

NCERT Physics Questions

Chapter 9: Gravitation

Solutions

Theory questions

Short theory questions

1. What is centripetal force?

Ans:

- *Ans: The force that causes the acceleration to keep the body moving along the circular path is centripetal forces.*
- *It acts towards the center of the circle, along the radius.*

2. Give a basic definition of gravitational force.

Ans: All objects in the universe attract each other. This force of attraction between objects is called the gravitational force.

3. Describe the universal law of gravitation.

Ans: According to the universal law of gravitation, the gravitational force between two objects is

- *directly proportional to the product of their masses,*
- *inversely proportional to the distance between them,*
- *and acts along the line joining the **center** of the two objects.*

4. What is the value of gravitational constant G and give its SI unit.

- Value is $6.673 \times 10^{-11} \text{Nm}^2\text{kg}^{-2}$
- It's SI unit is $\text{Nm}^2\text{kg}^{-2}$

5. Define freefall.

Ans: Whenever objects fall towards the earth under this force alone, we say that the objects are in free fall.

6. Give two notable properties of gravitational acceleration on Earth.

Ans:

- The magnitude of acceleration is independent of mass of the object.
- It's value is constant near the earth.

7. Define weight and its SI unit.

Ans:

- Weight of an object is the force with which it is attracted towards the earth.
- It's SI unit is Newton (N), same as that of force.

8. What is the difference between mass and weight?

Ans:

- Mass is the quantity of matter in an object, while weight is the force with which it is attracted towards the earth.
- Mass of an object remains same everywhere on Earth, while weight changes slightly with location depending on value of g .
- Mass has no direction, while weight is a force and has a direction.

9. What is the ratio of gravitational acceleration on the moon and on Earth?

Ans: $\frac{g_{\text{moon}}}{g_{\text{earth}}} = \frac{1}{6}$

10. Define thrust.

Ans: The force acting on an object perpendicular to the surface is called thrust.

11. Define pressure.

- The thrust on unit area is called pressure.
- It's SI unit is Pascal (Pa) or Nm^{-2} .

12. State two characteristics of pressure in fluids.

- Fluids exert pressure on the base and walls of the container in which they are enclosed.
- Pressure exerted in any confined mass of fluid is transmitted undiminished in all directions.

13. Define buoyant force.

*Ans: The **upward** force exerted by the water on the bottle is known as upthrust or buoyant force.*

14. Define density.

Ans: The mass per unit volume of a substance is called density.

15. State the relation between density and sinking of an object in a fluid.

Ans: Objects of density less than that of a liquid float on the liquid. The objects of density greater than that of a liquid sink in the liquid.

16. State Archimedes principle. (You should state it exactly in roughly the same words)

*Ans: When a body is immersed fully or partially in a fluid, it experiences an **upward** force that is equal to the **weight of the fluid displaced** by it.*

Long theory questions

1. Derive the formula of gravitational force between two objects.
2. Derive the SI unit of gravitational constant.
3. Derive the formula and calculate the value of acceleration of gravity on Earth.
4. Derive and find the ratio of gravitational constant on the moon and on Earth.