

3 (a) Define velocity.

.....  
..... [1]

(b) A constant driving force of 2400 N acts on a car of mass 1200 kg. The car accelerates from rest in a straight line along a horizontal road.

Assume that the resistive forces acting on the car are negligible.

(i) Calculate the acceleration of the car.

acceleration = .....  $\text{ms}^{-2}$  [1]

(ii) On Fig. 3.1, sketch a graph showing the variation with time  $t$  of the velocity  $v$  of the car for the first 20 seconds of its motion.

Label this line A.

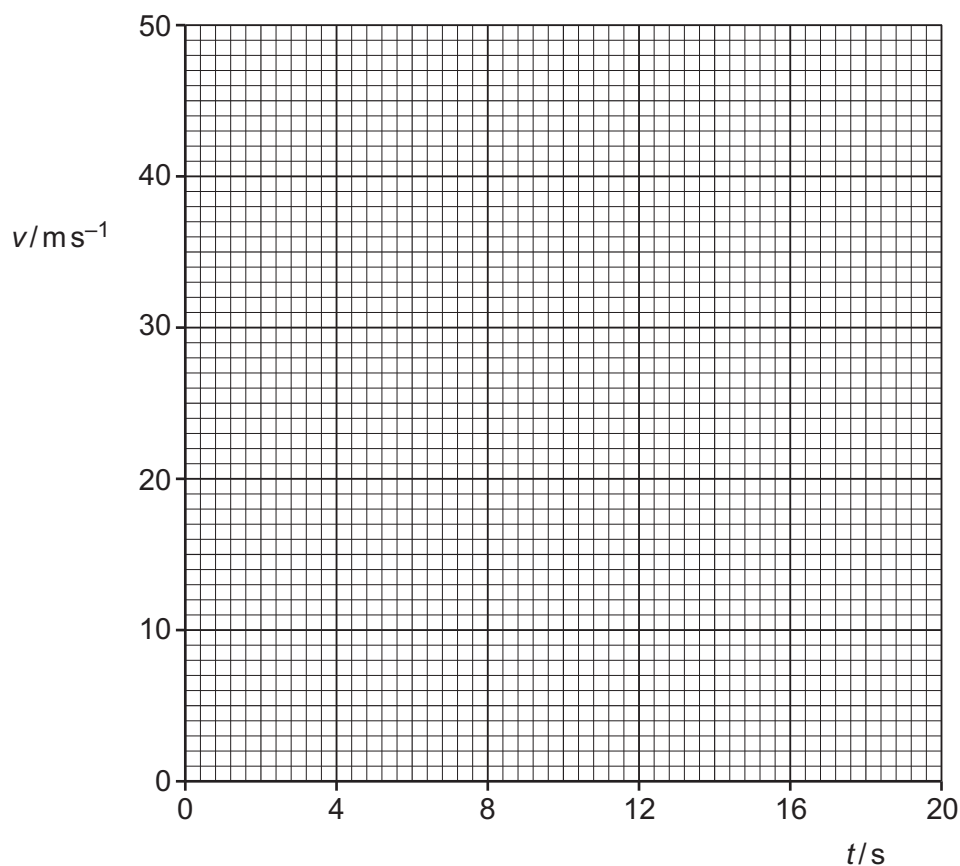


Fig. 3.1

[2]

- (c) In reality, a resistive force due to air resistance acts on the car in (b). This resistive force increases with speed until it becomes equal in magnitude to the driving force at time  $t = 12\text{ s}$ .
- (i) On Fig. 3.1, sketch a second line to show the variation with time  $t$  of the velocity  $v$  of the car for the first 20 seconds of its motion. Label this line B. [3]
- (ii) At time  $t = 20\text{ s}$ , the driving force is increased to  $3000\text{ N}$  and remains constant at this value.

Describe how the velocity of the car changes due to this increase in the driving force.

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..... [2]