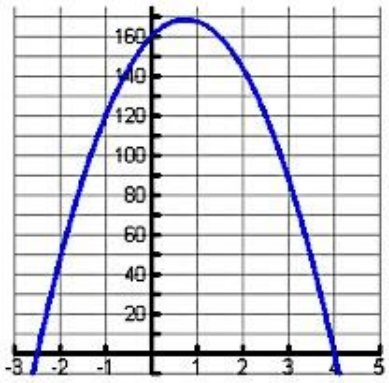
Homework 5.10 Real World Applications for Quadratic Functions

Use the scenario to answer the below questions.

Leejay Collins is catapulting a boulder off a cliff to hit the road runner. Let (t) represent the number of seconds that the boulder catapults off the cliff and h(t) denote the height of the boulder, in feet, above the base of the cliff. Ignoring air resistance, Michael developed the following formula to express the path of the boulder:
$h(t) = -16t^2 + 24t + 160.$



1. What does the x-axis represent?

2. The y-axis?

3. What part of the graph is insignificant? Why?

4. What was the height of the boulder before it was launched?

5. What special point on the graph is associated with this information?

6. If Leejay simply pushed a boulder off the cliff, how would the graph look different?

7. How long will it take before the boulder reaches the bottom of the cliff?

What special point on the graph is associated with this information?

8. After how many seconds does the boulder change direction?

How high is the boulder when it changes direction?

What is this significant point called on the graph?

9. If Leejay changes his mind, how many seconds does he have to stop the boulder from going over the cliff?

Jared and Jordan threw an object upward from the top of a 1200 ft tall building. The height of the object, measured in feet, t seconds after they threw it is $h(t) = -16t^2 + 160t + 1200$.

10. Sketch a picture depicting the problem.

11. Where is the object 3 seconds after *Jared and Jordan* threw it?

12. How long does it take for the object to hit the ground?

Vivian and Rebekka are standing on the top of a 1680 ft tall building and throw a small object upwards. At every second, they measure the distance of the object from the ground. Exactly t seconds after Vivan and Rebekka threw the object, its height, (measured in feet) is h (t) = 16t 2 + 256t + 1680

13. Find h(3). Explain what this value means?

14. How much does the object travel during the two seconds between 5 seconds and 7 seconds?

15. How long does it take for the object to reach a height of 2640 ft?

16. How long does it take for the object to hit the ground?

If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height h after t seconds is given by the equation h(t) 16t 128t 2 = − + (if air resistance is neglected).

17. How long will it take for the rocket to return to the ground?

18. After how many seconds will the rocket be 112 feet above the ground?

19. How long will it take the rocket to hit its maximum height?

20. What is the maximum height?