



## Section A

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

For  
Examiner's  
Use

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

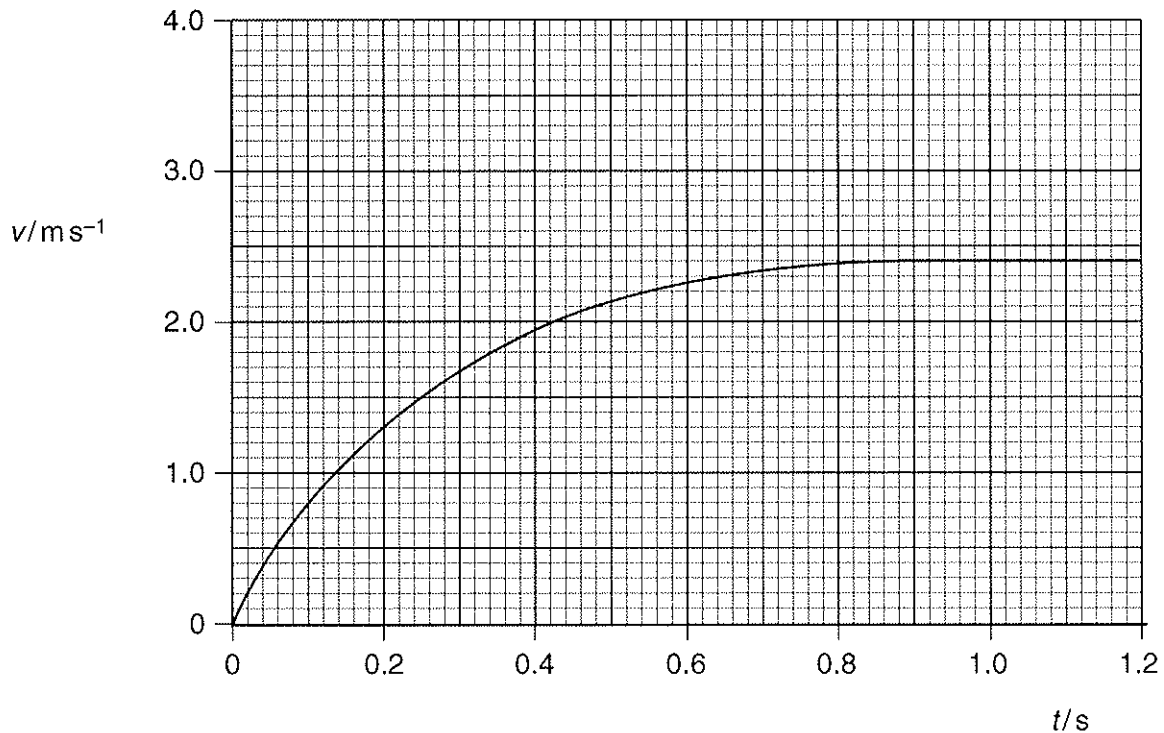


Fig. 1.1

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 = .....  $\text{ms}^{-2}$  [3]



(c) For the air resistance acting on this ball,

(i) calculate the maximum resistive force,

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force = ..... N [1]

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

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]

