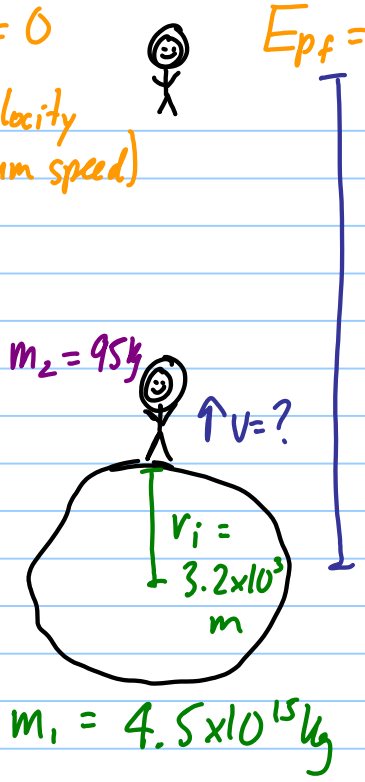
Quiz 7b

Note Title 25/01/2012

A 95 kg astronaut stands on the surface of a spherical asteroid with a mass of 4.5×10^{15} kg and radius of 3.2×10^{3} m. At what speed would he have to launch in order to escape the gravitational pull of the asteroid.

$E_{K_f} = 0$ (Escape velocity = minimum speed)

$E_{p_f} = 0$ (because r is r_f = really, really, ridiculously far away)



$$\Delta E_p = -\Delta E_K$$

$$E_{p_f} - E_{p_i} = +(E_{K_f} + E_{K_i})$$

$$+\left(+\frac{Gm_1m_2}{r}\right) = \frac{1}{2}m_2v^2$$

$$\frac{Gm_1}{r} = \frac{1}{2}v^2$$

$$v = \sqrt{\frac{2Gm_1}{r}}$$

$$= \sqrt{\frac{2(6.67\times10^{-11})(4.5\times10^{15})}{3.2\times10^3}}$$

$$= \boxed{14\ m/s}$$