

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

2 Kinematics in one dimension

Exercise B, Question 6

Question:

A van travelling at 40 mph skids to a halt in a distance of 15 m. Find the acceleration of the van and the time taken to stop, assuming that the deceleration is uniform and the van travels along a straight line. (Assume 1 mile = 1600 m.)

Solution:

$$40\text{mph} = \frac{40 \times 1600}{3600} \text{ m s}^{-1} = 17 \frac{7}{9} \text{ m s}^{-1}$$

$$v^2 = u^2 + 2as$$

$$0^2 = \left(17 \frac{7}{9}\right)^2 + 2(-r)(15)$$

$$\therefore 30r = 316 \frac{4}{81}$$

$$r = 10 \frac{130}{243} = 10.5 \text{ m s}^{-2} \text{ (3 s.f.), deceleration.}$$

$$s = \frac{(u+v)}{2} \times t$$

$$15 = \frac{\left(17 \frac{7}{9} + 0\right)}{2} \times t$$

$$\therefore 2 \times 15 = 17 \frac{7}{9} \times t$$

$$\therefore \frac{2 \times 15}{17 \frac{7}{9}} = t$$

$$\therefore t = 1 \frac{11}{16} \text{ s}$$

$$= 1.69 \text{ s (3 s.f.)}$$

