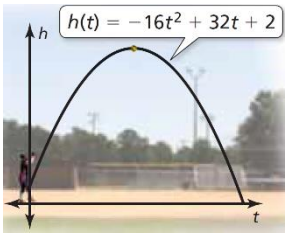
Chapter 4: Quadratic Functions

Name: _____

4.2.D2 – MODELING WITH QUADRATIC FUNCTIONS

Date: _____ Period: _____

1. The function shown models the height (in feet) of a softball t seconds after it is pitched in an underhand motion. Identify a reasonable domain and range for the given scenario.



2. A scientist records the diving patterns of a tagged shark. After collecting the recorded data, the path of the shark diving under water is modeled using the function $d = 0.1x^2 - 2.458x - 8.12$, where x represents the shark's horizontal distance from the point where the data recording began and d represents the shark's depth. Both are measured in meters. Determine the shark's furthest underwater depth.

3. A football is kicked. The height of the punted football, $h(x)$, in feet, can be modeled by the function $h(x) = -0.01x^2 + 1.18x + 2$, where x is the ball's horizontal distance, in feet, from the point of impact with the kicker's foot.
   a. What is the maximum height of the punt? How far from the point of impact does this occur?
   b. The nearest defensive player is 6 feet from the point of impact. How high must he reach to block the punt?
   c. If the ball is not blocked by the defensive player, how far down the field will it go before hitting the ground?

4. A flare is fired from a yacht in distress off the coast of Brisbane. The flare's height, h meters above the horizon t seconds after firing, is given by $h(t) = -2t^2 + 18t + 20$.
   a. When will the flare fall into the ocean?
   b. Complete the square and identify the vertex. What does the vertex represent in this scenario?
   c. Identify a reasonable range for the given scenario.

5. The function $h(x) = -0.03(x - 14)^2 + 6$ models the jump of a red kangaroo where x is the horizontal distance & h is the corresponding height (both in feet).
   a. What is the kangaroo's maximum height?
   b. How long is the kangaroo's jump?