

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## 2 Kinematics in one dimension

### Exercise C, Question 13

#### Question:

A ball is thrown vertically upwards with an initial velocity of  $30 \text{ m s}^{-1}$ . One second later, another ball is thrown upwards with an initial velocity of  $u \text{ m s}^{-1}$ . The balls collide after a further 2 seconds. Find the value of  $u$ .

#### Solution:

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

$$\text{1st ball } h_1 = 30 \times 3 + \frac{1}{2} \left( -9.8 \right) (3)^2$$

$$\text{2nd ball } h_1 = u \times 2 + \frac{1}{2} \left( -9.8 \right) (2)^2$$

putting the expressions equal and simplifying gives

$$90 - 44.1 = 2u - 19.6$$

$$\therefore 90 - 44.1 + 19.6 = 2u$$

$$65.5 = 2u$$

$$u = \frac{65.5}{2} = 32.75$$

$$u = 32.8 \text{ m s}^{-1} \text{ (3 s.f.)}$$

