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Solution 71

Gravitational force is given by:

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$$F = G \times \frac{m \times M}{d^2}$$

Distance between two masses is increased s.t. new distance is D= 5 d

New gravitational force $F_1 = F$

Let on of the mass is changed to m_1 so as to maintain the same gravitational force.

$$F_1 = G \times \frac{m_1 \times M}{D^2}$$

$D = 5\, d$

$F = F_1$

$$G \times \frac{m \times M}{d^2} = G \times \frac{m_1 \times M}{D^2}$$

$$G \times \frac{m \times M}{d^2} = G \times \frac{m_1 \times M}{25d^2}$$

$$\frac{m_1}{m} = 25$$

$m_1 = 25m$

Hence one of the masses should be increased by 25 times in order to have the same gravitational force.

Hence one of the masses should be increased by 25 times in order to have the same gravitational force.

Solution 72

In order to be able to notice the gravitational force of attraction between any two objects, at least one of the objects on the earth should have an extremely large mass. Since no object on the earth have an extremely large mass, we cannot notice such forces.

The two objects in a room do not move towards each other because due to their small masses, the gravitational force of attraction between them is very, very weak.

Solution 73

Acceleration due to gravity of earth,

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$$g = G \times \frac{M}{R^2} = 9.8 m/s^2$$

If mass of planet, m= M/2

And radius of planet, r= R/2

Acceleration due to gravity on the surface of planet will be:

$$g = G \times \frac{m}{r^2} \qquad ---(i)$$

$$m = \frac{M}{2} \qquad ----(ii)$$

$$r = \frac{R}{2} \qquad -----(iii)$$

Put (ii) and (iii) in (i) eq. we get

$$g = G \times \frac{\frac{M}{2}}{(\frac{R}{2})^2} = \frac{4}{2} \times (G \times \frac{M}{R^2})$$

$$g = 2 \times 9.8 m/s^2$$

$$g = 19.6 m/s^2$$

*********** END **********