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)

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

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

$$F_g = \frac{G m_1 m_2}{r^2} = \frac{\left(6.67\times10^{-11}\,\frac{N\cdot m^2}{kg^2}\right)(500\,kg)(0.001\,kg)}{(5\,m)^2}$$

$$= \boxed{1.33\times10^{-12}\,N}$$

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.

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

$$r = \sqrt{\frac{\left(6.67\times10^{-11}\,N\cdot m^2/kg^2\right)(200\,kg)(300\,kg)}{4.00\times10^{-10}\,N}} = \boxed{100\,m}$$

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).

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

$$M_1 = \frac{(3.52\times10^{22}\,N)(1.50\times10^{11}\,m)^2}{\left(6.67\times10^{-11}\,\frac{N\cdot m^2}{kg^2}\right)(5.98\times10^{24}\,kg)} = \boxed{1.99\times10^{30}\,kg}$$

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)

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

$r = 559{,}000\,m + 6.37\times10^{6}\,m$

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

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

$$F_g = \frac{\left(6.67\times10^{-11}\,\frac{N\cdot m^2}{kg^2}\right)(11{,}110\,kg)(5.98\times10^{24}\,kg)}{(6.929\times10^{6}\,m)^2}$$

$$F_g = \boxed{9.23\times10^{4}\,N}$$