$r_1 = 1.00 \, m$

$M_1 = 40.0 \, kg$

$54.0 \, m$

$r_2 = 2.00 \, m$

$m_2 = 60.0 \, kg$

$$W = \vec{F} \cdot \vec{r}$$

$$W = \int F(r) \, dr$$

$$W = \int F(r) \, dr$$

$$W = \int_{57}^{3} \frac{GM_1 M_2}{r^2} \, dr$$

$$W = GM_1 M_2 \int_{57}^{3} \frac{1}{r^2} \, dr$$

$$W = GM_1 M_2 \int_{57}^{3} r^{-2} \, dr \rightsquigarrow \frac{r^{-1}}{-1} = \frac{-1}{r}$$

$$GM_1M_2 \left(Final - initial \right)$$

$$Gm_1m_2 \left(-\frac{1}{r_f} - \frac{-1}{r_i} \right)$$

$$\left(6.67\times10^{-11} \right)\left(40 \right)\left(60 \right) \left(-\frac{1}{3} + \frac{+1}{57} \right) = -5.05\times10^{-8} J$$

$$1.600\times10^{-7}$$

$$F = m_1 a = \frac{G m_1 m_2}{r^2}$$

$$a(r) = \frac{G M_\oplus}{r^2}$$