

- 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.

acceleration = m s^{-2} [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} .

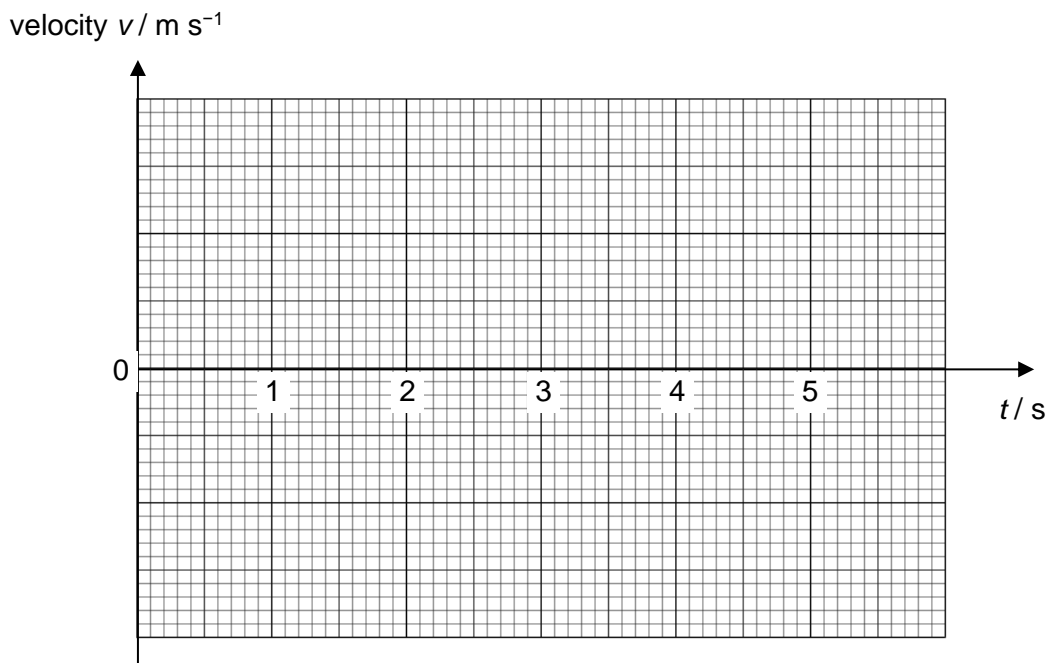


Fig. 2.1

(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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