Gravitation - Revision Notes

Key Concepts:

- 1. Gravitation:
- Universal force of attraction between any two masses.
- 2. Newton's Law of Gravitation:

F = G * (m1 * m2) / r^2

Where,

- F: Force between masses
- G: Gravitational constant (6.674 × 10^-11 Nm²/kg²)
- m1, m2: Masses of objects
- r: Distance between centers
- 3. Free Fall:
- When an object falls under gravity alone.
- Acceleration due to gravity (g) = 9.8 m/s^2

Equations of Motion under Gravity:

- v = u + gt
- $h = ut + \frac{1}{2}gt^2$
- $-v^{2} = u^{2} + 2gh$
- 4. Mass vs. Weight:
- Mass: Quantity of matter (constant).
- Weight: Force due to gravity (W = mg).
- 5. Weight on the Moon:
- Moon's gravity is 1/6th of Earth's.

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- Weight on Moon = $(1/6) \times$ Weight on Earth
- 6. Thrust and Pressure:
- Thrust: Force perpendicular to surface.
- Pressure = Thrust / Area
- 7. Buoyancy:
- Upward force on objects in fluids.
- Depends on volume of fluid displaced.
- 8. Archimedes' Principle:
- Upward force = Weight of fluid displaced.
- 9. Relative Density:
- Relative Density = Density of substance / Density of water

Important Formulas:

- Gravitational Force: $F = G * (m1 * m2) / r^2$
- Weight: W = mg
- Pressure: P = F / A
- Density: rho = m / V
- Relative Density = Density of substance / Density of water

Conceptual Questions:

- Why do objects fall to the ground?
- What is the difference between mass and weight?
- Why do some objects float in water?
- How does pressure depend on area?