$$= \frac{(2.30 \times 10^{-8}\ \text{N})(10.0\ \text{m})^2}{6.67 \times 10^{-11}\ \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}}$$

$$= 3.45 \times 10^4\ \text{kg}^2$$

$$m = 1.86 \times 10^2\ \text{kg}$$

4. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$= \frac{\left(6.67\times10^{-11}\ \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(5.98\times10^{24}\ \text{kg})(6.50\times10^2\ \text{kg})}{(4.15\times10^6\ \text{m}+6.37\times10^6\ \text{m})^2}$$

$$= 2.34 \times 10^3\ \text{N}$$

5. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$m_2 = \frac{F_g r^2}{Gm_1}$$

$$= \frac{(3.2\times10^{-6}\ \text{N})(2.1\times10^{-1}\ \text{m})^2}{\left(6.67\times10^{-11}\ \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(5.5\times10^1\ \text{kg})}$$

$$= 3.8 \times 10^1\ \text{N}$$

6. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$r = \sqrt{\frac{Gm_1m_2}{F_g}}$$

$$= \sqrt{\frac{\left(6.67\times10^{-11}\ \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(2.0\times10^2\ \text{kg})(2.0\times10^2\ \text{kg})}{3.7\times10^{-6}\ \text{N}}}$$

$$= 8.5 \times 10^{-1}\ \text{m}$$

7. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$= \frac{\left(6.67\times10^{-11}\ \frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}\right)(5.98\times10^{24}\ \text{kg})(70.0\ \text{kg})}{(6.37\times10^6\ \text{m})^2}$$

$$= 6.88 \times 10^2\ \text{N}$$

8. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$F_g \ \alpha\ m$$

Mass changes by a factor of:

$$\frac{\text{To}}{\text{From}} = \frac{35.0\ \text{kg}}{70.0\ \text{kg}} = 0.500$$

Mass changes by a factor of 0.500

$\therefore$ F_g will change by a factor of 0.500

$$F_g = 6.88 \times 10^2\ \text{N} \times 0.500$$
$$= 3.44 \times 10^2\ \text{N}$$

9. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$F_g \ \alpha\ \frac{1}{r^2}$$

Distance changes by a factor of:

$$\frac{\text{To}}{\text{From}} = \frac{1.27\times10^7\ \text{m}}{6.37\times10^6\ \text{m}} = 2.00$$

Distance changes by a factor of 2.00

$\therefore$ F_g changes by a factor of 0.250 or $\frac{1}{(2.00)^2}$

$$F_g = 6.88 \times 10^2\ \text{N} \times 0.250$$
$$= 1.72 \times 10^2\ \text{N}$$

10. $$F_g = \frac{Gm_1m_2}{r^2}$$

$$F_g \ \alpha\ \frac{1}{r^2}$$

Distance changes by a factor of:

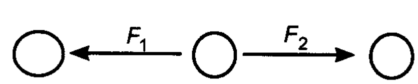
$$\frac{\text{To}}{\text{From}} = \frac{9.85\times10^6\ \text{m}}{6.37\times10^6\ \text{m}} = 1.50$$

Distance changes by a factor of 1.50

$\therefore$ F_g changes by a factor of $\frac{1}{(1.50)^2} = 0.444$

$$F_g = 6.88 \times 10^2\ \text{N} \times 0.444$$
$$= 3.06 \times 10^2\ \text{N}$$

11.



Because $F_1 = F_2$ and because these forces are in opposite directions, the net force will be zero.