Quadratic word problems

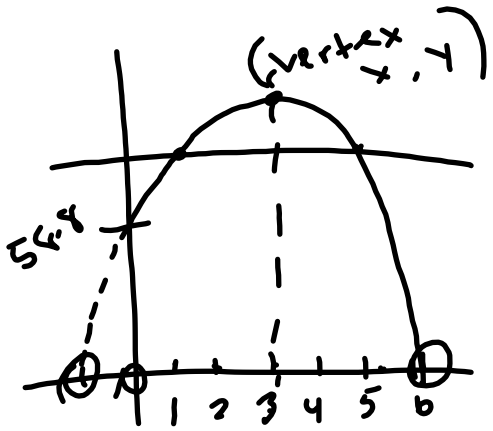
1. **An object is launched at 19.6 meters per second (m/s) from a 58.8-meter tall platform. The equation for the object's height s at time t seconds after launch is $s(t) = -4.9t^2 + 19.6t + 58.8$, where s is in meters. When does the object strike the ground?**

Solve

$$x = \frac{-19.6 \pm \sqrt{19.6^2 - 4(-4.9)(58.8)}}{2(-4.9)}$$

$$x = \frac{-19.6 + 39.2}{-9.8} = -$$

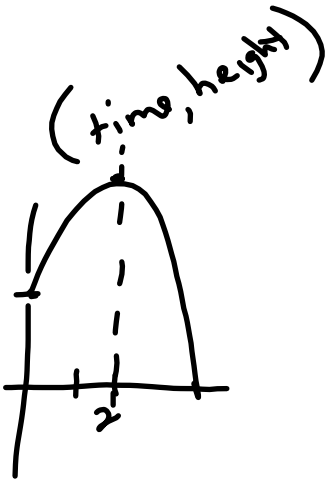
$$x = \frac{-19.6 - 39.2}{-9.8} = 6 \text{ sec.}$$



1. **An object in launched directly upward at 64 feet per second (ft/s) from a platform 80 feet high. The equation of the object's height, h, at time, t, seconds after launch is $h(t) = -16t^2 + 64t + 80$. What will be the object's maximum height? When will it attain this height?**

time $x = \frac{-64}{2(-16)} = 2$ sec

$h(2) = -16(2)^2 + 64(2) + 80 = 144$ ft

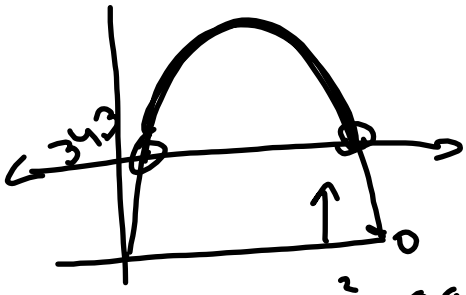


1. An object is launched from ground level directly upward at 39.2 m/s. The equation of the object's height, h, at time, t, seconds after launch is $h(t) = -4.9t^2 + 39.9t$. For how long is the object at or above a height of 34.3 meters?

$34.3 = -4.9t^2 + 39.9t - 34.3$

$0 = -4.9t^2 + 39.9t - 34.3$

$x = \frac{-39.9 \pm \sqrt{39.9^2 - 4(-4.9)(34.3)}}{2(-4.9)}$



$x = \frac{-39.9 + 30.3}{-9.8} = .98$

$x = \frac{-39.9 - 30.3}{-9.8} = 7.16$

$0 = -4.9t^2 + 39.9t$

$7.16 - .98 = 6.18$ sec

5. When a flare is fired upward at 58.8 m/s, its height, h meters, is given by the equation h = -4.9t^2 + 58.8t, where t seconds is the time since firing.

a) Determine the maximum height of the flare and the time it takes to reach this height.
b) For how many seconds is the flare higher than 98 m?