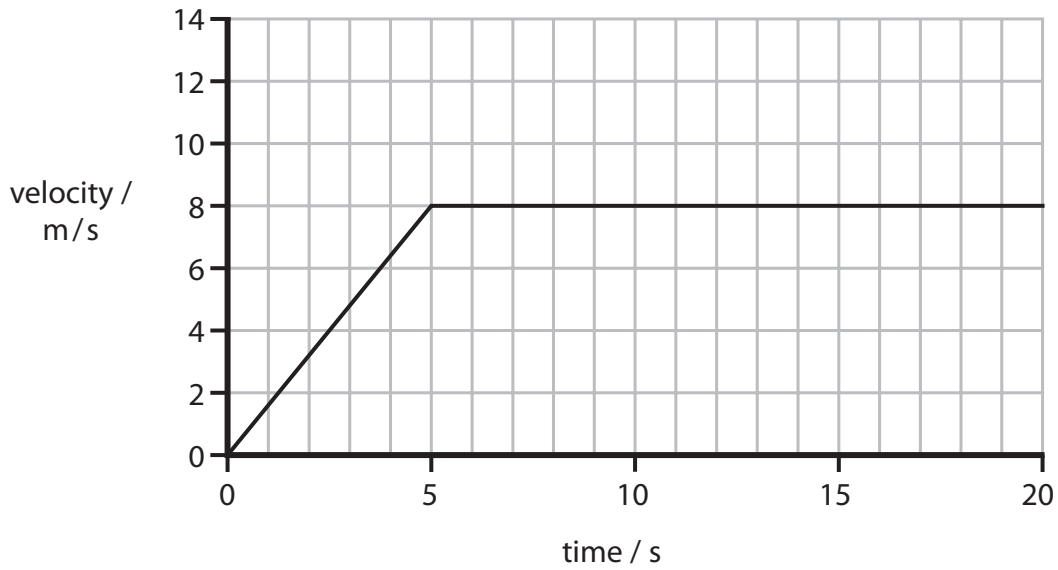


## Forces and motion

- 1 (a) Here is the velocity-time graph for a car for the first 20 s of a journey.



- (i) Calculate the change in velocity of the car during the first 5 s.

(1)

change in velocity = ..... m/s

- (ii) Calculate the acceleration of the car during the first 5 s.

(2)

acceleration = ..... m/s<sup>2</sup>

- (iii) State the size of the resultant force between 10 s and 15 s

(1)

resultant force = ..... N

(b) The mass of a car is 1200 kg.

Calculate the resultant force on the car required to produce an acceleration of  $0.8 \text{ m/s}^2$ .

(2)

resultant force = ..... N

\* (c) A car, travelling at  $20 \text{ m/s}$ , with just the driver inside takes  $70 \text{ m}$  to stop in an emergency.

The same car is then fully loaded with luggage and passengers as well as the driver.

Explain why it will take a different distance to stop in an emergency from the same speed.

(6)

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**(Total for Question = 12 marks)**

2 (a) A car accelerates at a constant rate of  $1.83 \text{ m/s}^2$  along a flat straight road.

The force acting on the car is  $1.870 \text{ kN}$ .

Calculate the mass of the car.

Give your answer to three significant figures.

(3)

mass = ..... kg

(b) The car accelerates from rest for  $16 \text{ s}$ .

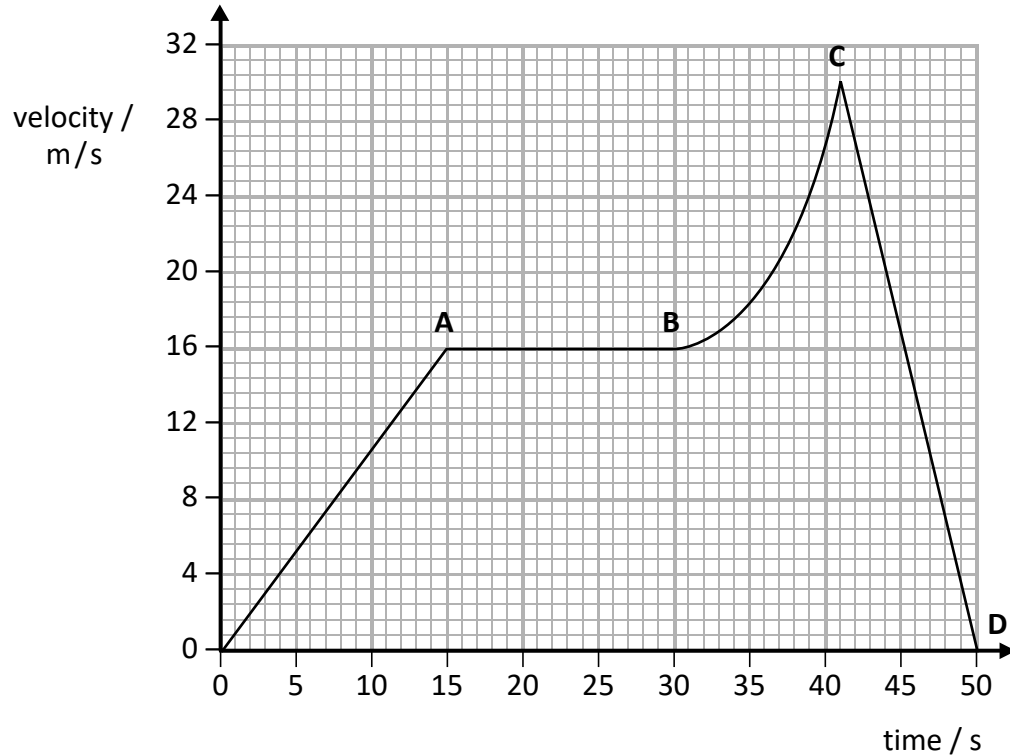
Calculate the speed of the car after  $16 \text{ s}$ .

(3)

speed = ..... m/s

(c) The car starts on another journey.

Figure 6 shows the graph of the car's movement.



**Figure 6**

Show that the distance travelled when the car is moving at a constant speed is greater than the distance travelled when the car is slowing down.

(4)