The Practise Ground

Class 11 Physics

Projectile Motion

Launch speed u at angle θ to the horizontal

1

$$R = u^2 \sin 2\theta / g$$

Horizontal range

Maximum range at θ = 45° on level ground

2

$$H = u^2 \sin^2\theta / 2g$$

Maximum height

Reached when the vertical velocity is zero

3

$$T = 2u \sin\theta / g$$

Time of flight

Time from launch to landing on level ground

4

$$u_x = u \cos\theta \quad u_y = u \sin\theta$$

Velocity components

ux stays constant; uy changes because of gravity

u	θ	g	R	H
launch speed	**launch angle**	**gravity**	**range**	**max height**
m/s	degrees	9.8 m/s²	metre (m)	metre (m)

Two motions in one

Horizontal motion: constant velocity.

Vertical motion: free fall with acceleration g downward.

Quick example

u = 20 m/s, θ = 30°, g = 10 m/s²

T = 2 × 20 × 0.5 / 10 = 2 s

H = 400 × 0.25 / 20 = 5 m

Think you've got it? Test yourself.

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