Webassign Work

3. An object has a mass of 0.5 kg on Earth and a weight of 25 N on Planet Amarshakon. According to this data, what is the value of the acceleration due to gravity on Amarshakon?

You can calculate the acceleration due to gravity on Amarshakon with the equation

$$F_g = mg$$

Plugging in the variables, you get

$$0.5a = 25$$

$$a = \boxed{50}$$

The mass of the object on Amarshakon is $\boxed{\text{the same as on Earth}}$. Mass always remains constant.

6. A heavier mass m_1 and a lighter mass m_2 are 19.5 cm apart and experience a gravitational force of attraction that is 9.60×10^{-9} in magnitude. The two masses have a combined value of $5.40\ \text{kg}$. Determine the value of each individual mass.

You can determine the two masses with the equations

$$m_1 + m_2 = 5.40\ \text{kg}$$

$$F = \frac{Gm_1m_2}{d^2}$$

Plugging in the variables into the second equation:

$$9.60 \times 10^{-9} = \frac{6.67 \times 10^{-11} \cdot m_1m_2}{0.195^2}$$

From this, we determine that $m_1m_2 = 5.33$, and we plug this into the first equation.

$$\frac{5.33}{m_2} + m_2 = 5.40$$

Therefore,

$$m_1 = \boxed{4.1\ \text{kg}} \text{ and } m_2 = \boxed{1.3\ \text{kg}}$$

7. Two spheres A and B are placed in the arrangement shown below.

The sphere should be placed between the two spheres closer to A, so that the gravitational forces acting on it are opposite to each other and equal.

To find the exact location of the third sphere, we must set the gravitational forces equal to each other; therefore,

$$\frac{(40)}{d^2} = \frac{(64)}{(5-d)^2}$$

$$\boxed{d = \frac{-5(2\sqrt{10}-5)}{3}}$$