

- 3 (a) An object is moved from point P to point R either by a direct path or by the path P to Q to R, as shown in Fig. 3.1.

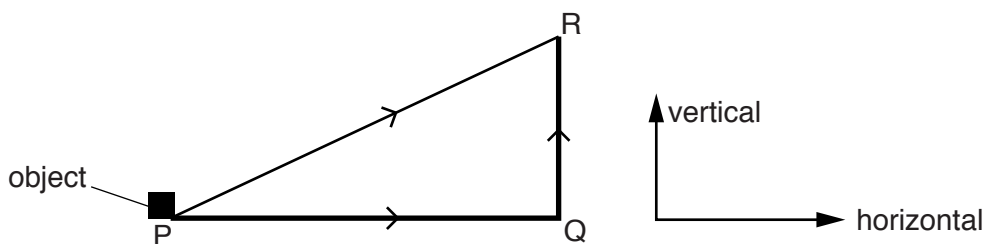


Fig. 3.1

P and Q are on the same horizontal level. R is vertically above Q.

Explain whether the work done moving the object against the gravitational field is the same or different along paths PR and PQR.

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[2]

- (b) A ball is thrown with an initial velocity V at an angle θ to the horizontal, as shown in Fig. 3.2.

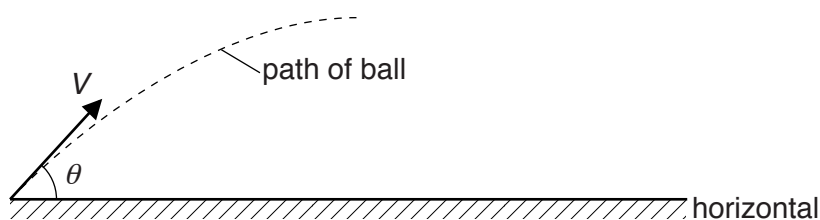


Fig. 3.2 (not to scale)

The variation with time t of the height h of the ball is shown in Fig. 3.3.

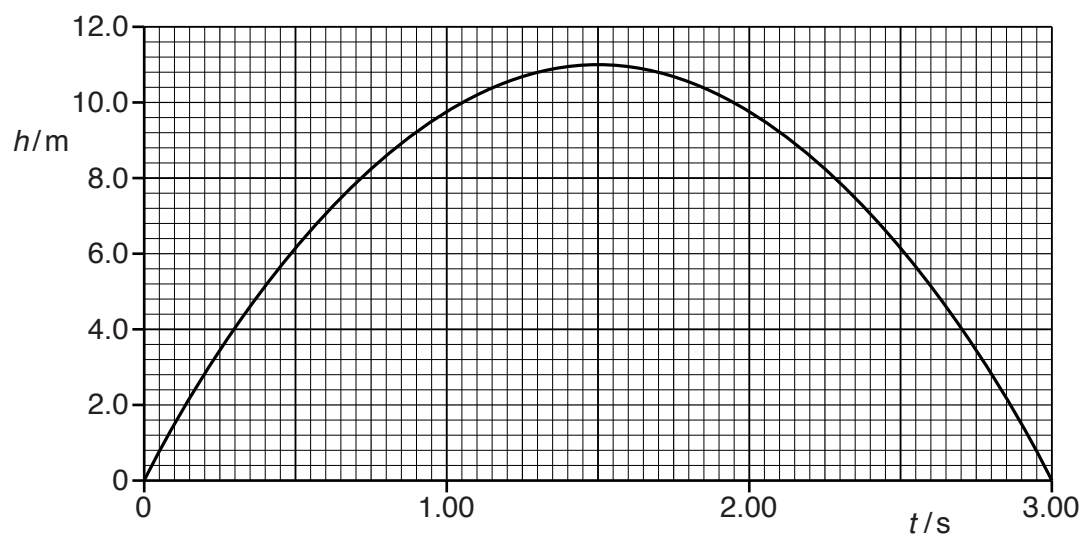


Fig. 3.3

Air resistance is negligible.

- (i) Use the time to reach maximum height to determine the vertical component V_v of the velocity of the ball for time $t = 0$.

$$V_v = \dots\dots\dots \text{ms}^{-1} \quad [2]$$

- (ii) The horizontal displacement of the ball at $t = 3.00 \text{ s}$ is 25.5 m .
On Fig. 3.4, draw the variation with t of the horizontal displacement x of the ball.

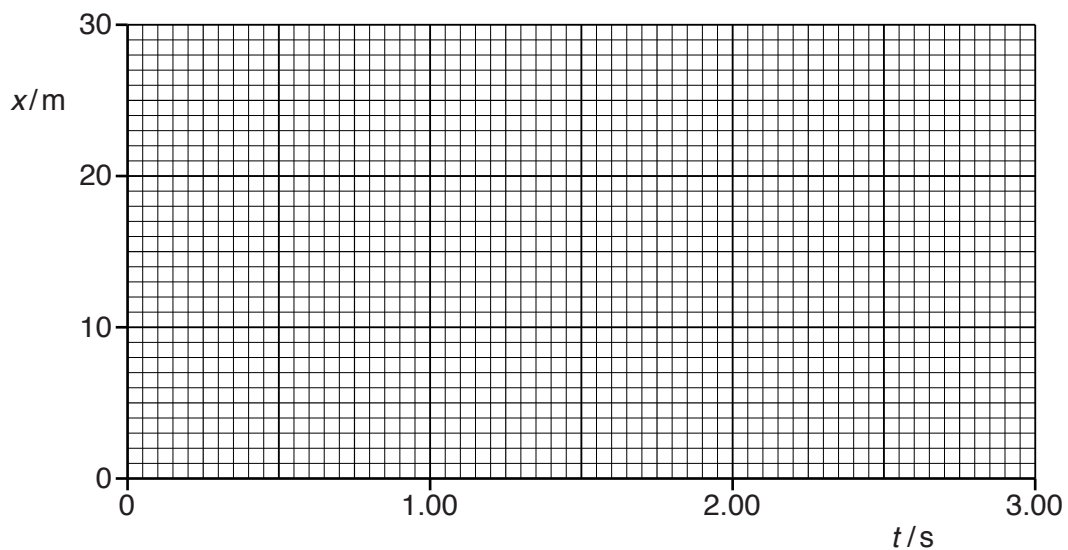


Fig. 3.4

[1]

- (iii) For the ball at maximum height, calculate the ratio

$$\frac{\text{potential energy of the ball}}{\text{kinetic energy of the ball}}.$$

$$\text{ratio} = \dots\dots\dots [3]$$

- (iv) In practice, air resistance is not negligible. State and explain the effect of air resistance on the time taken for the ball to reach maximum height.

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 [2]