Answers

Quadratic Word Problems Worksheet

x-int 1. The Empire State Building is 1250 feet tall. If an object is thrown upward from the top of the building at an initial velocity of 38 feet per second, its height s seconds after it is thrown is given by the function $h(s) = -16s^2 + 38s + 1250$. How long will it take for the ball to hit the ground? ≈ 10.1 Seconds

x-int 2. A juggler throws a ball into the air, releasing it 5 feet above the ground with an initial velocity of 15 ft/sec. She catches the ball with her other hand when the ball returns to 5 feet above the ground. If the equation $h = -16t^2 + 15t$ gives the path of the ball from hand to hand, find how long the ball is in the air. $\frac{15}{16}$ sec in the air or $\approx .93$ sec in the air

3. A ball is thrown straight up with an initial velocity of 56 feet per second. The height, h, of the ball t the seconds after it is thrown is given by the formula $h(t) = 56t - 16t^2$ air

vertex a) What is the maximum height? 49 feet Vertex $(1.75, 49)$

$56(1) - 16(1)^2$ b) What is the height of the ball after 1 second? 40 feet

c) After how many seconds will it return to the ground? 3.5 Seconds

vertex 4. A ball is thrown upward from the ground. Its height (h, in feet) is given by the function $h = -16t^2 + 64t + 3$, where t is the length of time (in seconds) that the ball has been in the air. What is the maximum height that the ball reaches? 67 feet high

vertex 5. The height, $h(t)$, in feet, of an object shot from a cannon with initial velocity of 20 feet per second can be modeled by the equation $h(t) = -16t^2 + 20t + 6$, where t is the time, in seconds, after the cannon is fired. What is the maximum altitude that the object reaches? 12.25 feet high

x-int 6. Physicists tell us that altitude h in feet of a projectile t seconds after firing is $h = -16t^2 + v_0 t + h_0$, where v_0 is the initial velocity in feet per second and h_0 is the altitude in feet from which it is fired. If a rocket is launched from a hilltop 2400 feet above the desert with an initial upward velocity of 400 feet per second, then when will it land on the desert? $h = -16t^2 + 400t + 2400$ In 30 Seconds

7. The engine torque y (in foot-pounds) of one model of car is given by $y = -3.75x^2 + 23.2x + 38.8$ where x is the speed of the engine (in thousands of revolutions per minute).

vertex a) Find the engine speed that maximizes the torque. Max Speed ≈ 3.09
b) What is the maximum torque? max Torque 74.7

Vertex $(3.09, 74.7)$

x-int 8. In baseball, the flight of a pop-up may be described as $d = -16t^2 + 80t + 3.5$ where d gives the ball's height above the ground in feet as a function of time t. How long does the catcher have to get into position under the ball after the ball is hit? ≈ 5 sec to get under the ball $(5,0)$
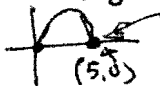
9. When a gray kangaroo jumps, its path through the air can be modeled by $y = -0.0267x^2 + 0.8x$ where x is the kangaroo's horizontal distance traveled (in feet) and y is its corresponding height (in feet).
vertex a) How high can a gray kangaroo jump? ≈ 6 feet
x-int b) How far can it jump? ≈ 29.9 or 30 feet