

Answer on Question #48929 – Physics – Astronomy | Astrophysics

Question.

What is the force of gravity between Jupiter and Saturn? The mass of Jupiter is $6.4 \times 10^{24} \text{ kg}$. The mass of Saturn is $5.7 \times 10^{26} \text{ kg}$. The distance between Jupiter and Saturn is $6.52 \times 10^{11} \text{ m}$.

Given:

$$M_J = 6.4 \cdot 10^{24} \text{ kg}$$

$$M_S = 5.7 \cdot 10^{26} \text{ kg}$$

$$R = 6.52 \cdot 10^{11} \text{ m}$$

Find:

$$F = ?$$

Solution.

By definition the force of gravity is:

$$F = G \frac{M_J M_S}{R^2},$$

where $G = 6.67 \cdot 10^{-11} \frac{\text{m}^3}{\text{kg} \cdot \text{s}^2}$.

Calculate:

$$F = \frac{6.67 \cdot 10^{-11} \cdot 6.4 \cdot 10^{24} \cdot 5.7 \cdot 10^{26}}{42.51 \cdot 10^{22}} = 5.724 \cdot 10^{17} \text{ N}$$

Answer.

$$F = G \frac{M_J M_S}{R^2} = 5.724 \cdot 10^{17} \text{ N}$$