

P12 - 7.2 - Fg Ep Work to Height Notes

What is the Gravitational Force, F_g , and Potential Energy between twins of 50kg 5 m apart?

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

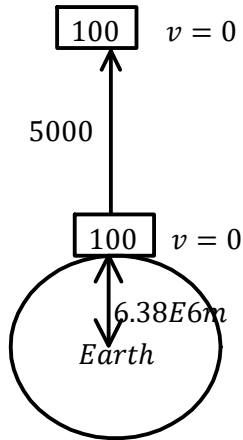
$$F_g = \frac{(6.67 \times 10^{-11})(50)(50)}{(5)^2}$$

$$F_g = 6.67 \times 10^{-9} \text{ N}$$

$$E_p = -\frac{GMm}{r}$$

$$E_p = -\frac{6.67E-11(50)(50)}{5}$$

$$E_p = 3.36E-8 \text{ J}$$



$$W = \Delta E$$

$$W = \Delta E_k + \Delta E_p$$

$$W = \Delta E_p \quad ; E_k = 0$$

$$W = E_{pf} - E_{pi}$$

$$W = -\frac{GMm}{r_f} - \left(-\frac{GMm}{r_i}\right)$$

$$W = -\frac{6.67E-11(5.98E24)(100)}{6.38E6 + 5000} - \left(-\frac{6.67E-11(5.98E24)(100)}{6.38E6}\right)$$

$$W = -6246922475 - -6251818182 \text{ J}$$

$$W = 4895707$$

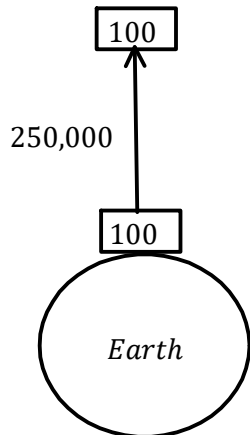
$$W = 4.89 \times 10^6 \text{ J}$$

$$W = GMm \left(\frac{1}{r_i} - \frac{1}{r_f} \right)$$

$$E_p = mgh$$

$$E_p = 100(9.8)(5000)$$

$$E_p = 4.9 \times 10^6 \text{ J}$$



$$W = \Delta E$$

$$W = \Delta E_k + \Delta E_p$$

$$W = \Delta E_p$$

$$W = E_{pf} - E_{pi}$$

$$W = -\frac{GMm}{R} - \left(-\frac{GMm}{r}\right)$$

$$W = -\frac{6.67E-11(5.98E24)(100)}{6.38E6 + 250000} - \left(-\frac{6.67E-11(5.98E24)(100)}{6.38E6}\right)$$

$$W = -6016078431 - -6251818182 \text{ J}$$

$$W = 235739751$$

$$W = 2.36 \times 10^8 \text{ J}$$

$$E_p \neq mgh; h > 10000 \text{ m}$$

$$E_{pi} + E_{ki} + \Delta E = E_{pf} + E_{kf}$$

$$E_{pi} + E_{ki} + W = E_{pf} + E_{kf}$$

$$W = (E_{pf} - E_{pi}) + (E_{kf} - E_{ki})$$

$$W = \Delta E$$

$$W = \Delta E$$

$$W = \Delta E_p + \Delta E_k$$

$$W = (E_{pf} - E_{pi}) + (E_{kf} - E_{ki})$$