

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## Exam style practice papers

### Exercise MM1B, Question 1

#### Question:

A car, of mass 1200 kg, accelerates from rest to a speed of  $10 \text{ m s}^{-1}$ , as it travels a distance of 40 m. Assume that the acceleration of the car is constant.

(a) Calculate the acceleration of the car and the magnitude of the resultant force on the car.  
(4 marks)

(b) If the car continues with the same acceleration, how long would it take to reach a speed of  $20 \text{ m s}^{-1}$  and how far would it have travelled since setting off. (4 marks)

(c) Explain why it is unlikely that the car would continue to move with the same acceleration.  
(2 marks)

#### Solution:

$$\text{Using } v^2 = u^2 + 2as,$$

$$10^2 = 0 + 2 \times a \times 40$$

$$(a) \quad a = \frac{100}{80}$$

$$a = 1.25$$

$\therefore$  Acceleration is  $1.25 \text{ m s}^{-2}$

$$\text{Using } F = ma$$

$$F = 1200 \times 1.25$$

$$= 1500$$

$\therefore$  Resultant force is 1500 N

$$\text{Using } v = u + at,$$

$$(b) \quad 20 = 0 + 1.25t$$

$$t = 16$$

$\therefore$  Time is 16 s

To find the distance, use  $v^2 = u^2 + 2as$

$$20^2 = 0 + 2 \times 1.25 \times s$$

$$s = 160$$

$\therefore$  Distance is 160 m

(c) Air resistance would increase as speed increases, and decrease the resultant force and the acceleration.

