

8. A 60.0 kg astronaut weighs 96.0 N on the surface of the moon. Determine the acceleration due to gravity on the moon.
(GRAVITATIONAL FIELD STRENGTH)

$$g = \frac{F_g}{m} = \frac{96\text{ N}}{60\text{ kg}} = \boxed{1.6\text{ m/s}^2}$$

9. A 500. kg cow and a 0.00100 kg mosquito are 5.00 m apart. Calculate the gravitational force between them.

$$F_g = \frac{G m_1 m_2}{r^2} = \frac{(6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2})(500\text{ kg})(0.001\text{ kg})}{(5\text{ m})^2} = \boxed{1.33 \times 10^{-12} \text{ N}}$$

10. The gravitational force between a 200. kg and 300. kg object is 4.00×10^{-10} N. Find the separation distance between the two objects.

$$F_g = \frac{G m_1 m_2}{r^2} \rightarrow r = \sqrt{\frac{G m_1 m_2}{F_g}}$$

$$r = \sqrt{\frac{(6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2)(200\text{ kg})(300\text{ kg})}{4.00 \times 10^{-10} \text{ N}}} = \boxed{100\text{ m}}$$

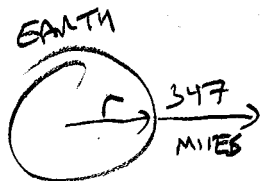
11. ~~What is~~ The gravitational force of attraction between Earth and the Sun is 3.52×10^{22} N. Calculate the mass of the sun. (Hint: the mass of Earth and distance on reference tables).

$$F_g = \frac{G m_1 m_2}{r^2} \rightarrow M_1 = \frac{F_g r^2}{G m_2}$$

$$M_1 = \frac{(3.52 \times 10^{22} \text{ N})(1.50 \times 10^{11} \text{ m})^2}{(6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2})(5.98 \times 10^{24} \text{ kg})} = \boxed{1.99 \times 10^{30} \text{ kg}}$$

12. The Hubble Space Telescope has a mass of 11,110 kg (24,490 lb) that orbits at 559,000 m (347 miles) above the surface of the Earth.

- A) Determine the gravitational force between the telescope and Earth. (Hint: find the radius of Earth on the Reference Tables)



$$r = 559,000\text{ m} + r_{\text{EARTH}}$$

$$r = 559,000\text{ m} + 6.37 \times 10^6\text{ m}$$

$$r = 6,929,000\text{ m}$$

$$F_g = \frac{G m m_2}{r^2}$$

$$F_g = \frac{(6.67 \times 10^{-11} \frac{\text{N} \cdot \text{m}^2}{\text{kg}^2})(11,110\text{ kg})(5.98 \times 10^{24} \text{ kg})}{(6.929 \times 10^6 \text{ m})^2}$$

$$F_g = \boxed{9.23 \times 10^4 \text{ N}}$$