

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

2 Kinematics in one dimension

Exercise Test yourself, Question 2

Question:

The velocity of a car increases from 5 m s^{-1} to 25 m s^{-1} as it travels a distance of 100 m. Assume that the acceleration of the car is constant and that the car moves along a straight line.

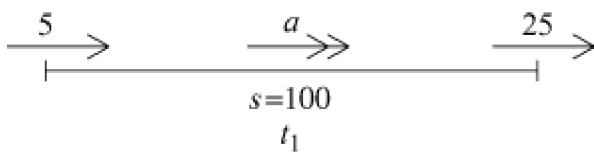
- (a) Find the acceleration of the car.
 (b) Find the speed of the car when it has travelled 50 m.
 (c) Find the time it takes for the car to travel the 100 m.

Solution:

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

$$25^2 = 5^2 + 2(a)(100)$$

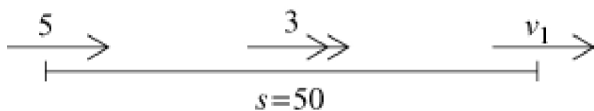
(a) $\therefore 25^2 - 5^2 = 200a$
 $600 = 200a$
 ie $a = 3 \text{ m s}^{-2}$



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

$$v_1^2 = 5^2 + 2(3)(50)$$

(b) $v_1^2 = 325$
 $\therefore v_1 = \sqrt{325} = 18.027\dots$
 $v_1 = 18.0 \text{ m s}^{-1}$ (3 s.f.)



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

(c) $100 = \frac{(5+25)}{2} \times t_1$

$$\therefore 100 = 15t_1$$

$$t_1 = \frac{100}{15} = 6 \frac{2}{3} \text{ seconds}$$

