

Work sheet-Class XI, Chapter-8, Gravitation -1/3

(1/3: Introduction, Universal law of gravitation, Gravitational constant)

1. State Newton's Law of Gravitation.
2. Which is greater – the attraction of Earth for 1 kg of apple or attraction of 1 kg apple for earth?
3. Do the force of friction and other contact forces arise due to gravitational attraction? If not, what is the origin of these forces?
4. The mass of the moon is nearly 1% of mass of the earth. What will be the gravitational force of earth on the moon in comparison to the gravitational force of the moon on the earth?
5. At noon, the attraction of earth and sun on a body on the surface of earth are in the opposite directions. But at mid night they are in the same direction. Does a body weigh more at mid night?
6. The gravitational force between two spheres is x when the distance between their centres is y . What will be the new force if the separation is made $3y$?
7. Does the gravitational force between two particles depend upon the medium between the two particles?
8. You can shield a charge from electrical forces by putting it inside a hollow conductor. Can you shield a body from the gravitational influence of nearby matter by putting it inside a hollow sphere or by some other means?
9. If you compare the gravitational force on earth due to the sun to that due to the moon, you would find that the sun's pull is 177 times greater than the moon's pull. Tidal effects on earth is more due to the sun or moon? Why?
10. An artificial satellite revolving around the earth does not require any fuel. On the other hand, aeroplane requires fuel to fly at a certain height. Why?
11. A mass M is broken into two parts, m and $(M-m)$. How is m related to M so that the gravitational force between these two parts is maximum?
12. According to Newton's law of gravitation every particle of matter attracts every other particle. But bodies on the surface of the earth never move towards each other on account of this force of attraction. Why?
13. A sphere of mass 40 kg is attracted by another sphere of mass 15 kg with a force of $1/10$ mg wt. Find the value of constant of gravitation if centres of spheres are 0.2 m apart.
[$6.533 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$]
14. Calculate the force of attraction between two bodies, each of mass 100 kg and 1m apart on the surface of the earth. Will the force of attraction be different if same bodies are taken on the moon. Their separation remains constant?
[$F=6.67 \times 10^{-7} \text{ N}$, same]
15. An apple of mass 250 gram falls from a tree. What is the acceleration of the apple towards the earth? Also predict the acceleration of the earth towards the apple. Is there any upward motion of earth towards the apple? Justify your answer.
Given: Mass of earth = 5.983×10^{24} kg, Radius of earth = 6.378×10^8 m, $G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$.