2017 Ph H2 Q3

Section: Our Dynamic Universe
Topic: Vertical Motion

(a) (i) Question Summary

A ball is thrown vertically upwards with initial vertical velocity **+5.6 m s⁻¹** (from the graph).
Find the time to reach maximum height.

✅ Answer:

$t = 0.57\,\text{s}$

Working

At the top: $v = 0$.
$v = u + at \Rightarrow 0 = 5.6 - 9.8t$

$t = \dfrac{5.6}{9.8} = 0.57\,\text{s}.$

(a) (ii) Question Summary

Find the distance the ball falls from its maximum height to the ground.

✅ Answer:

$s = 3.0\,\text{m}$

Working

From the graph, the ball hits the ground at $v = -7.7\,\text{ms}^{-1}$.
$v^2 = u^2 + 2as$

$(-7.7)^2 = 0^2 + 2(9.8)s$

$s = \dfrac{59.3}{19.6} \approx 3.0\,\text{m}.$

(b) Explanation

A ball thrown upwards with **greater initial velocity** would produce a **steeper upward line** on the velocity-time graph, crossing zero later, and continuing further to negative velocities before hitting the ground.