

- 2 A ball is released from rest at time $t = 0$ s and falls freely. It hits the ground after falling downwards for 2.0 s. Take the sign convention of up as positive.

- (a) State the acceleration of the ball during the fall.

$$\text{acceleration} = \dots \text{m s}^{-2} \quad [1]$$

- (b) Show that the velocity of the ball just before it hits the ground is -20 m s^{-1} .

[1]

After 0.20 seconds upon hitting the ground, the ball rebounds vertically from the ground with a speed of 10 m s^{-1} .

velocity $v / \text{m s}^{-1}$

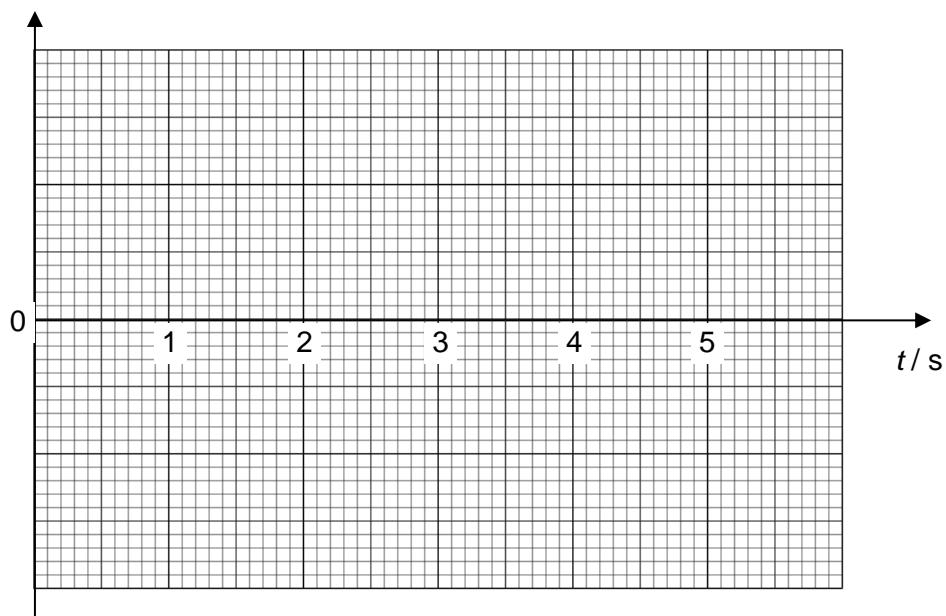


Fig. 2.1

- (c) On Fig. 2.1, sketch the graph that shows the variation with time t of the velocity v of the ball up to the moment when the ball hits the ground for the second time.

[3]

- (d) On your graph, mark and label the point X where the ball reaches its highest point after the first bounce.

[1]

- (e) In real life, there is air resistance.

Describe qualitatively the motion of the falling ball before it hits the ground.

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[2]

