

- 2 (a) A ball is thrown vertically down towards the ground and rebounds as illustrated in Fig. 2.1.

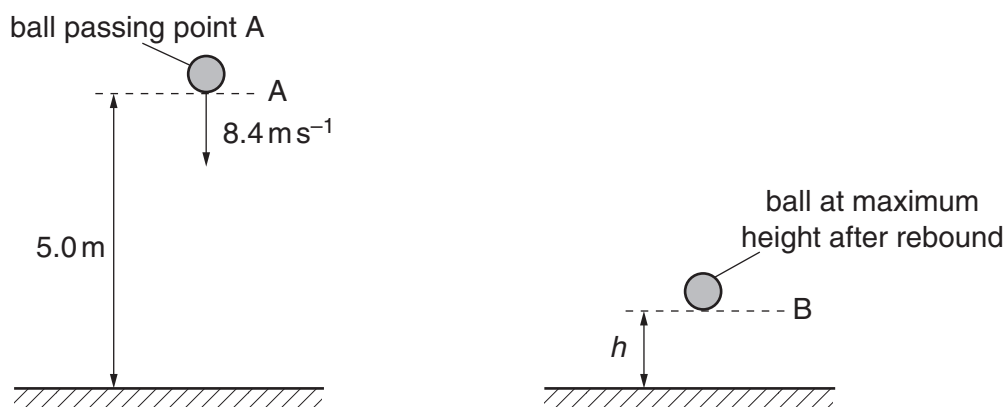


Fig. 2.1

As the ball passes A, it has a speed of 8.4 m s^{-1} . The height of A is 5.0 m above the ground. The ball hits the ground and rebounds to B. Assume that air resistance is negligible.

- (i) Calculate the speed of the ball as it hits the ground.

speed = m s^{-1} [2]

- (ii) Show that the time taken for the ball to reach the ground is 0.47 s.

- (b) The ball rebounds vertically with a speed of 4.2 m s^{-1} as it leaves the ground. The time the ball is in contact with the ground is 20 ms . The ball rebounds to a maximum height h .

The ball passes A at time $t = 0$. On Fig. 2.2, plot a graph to show the variation with time t of the velocity v of the ball. Continue the graph until the ball has rebounded from the ground and reaches B.

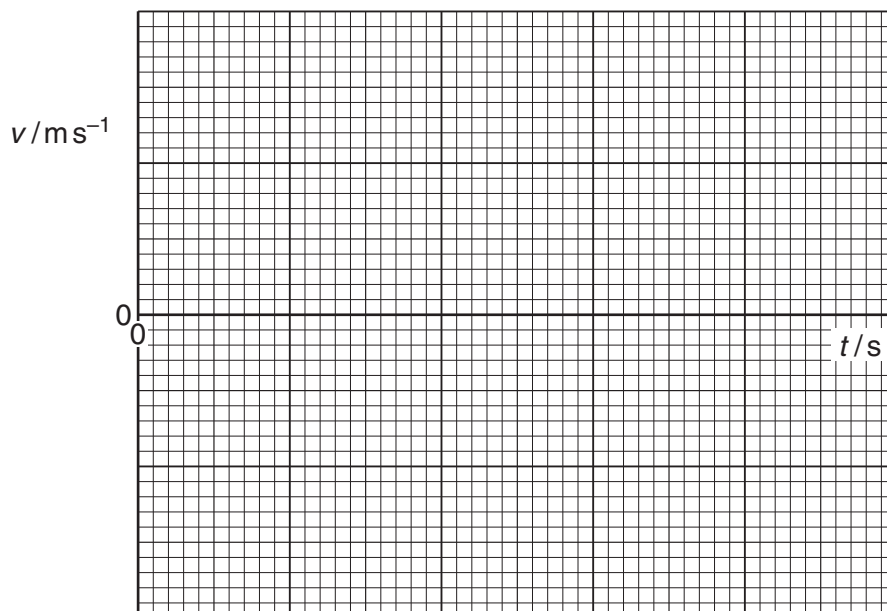


Fig. 2.2

[3]

- (c) The ball has a mass of 0.050 kg . It moves from A and reaches B after rebounding.

- (i) this motion, calculate the change in

1. kinetic energy,

change in kinetic energy = J [2]

2. gravitational potential energy.

change in potential energy = J [3]

(ii) State and explain the total change in energy of the ball for this motion.

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