

Section 1: Introduction

Exercise level 2

1. A particle is projected from point O on horizontal ground with a velocity of 50 ms^{-1} at an angle of 30° to the horizontal. Find
 - (i) The velocity of the particle after 2 seconds,
 - (ii) The time taken for the particle to reach its greatest height,
 - (iii) The greatest height reached by the particle.
2. A stone is thrown horizontally from a cliff 50 m high. It travels 65 m horizontally before hitting the water. Find
 - (i) the time in the air,
 - (ii) the initial speed of the stone.
3. A ball is thrown horizontally from a tower 19.6 m high at a speed of 24.5 ms^{-1} . Find the horizontal distance that it travels before hitting the ground and its velocity as it hits the ground.
4. A particle is projected from point O on a horizontal plane with a speed 45 ms^{-1} and at an angle θ such that $\tan \theta = 2$.
 - (i) Write down the initial horizontal and vertical components of the velocity.
 - (ii) Write down equations for the velocity at time t .
 - (iii) Write down equations for the position at time t .
 - (iv) Find the time of flight and the range.
 - (v) Find the maximum height reached.
5. A golf ball is given an initial velocity of 30 ms^{-1} at an angle α to the horizontal such that $\tan \alpha = \frac{4}{3}$. Find
 - (i) The horizontal and vertical components of the velocity initially,
 - (ii) The time to reach the highest point and the maximum height reached,
 - (iii) The time of flight and the range.
6. A tennis player serves the ball horizontally with a speed of 20 ms^{-1} and at a height of 2.8 m. The net is 1 m high and 12 m away. Will the ball clear the net and if so by how much?