Question:

A satellite of mass 2.00X10^4 kg is placed in orbit around Jupiter. The mass of Jupiter is 1.90X10^27 kg. The distance between the satellite and the centre of Jupiter is 7.24X10^7 m.
a) If the mass of Io were to suddenly double, by what amount would the force of gravitational attraction change? (Do not actually calculate the force of attraction; just determine how much more or less the force of gravity would change.)
b) If the distance between Jupiter and Callisto double (2To), by what amount would the force of gravitational attraction (Fg) change?

Solution:

1)

Newton's law of universal gravitation: $F_{12} = \frac{Gm_1m_2}{R_{12}^2} \Rightarrow F \sim m$

So, if the mass of Io were to suddenly double the force of attraction will be double too.

2)

$F \sim \frac{1}{R^2}$

So, if the distance between Jupiter and Callisto double the force of gravitational attraction reduced four times.

Answer:

1) Force will increase twice;

2) Force will reduced four times.