

Real Life Situations Modeled by Quadratic Equations

Solve the following problems using what you know about quadratics. Graphing calculators are not necessary. (Hint: These equations are not prime!)

1. A pilot is flying at approximately 10,000 feet and is forced to eject from her jet. The following equation models the height, H , (given in feet), of the pilot over time, t , (given in seconds), after she is ejected from the jet and parachutes to the ground.

$$H = -16t^2 + 624t + 4320$$

- a. What is the maximum height (relative to the ground) reached by the pilot after being ejected?
- b. How many feet above the jet was the pilot ejected?
- c. How long did it take before the pilot landed on the ground from her highest point?



2. The height h in feet of a projectile launched vertically upward from the top of a 32-foot tall bridge is given by $h = 32 + 16t - 16t^2$, where t is time in seconds.
 - a. When does the projectile reach a maximum height?
 - b. How long will it take the projectile to strike the ground?
3. The height h in feet of a projectile launched vertically upward from the top of a bridge is given by $h = 280 + 72t - 16t^2$ where t is time in seconds.
 - a. How high is the top of the bridge?
 - b. When does the projectile reach a maximum height?
 - c. How long will it take the projectile to strike the ground (not the top of the bridge)?



4. A company's weekly revenue in dollars is given by $R = 2000x - 2x^2$ where x is the number of items produced during a week.
- What amount of items will produce the maximum revenue?
 - What will the maximum total revenue be?

5. The formula below gives the height of an object thrown from a building 160 feet high with an initial speed of 48 ft/sec: $h = -16t^2 + 48t + 160$, where t is measured in seconds.
- Find the time it takes for the object to hit the ground.
 - Find the maximum height of the object.

6. The height h in feet of a projectile launched vertically upward from the top of a 96-foot tall tower when time t is measured in seconds, is given by $h = 96 + 80t - 16t^2$.
- How long will it take the projectile to strike the ground?
 - What is the maximum height that the projectile reaches?



7. A model rocket is projected straight upward from the ground level according to the height equation $h = -16t^2 + 192t$, where h is the height in feet and t is the time in seconds.
- At what time is the height of the rocket maximum?
 - What is the maximum height?