

## Quadratic function applications (like projectile problem)

### Problem 1.

A snooker ball is launched 0.6 metres height pool table with a horizontal velocity of 2.4 m/s. Let find the necessary time that the ball reach ground level and the range from the edge of the pool table and the point where the ball touch the floor.

Solution:

Horizontally	Vertically
$x = ?$ $v_{ix} = 2.4 \text{ m / s}$ $a_x = 0 \text{ m / s}^2$ $t = ?$	$y = -0.60 \text{ m}$ $v_{iy} = 0 \text{ m / s}$ $a_y \approx -10 \text{ m / s}^2$ $t = ?$

$$y = v_{iy}t + \frac{1}{2}a_yt^2 \Rightarrow -0.60 \text{ m} = 0 \frac{\text{m}}{\text{s}} \cdot t + \frac{1}{2} \cdot \left(-10 \frac{\text{m}}{\text{s}^2}\right) \cdot t^2 = -5 \frac{\text{m}}{\text{s}^2} \cdot t^2 \Rightarrow t \approx 0.35 \text{ s}$$

$$x = v_{ix}t + \frac{1}{2}a_xt^2 = 2.4 \frac{\text{m}}{\text{s}} \cdot 0.35 \text{ s} + \frac{1}{2} \cdot 0 \frac{\text{m}}{\text{s}^2} \cdot 0.35^2 \text{ s}^2 = 2.4 \frac{\text{m}}{\text{s}} \cdot 0.35 \text{ s} = 0.83 \text{ m}$$

So the answer is: the ball flight time is 0.35 seconds and landing point is at 0.83 m from the pool table edge.

Homework:

### Problem 2

A football is hit by an angle reaching 22 metres height and landing at range of 35 metres from hitting point. Let find initial horizontal velocity.

### Problem 3

A football is hit with initial velocity of 25 m/s by an angle of 45 degrees. Find: the flight time, the range and maximum height.

### Problem 4

A long jumper leave the ground with initial velocity 12 m/s, by an angle of 28 degrees. Find the flight time, length and height of jump.