Question 68520 – Physics/Mechanics – Relativity

A motorbike starts from rest and moves with an acceleration of 1.5 m/s^2. After traveling 15 m it crosses a bridge in 10.2 s.

(a) What is the motorbike's speed just after it leaves the bridge?

(b) Find the length of the bridge.

Answer:

(a) $v_0 = 0\frac{m}{s}, thus\ v_1^2 = 2aS, v_1 = \sqrt{2aS} = \sqrt{2 \cdot 1.5 m/s \cdot 15m} = \sqrt{45}\frac{m}{s} = 6.7\ m/s$

$$v_2 = v_1 + at = 6.7\frac{m}{s} + 1.5\frac{m}{s^2} \cdot 10.2s = 22\ m/s$$

(b) $S_b = v_1 t + \frac{at^2}{2} = 6.7\frac{m}{s} \cdot 10.2s + 1.5\frac{m}{s^2} \cdot \frac{(10.2\ s)^2}{2} = 146.5\ m$