

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

2 Kinematics in one dimension

Exercise B, Question 4

Question:

A lift rises vertically from rest, accelerating at a constant rate until it reaches a speed of 1.6 m s^{-1} after 8 seconds.

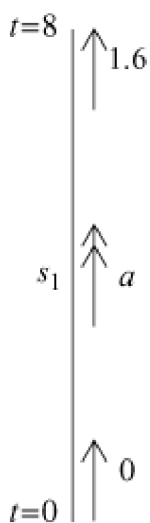
- (a) Find the acceleration of the lift.
- (b) The lift continues to accelerate for a further 2 seconds. Find the distance that the lift has now risen.
- (c) The lift then slows down, at a constant rate, and stops after a further 5 seconds. Find the total distance travelled by the lift.

Solution:

$$v = u + at$$

$$(a) \quad 1.6 = 0 + a \times 8$$

$$\therefore a = 0.2 \text{ m s}^{-2}$$



$$s = \frac{(u+v)}{2} \cdot t \text{ in 1st part}$$

$$s_1 = \frac{(0+1.6)}{2} \times 8$$

$$s_1 = 6.4 \text{ m}$$

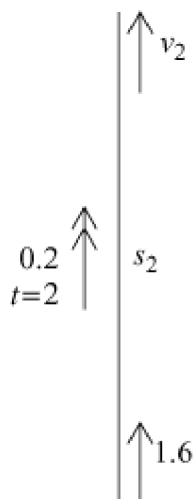
(b)

$$s = ut + \frac{1}{2}at^2 \text{ in 2nd part}$$

$$s_2 = 1.6 \times 2 + \frac{1}{2} \times 0.2 \times 2^2$$

$$s_2 = 3.6 \text{ m}$$

$$\therefore \text{total distance} = s_1 + s_2 = 6.4 + 3.6 = 10 \text{ metres}$$



In second part, $v = u + at$

$$v_2 = 1.6 + 0.2 \times 2 = 2 \text{ m s}^{-1}$$

In last part, $s = \frac{(u+v)}{2} \times t$

$$(c) \quad s_3 = \frac{(2+0)}{2} \times 5 = 5 \text{ metres}$$

$$\therefore \text{total distance} = 10 + 5 \\ = 15 \text{ metres}$$

