Answer on Question #60637 – Math – Calculus

Question

A ball is launched into the air from below a cliff, such that after t seconds its height above the cliff top is h metres, and is given by the equation

h = − 4.9t^2 + 19.6t − 9.6.

Calculate, to the nearest metre, the maximum height the ball achieves above the cliff top.

Solution

The ball achieves the maximum height when its velocity equals 0:

$$v(t) = \frac{dh}{dt} = (-4.9t^2 + 19.6t - 9.6)' = -9.8t + 19.6 = 0 \;\rightarrow\; t = \frac{19.6}{9.8} = 2\ s.$$

Maximum height:

$$h_{max} = h(2) = -4.9 \cdot 2^2 + 19.6 \cdot 2 - 9.6 = 10\ m.$$

Answer: $h_{max} = h(2) = 10\ m.$