

Answer on Question #43193-Physics-Mechanics-Kinematics-Dynamics

The acceleration of moon with respect to earth is 0.0027 m/s^2 and the acceleration of an apple falling on earth's surface is about 10 m/s^2 . Assume that the radius of the moon is one fourth of the earth's radius. If the moon is stopped for an instant and then released, it will fall towards the earth. The initial acceleration of the moon towards the earth will be

Solution

$$F_{gravity} = \frac{Gm_1m_2}{d^2},$$

Gravitational acceleration with respect to Earth is $\frac{GM}{d^2}$, where G is gravitational constant, M is mass of the Earth, d is distance from the center of the Earth to the center of the object.

Given:

$$\frac{GM}{\rho^2} = 0.0027 \frac{\text{m}}{\text{s}^2}, \text{ where } \rho \text{ is distance between Earth and Moon.}$$

The acceleration of the moon (due to earth's gravity) doesn't depend on how fast the moon is going; it just depends on its position relative to the earth.

So, the initial acceleration of the moon towards the earth will be $0.0027 \frac{\text{m}}{\text{s}^2}$.