

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## 2 Kinematics in one dimension

### Exercise C, Question 6

#### Question:

A ball is thrown vertically upwards from ground level with an initial speed of  $7 \text{ m s}^{-1}$ . Assume that no resistance forces act on the ball, so that it moves only under the influence of gravity.

(a) Find the maximum height of the ball.

(b) The ball hits the ground  $T$  seconds after it was thrown. Find  $T$ . [A]

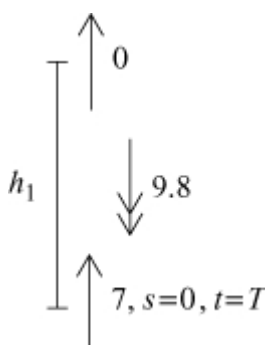
#### Solution:

$$\begin{aligned} v^2 &= u^2 + 2as \\ 0^2 &= 7^2 + 2(-9.8)(h_1) \end{aligned}$$

$$(a) \therefore 19.62h_1 = 49$$

$$h_1 = \frac{49}{19.6} = 2.5$$

$\therefore$  maximum height = 2.50 m (3 s.f.)



(b) When it hits the ground again its displacement is zero

$$s = ut + \frac{1}{2}at^2$$

$$0 = 7 \times T + \frac{1}{2}(-9.8)T^2$$

$$\therefore 0 = T[7 - 4.9T]$$

$$T = 0 \text{ (the start) or}$$

$$7 = 4.9T$$

$$\therefore T = \frac{7}{4.9}$$

$$T = 1.4285\dots$$

$$T = 1.43 \text{ seconds (3 s.f.)}$$

