

Gravitation Class 11 Topic Tree



Here are **30 important terms and definitions** related to **Gravitation**:

1. **Gravitation**: The force of attraction between any two objects with mass in the universe.
2. **Gravity**: The force of attraction exerted by the Earth on objects, pulling them towards its center.
3. **Newton's Law of Universal Gravitation**: States that every particle in the universe attracts every other particle with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.
4. **Gravitational Constant (G)**: A universal constant, representing the proportionality factor in Newton's law of gravitation, $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$.
5. **Gravitational Force (F)**: The attractive force between two masses due to gravity, given by $F = G \frac{m_1 m_2}{r^2}$, where m_1 and m_2 are masses and r is the distance between them.
6. **Acceleration Due to Gravity (g)**: The acceleration experienced by an object due to the gravitational pull of the Earth, $g \approx 9.8 \text{ m/s}^2$ at the Earth's surface.
7. **Gravitational Field**: The region around a mass in which another mass experiences a gravitational force.
8. **Gravitational Field Intensity (E)**: The force experienced per unit mass placed in a gravitational field, $E = \frac{F}{m}$.
9. **Gravitational Potential Energy (U)**: The energy possessed by an object due to its position in a gravitational field, $U = -G \frac{m_1 m_2}{r}$.
10. **Gravitational Potential (V)**: The gravitational potential energy per unit mass at a point in space, $V = -\frac{GM}{r}$.
11. **Orbital Velocity (v)**: The velocity needed for an object to stay in a stable orbit around a planet or star, $v = \sqrt{\frac{GM}{r}}$.
12. **Escape Velocity**: The minimum velocity required for an object to escape the gravitational pull of a planet or star without further propulsion, $v_e = \sqrt{\frac{2GM}{R}}$.
13. **Kepler's First Law**: Planets move in elliptical orbits with the Sun at one of the two foci.

14. **Kepler's Second Law (Law of Areas):** A line segment joining a planet and the Sun sweeps out equal areas during equal intervals of time.
15. **Kepler's Third Law (Law of Periods):** The square of the orbital period of a planet is proportional to the cube of the semi-major axis of its orbit, $T^2 \propto r^3$.
16. **Weight:** The force with which an object is pulled towards the center of the Earth due to gravity, $W = mg$.
17. **Mass:** A measure of the amount of matter in an object, which remains constant regardless of location.
18. **Weightlessness:** A condition experienced when the only force acting on a body is gravity, such as in free-fall or in orbit around a planet.
19. **Satellite:** A natural or artificial body that revolves around a planet due to gravitational attraction.
20. **Geostationary Satellite:** A satellite that orbits the Earth at the same rotational speed as the Earth, appearing stationary relative to the Earth's surface.
21. **Polar Satellite:** A satellite that orbits the Earth in such a way that it passes over the poles and covers every part of the Earth's surface.
22. **Artificial Satellite:** A man-made object placed into orbit around a planet or star.
23. **Natural Satellite:** A celestial body that naturally orbits a planet, like the Moon orbiting the Earth.
24. **Black Hole:** A region in space where the gravitational pull is so strong that not even light can escape.
25. **Event Horizon:** The boundary surrounding a black hole, beyond which nothing can escape the gravitational pull.
26. **Tidal Force:** A differential gravitational force experienced by an object, caused by the varying distance between different parts of the object and the source of gravity.
27. **Perihelion:** The point in a planet's orbit closest to the Sun.
28. **Aphelion:** The point in a planet's orbit farthest from the Sun.
29. **Inertial Mass:** A measure of an object's resistance to any change in its state of motion due to an applied force.
30. **Gravitational Mass:** The quantity that determines the gravitational force between objects and is equivalent to inertial mass as per Einstein's equivalence principle.

These terms form the core concepts needed to understand the theory and applications of gravitation.