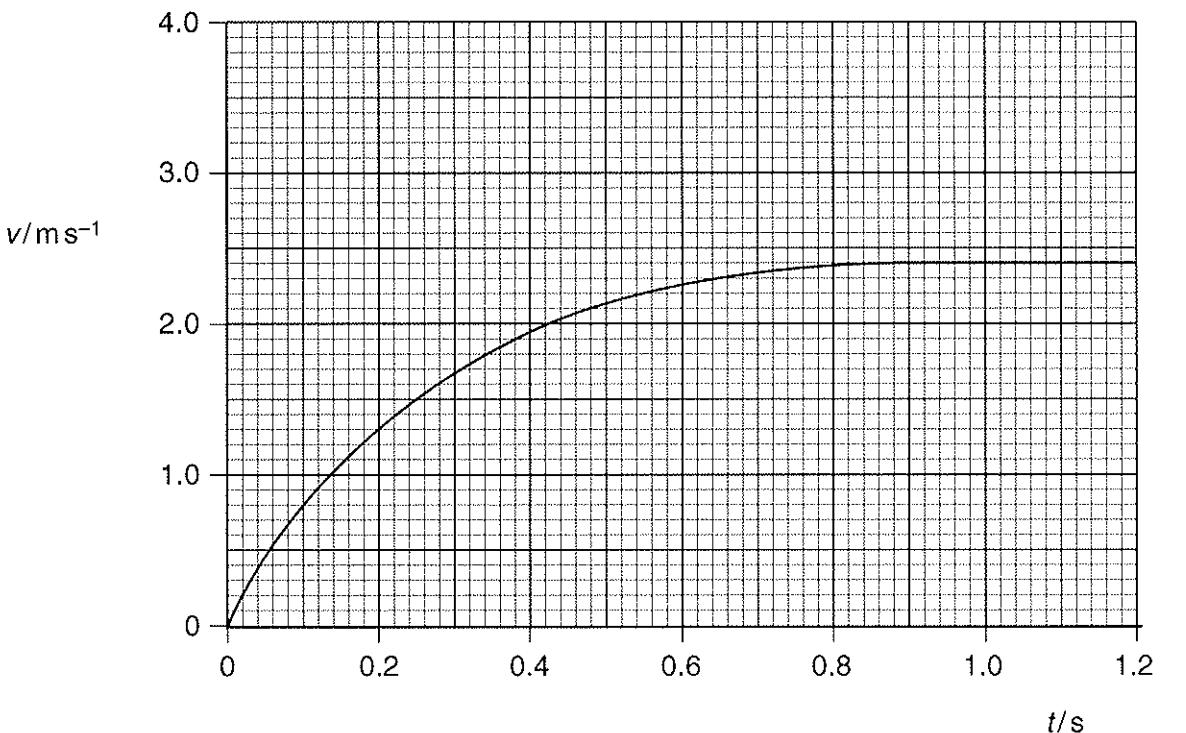


**Section A**

Answer **all** the questions in this Section.

- 1** The variation with time  $t$  of the vertical speed  $v$  of a light ball falling through air is shown in Fig. 1.1.



**Fig. 1.1**

The mass of the ball is 15 g.

- (a) On Fig. 1.1, draw a line to show the variation with time  $t$  of the vertical speed  $v$  of the ball falling from rest in a vacuum. [1]
- (b) Use Fig. 1.1 to determine the acceleration of the ball falling through air at time  $t = 0.20$  s. Show your construction on Fig. 1.1.

acceleration = .....  $\text{m s}^{-2}$  [3]



- (c) For the air resistance acting on this ball,  
(i) calculate the maximum resistive force,

force = ..... N [1]

- (ii) show that the resistive force at time  $t = 0.20\text{ s}$  is about 0.083N.

force = ..... N [1]

- (d) Without drawing a graph, use Fig. 1.1 and the answers in (c) to suggest whether the magnitude of the air resistance force is proportional to the speed of the ball.

[3]

