

Name of the student: *Date:* 16/09/2020

Gravitation:

The attractive force that exists between any two particles in the universe is called **gravitational force**.

Newton's Law of Gravitation and Gravitational Force:

The gravitational attraction between two homogeneous spheres is proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

If we assume that the two point objects or spherical bodies have masses m_1 and m_2 and the distance between them is d . Then the gravitational force F acting between them is given by,

The gravitational attraction between two homogeneous spheres is proportional to the product of their masses.

$$F \propto m_1 m_2 \dots\dots\dots (i)$$

The gravitational attraction between two homogeneous spheres is inversely proportional to the square of the distance between their centers.

$$F \propto \frac{1}{d^2} \dots\dots\dots (ii)$$

From (i) and (ii) we get,

$$F \propto \frac{m_1 m_2}{d^2}$$

Or, $F = G \frac{m_1 m_2}{d^2}$ [Here G is the constant of proportionality. It is called the universal gravitational constant.]

Q. The masses of two spherical objects are 500 gm and 2 kg. Distance between their centers is 5 meter. What is the gravitational force between them? [$G = 6.674 \times 10^{-11} \text{ Nm}^2\text{Kg}^{-2}$]

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If the distance between the objects is doubled, keeping the product of the masses constant, the corresponding force will be one fourth

Q. The masses of P and Q are 30 gm and 40 gm respectively. Distance between them is 5 cm. If the distance between P and Q becomes 15 cm, what will be the change in the force of attraction between them? Explain mathematically.

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SK Pal