What is the gravitational field strength on the moon? How much would you weigh on the moon? *Mass and radius of moon are provided on formula sheet.*

An 80 kg person is on a planet the same size as earth. Determine the mass of the planet if his weight on the surface is 650 N.

How high above the surface of earth would a person with mass 68 kg experience a gravitational force of 250 N?

Two objects of equal mass are separated by 5.0 m. The gravitational force that they exert on each other is $1.0 \times 10^{-9}$ N. determine the mass of each object.

A rock is dropped from a height of 6.0 m on a newly discovered planet. The rock reaches the ground in 0.88 s. If the planet has a mass of $7.77 \times 10^{24}$ kg, what is the radius of the planet?

What is the gravitational field strength on the moon? How much would you weigh on the moon? *Mass and radius of moon are provided on formula sheet.*

$g = G\frac{M}{R^2}$

$= (6.67\times10^{-11})\frac{(7.35\times10^{22})}{(1.74\times10^{6})^2} = \boxed{1.62\ \frac{N}{kg}}$

$F_g = mg$

$\approx \boxed{100\ N}$

An 80 kg person is on a planet the same size as earth. Determine the mass of the planet if his weight on the surface is 650 N.

$F_g = G\frac{Mm}{r^2} \rightarrow M = \frac{F_g r^2}{Gm} = \frac{(650)(6.38\times10^{6})^2}{(6.67\times10^{-11})(80)} = \boxed{4.96\times10^{24}\ kg}$

How high above the surface of earth would a person with mass 68 kg experience a gravitational force of 250 N?

$F_g = G\frac{Mm}{r^2} \rightarrow r = \sqrt{G\frac{Mm}{F_g}} = \sqrt{\frac{(6.67\times10^{-11})(5.98\times10^{24})(68)}{250}}$

$= 1.04\times10^{7}\ m$

$h = r - R_E = \boxed{4.0\times10^{6}\ m}$

Two objects of equal mass are separated by 5.0 m. The gravitational force that they exert on each other is $1.0 \times 10^{-9}$ N. determine the mass of each object.

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

$= G\frac{m^2}{r^2} \rightarrow m = \sqrt{\frac{F_g r^2}{G}} = \sqrt{\frac{(1.0\times10^{-9})(5.0)^2}{6.67\times10^{-11}}}$

$= \boxed{19.4\ kg}$

A rock is dropped from a height of 6.0 m on a newly discovered planet. The rock reaches the ground in 0.88 s. If the planet has a mass of $7.77 \times 10^{24}$ kg, what is the radius of the planet?

① KINEMATICS TO FIND g

$d = v_i t + \frac{1}{2} a t^2$ ($v_i = 0$)

$a = \frac{2d}{t^2} = 15.5 \frac{m}{s^2}$

$a = g$

② g TO FIND R

$g = G\frac{M}{R^2} \rightarrow R = \sqrt{\frac{GM}{g}}$

$R = \sqrt{\frac{(6.67\times10^{-11})(7.77\times10^{24})}{15.5}} = 5.78\times10^{6}\ m$