

## Answer on Question 76300, Physics, Other

### Question:

Two objects have equal masses and experience a gravitational force of 25 N towards one another. Their centers are 36 cm apart. Determine each of their masses.

### Solution:

We can find the masses of the objects from the Newton's universal law of gravitation:

$$F_{attr} = G \frac{m_1 m_2}{r^2},$$

here,  $G = 6.67 \cdot 10^{-11} \text{ Nm}^2/\text{kg}^2$  is the gravitational constant;  $m_1 = m_2 = m$  are the masses of the objects, respectively;  $r$  is the distance between the centers of the objects.

Then, we get:

$$F_{attr} = G \frac{m^2}{r^2},$$

$$m = \sqrt{\frac{F_{attr} r^2}{G}} = \sqrt{\frac{25 \text{ N} \cdot (0.36 \text{ m})^2}{6.67 \cdot 10^{-11} \frac{\text{Nm}^2}{\text{kg}^2}}} = 2.2 \cdot 10^5 \text{ kg}.$$

### Answer:

$$m = 2.2 \cdot 10^5 \text{ kg}.$$

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