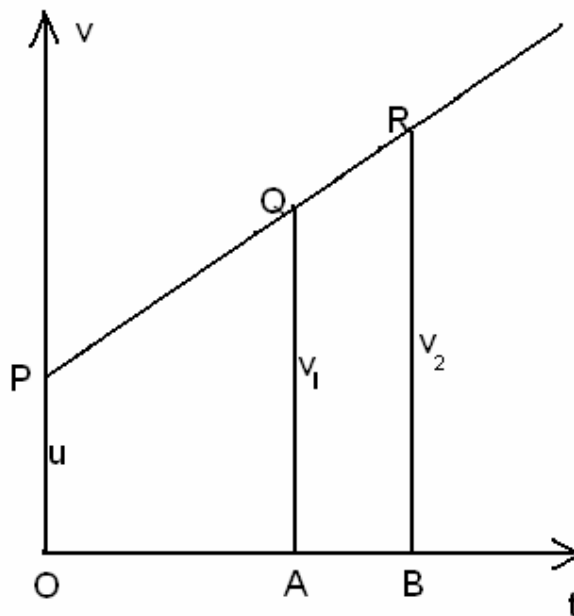


Speedometer Test

A Caltech freshman, inexperienced with suburban traffic officers, has just received a ticket for speeding. Thereafter, when he comes upon one of the "Speedometer Test" sections on a level stretch of highway, he decides to check his speedometer reading. As he passes the "0" start of the marked section, he presses on his accelerator and for the entire period of the test he holds his car at constant acceleration. He notices that he passes the 0.10 mile post 16 s. after starting the test, and 8.0 s. later he passes the 0.20 mile post.

- What should his speedometer have read at the 0.20 mile post?
- What was his acceleration?

Sukumar Chandra's Solution (notes)



u = initial velocity, a = acceleration.

V_1 = velocity at 16th second,

V_2 = velocity at 24th second.

$$V_1 = u + 16a, V_2 = u + 24a,$$

As, distance = average velocity x time

$$0.10 = 16(u + V_1)/2 = 16(u + 8a) \Rightarrow u + 8a = 1/160 \quad (1)$$

$$0.20 = 24(u + V_2)/2 = 24(u + 12a) \Rightarrow u + 12a = 1/120 \quad (2)$$

$$(2) - (1) \Rightarrow 4a = 1/480 \Rightarrow a = 1/1920 \text{ mi-sec}^{-2} = \underline{2.75 \text{ ft-sec}^{-2}}$$

$$\text{Also, } V_2 = u + 24a = u + 12a + 12a = 1/120 + 12/1920 = 7/480 \text{ mi-sec}^{-1} = \underline{52.5 \text{ mi-hr}^{-1}}$$