Two spherical objects have masses of $m_1 = 3.1 \times 10^5$ kg and $m_2 = 6.5 \times 10^3$ kg. The gravitational attraction between them is $F = 65$ N. How far apart are their centers?

Solution:

The gravitation force

$$F = G \frac{m_1 m_2}{r^2}$$

Thus, the distance between objects

$$r = \sqrt{G \frac{m_1 m_2}{F}} = \sqrt{6.67 \times 10^{-11} \times \frac{3.1 \times 10^5 \times 6.5 \times 10^3}{65}} = 0.045 \text{ m}$$

Answers: 0.045 m