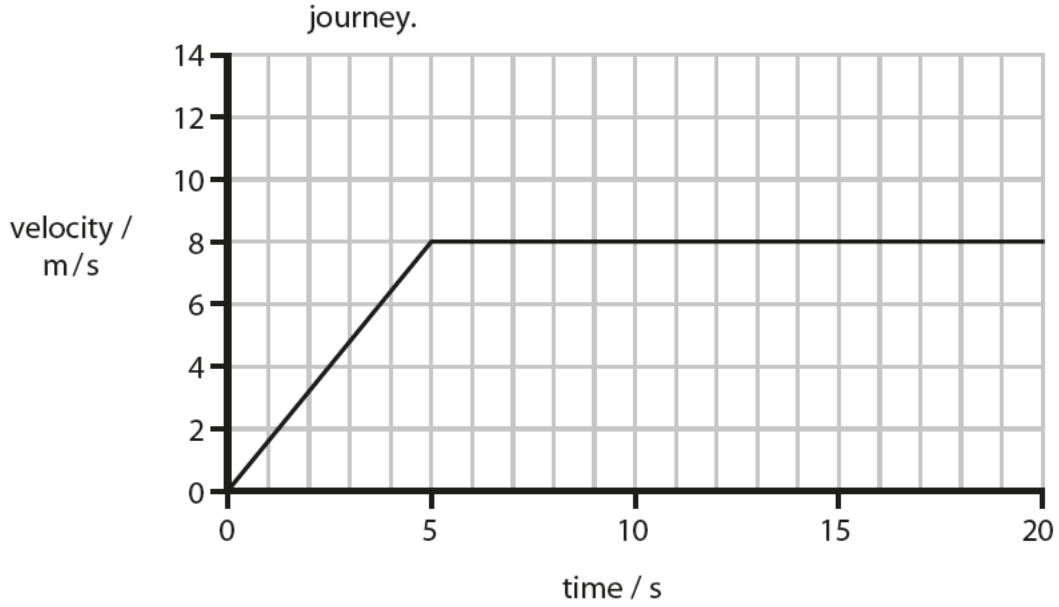
Forces and motion

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^2

(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 m/s^2.

(2)

resultant force = ... N

*(c) A car, travelling at 20 m/s, with just the driver inside takes 70 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 m/s^2 along a flat straight road.

The force acting on the car is 1.870 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 s.

Calculate the speed of the car after 16 s.

(3)

speed = ... m/s

(c) The car starts on another journey.

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

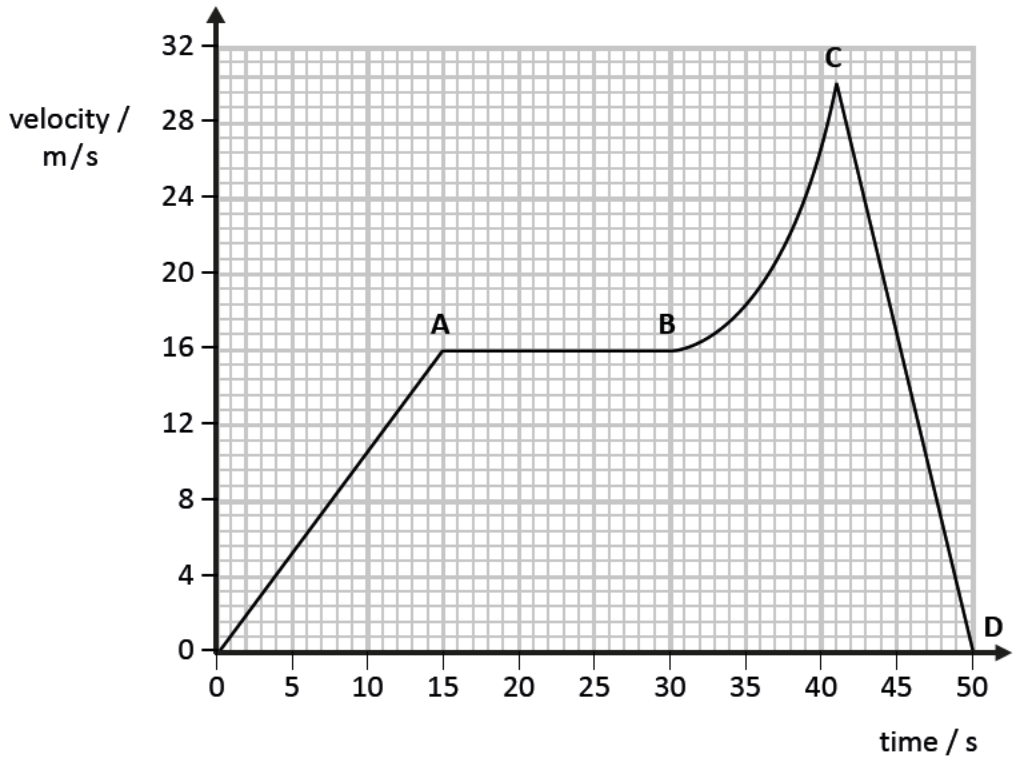


Figure 6

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)

(Total for Question = 10 marks)