



Class 9th Science

Gravitation

Chapter 9

Lecture - 03

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The background is a vibrant, abstract space scene. It features a gradient of colors from deep red on the left to light blue on the right. There are several stylized planets: one with blue and white stripes in the top left, one with orange and white stripes in the bottom right, and several smaller, dark blue, cratered planets scattered throughout. Small white stars and sparkles are also visible. The overall style is modern and artistic.

01

FREE FALL

FREE FALL – THE CONCEPT

“It is a situation where the body experiences only gravitational force and no other force should be taken into consideration.”

FREE FALL – NUMERICAL (DOWNWARD MOTION)

Que : A ball is dropped from a building 120m tall, find

(i.) Time of Fall

(ii.) Velocity, when it touches the ground

FREE FALL – NUMERICAL (UPWARD MOTION)

Que : An object is projected upwards with a velocity of 25 m/s. Find :

(i.) Maximum Height achieved

(ii.) Time taken by the object to reach the ground again.

FREE FALL – NUMERICAL

Que : An object is projected upwards from a building of height 100 m with a velocity of 5 m/s. Find :

- (i.) Time taken by the object to reach the ground.
- (ii.) Velocity of the object while striking the ground.
- (iii.) Maximum Height achieved.

MASS V/S WEIGHT

Q.no

An object has mass 60kg, find its

i. Weight on Earth

ii. Weight on Moon

(Given g on moon is $\frac{1}{6}^{\text{th}}$ times of g on earth)

Olympiad level

KEPLER'S LAW OF PLANETARY MOTION

1. Kepler's First Law : Law of Orbits

The orbit of a planet is an ellipse with the Sun at one of the foci.

2. Kepler's Second Law : Law of Areas

The line joining the planet and the Sun sweep equal areas in equal intervals of time.

3. Kepler's Third Law : Law of Periods

The cube of the mean distance of a planet from the Sun is proportional to the square of its orbital period (T)

$$T^2 \propto r^3$$