

Answer **all** questions in the spaces provided.

- 1 A golfer strikes a ball so that it leaves the ground with a velocity of 6.0 m s^{-1} at an angle θ to the horizontal, as illustrated in Fig. 1.1.

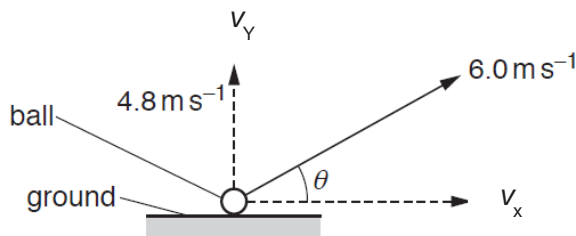


Fig. 1.1 (not to scale)

The magnitude of the initial vertical component, v_y , of the velocity is 4.8 m s^{-1} . Assume that air resistance is negligible.

- (a) Show that the magnitude of the initial horizontal component, v_x , of the velocity is 3.6 m s^{-1} .

[1]

- (b) The ball leaves the ground at time $t = 0$ and reaches its maximum height at $t = 0.49 \text{ s}$.

On Fig. 1.2, sketch separate lines to show the variation with time t , until the ball returns to the ground, of

- (i) the vertical component, v_y , of the velocity (label this line Y), [2]
- (ii) the horizontal component, v_x , of the velocity (label this line X). [2]

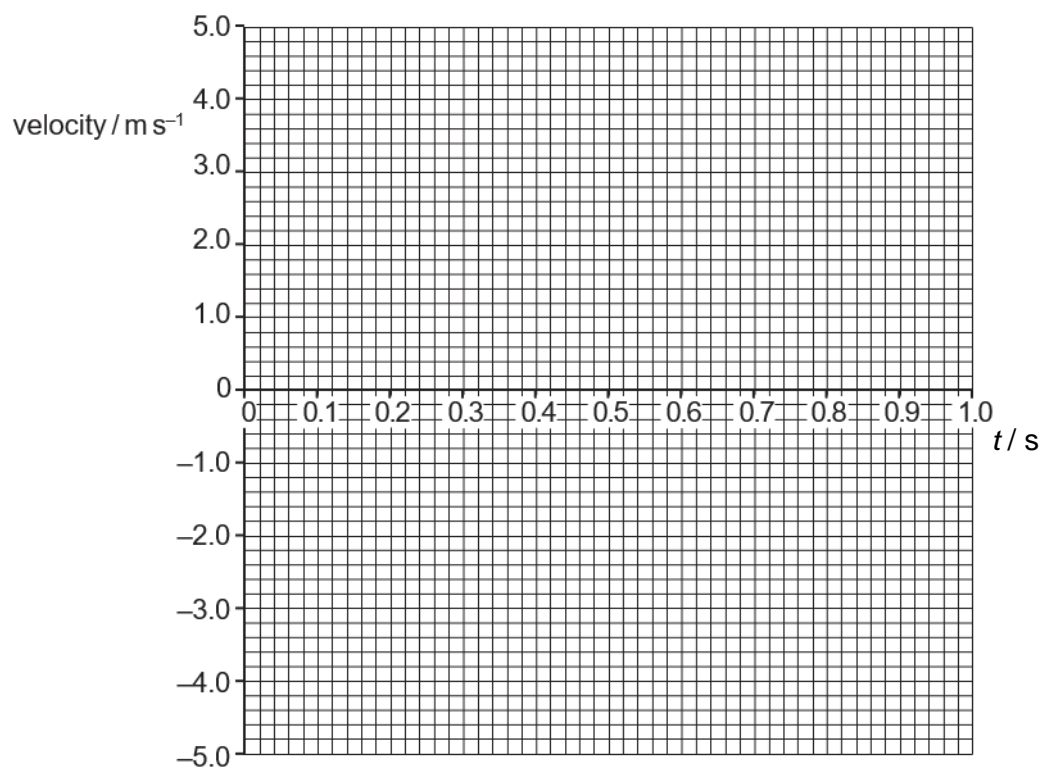


Fig. 1.2

- (c) Calculate the maximum height reached by the ball.

maximum height = m [2]

- (d) For the movement of the ball from the ground to its maximum height, determine the ratio

$$\frac{\text{kinetic energy at maximum height}}{\text{change in gravitational potential energy}}$$

ratio = [2]

6

- (e) In practice, air resistance is not negligible.

State and explain how the actual time taken for the ball to reach maximum height is affected compared to the time calculated when air resistance is assumed to be negligible.

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..... [1]

[Total: 10]