

What is the gravitational field strength on the moon? How much would you weigh on the moon? *Mass and radius of moon 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 1.0×10^{-10} 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 7.77×10^{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 provided on formula sheet.

$$g = G \frac{M}{R^2} = (6.67 \times 10^{-11}) \frac{(7.35 \times 10^{22})}{(1.74 \times 10^6)^2} = 1.62 \frac{\text{N}}{\text{kg}}$$

$F_g = mg \approx 100 \text{ N}$

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.

$$F_g = G \frac{Mm}{r^2} \rightarrow M = \frac{F_g r^2}{Gm} = \frac{(650)(6.38 \times 10^6)^2}{(6.67 \times 10^{-11})(80)} = 4.96 \times 10^{24} \text{ kg}$$

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

$$F_g = G \frac{Mm}{r^2} \rightarrow r = \sqrt{G \frac{Mm}{F_g}} = \sqrt{\frac{(6.67 \times 10^{-11})(5.98 \times 10^{24})(68)}{250}} = 1.04 \times 10^7 \text{ m}$$

$$h = r - R_E = 4.0 \times 10^6 \text{ m}$$

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

$$F_g = G \frac{m_1 m_2}{r^2} = G \frac{m^2}{r^2} \rightarrow m = \sqrt{\frac{F_g r^2}{G}} = \sqrt{\frac{(1.0 \times 10^{-9})(5.0)^2}{6.67 \times 10^{-11}}} = 19.4 \text{ kg}$$

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 7.77×10^{24} kg, what is the radius of the planet?

① KINEMATICS TO FIND g

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

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

g

② g TO FIND R

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

$$R = \sqrt{\frac{(6.67 \times 10^{-11})(7.77 \times 10^{24})}{15.5}} = 5.78 \times 10^6 \text{ m}$$

