October 7

GUIDED NOTES: More Applications of Quadratics

A water balloon is launched into the air so that its height, in meters, after t seconds is modeled by the equation $h(t) = -4.9t^2 + 27t + 2.4$.

EX1) How high is the balloon after 1 second? $=t$ Evaluate

$h(1) = -4.9(1)^2 + 27(1) + 2.4 = \boxed{24.5\text{ m}}$

EX2) When is the balloon at a height of 30 meters? $=h$

$30 = -4.9t^2 + 27t + 2.4$

$-30 \quad\quad -30$

$-1 \cdot (0 = -4.9t^2 + 27t - 27.6)$

$0 = 4.9t^2 - 27t + 27.6$

a: 4.9 b: −27 c: 27.6

Quadratic Formula

$t = \dfrac{-(-27) \pm \sqrt{(-27)^2 - 4(4.9)(27.6}}{2(4.9)}$

$t = \dfrac{27 \pm \sqrt{188.04}}{9.8}$

$t = 4.15, 1.36$

$\boxed{1.36\text{ secs and } 4.15\text{ secs}}$

EX3) What is the maximum height of the balloon?

Vertex

$h(t) = -4.9t^2 + 27t + 2.4$

a: −4.9 b: 27 c: 2.4

$t = \dfrac{-(27)}{2(-4.9)} = \dfrac{-27}{-9.8} = 2.76\text{ secs}$

$-4.9(2.76)^2 + 27(2.76) + 2.4$

$= \boxed{39.59\text{ m}}$

EX4) When will the balloon hit the ground? $h = 0$

$-1 \cdot (0 = -4.9t^2 + 27t + 2.4)$

$0 = 4.9t^2 - 27t - 2.4$

a: 4.9 b: −27 c: −2.4

Quadratic Formula

$t = \dfrac{-(-27) \pm \sqrt{(-27)^2 - 4(4.9)(-2.4}}{2(4.9)}$

$t = \dfrac{27 \pm \sqrt{776.04}}{9.8}$

$t = 5.60, \cancel{-.09}$

$\boxed{5.60\text{ secs}}$

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