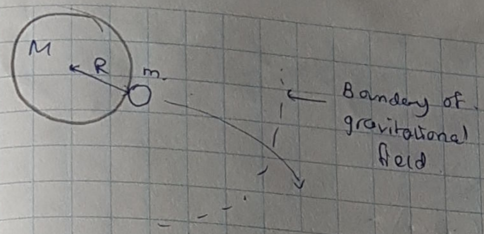
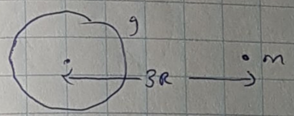


Needed energy for the escape = $\left[0-\left(-\frac{GM}{R}\right)\right]m$

$\therefore \frac{1}{2}\cancel{m}V_e^2 = \frac{GM\cancel{m}}{R}$

$V_e = \sqrt{\frac{2GM}{R}}$ //

(1)



$GM = gR^2$

$\therefore M = \frac{gR^2}{G}$

~~Energy needed $= -\left[\frac{G gR^2}{8G}\right]m$~~

~~$= -\frac{gm \times 9R^2}{}$~~

~~$= -9R^2 gm$~~ //

Energy needed = Potential energy x Mass $= \left[0-\left(-\frac{GM}{3R}\right)\right]m$

$= \cancel{\left(-\frac{GM}{3R}\right) \times m}$

$= \cancel{\left(-\frac{gR^2}{3R}\right) \times m}$

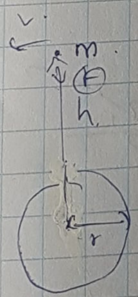
$= \cancel{-\frac{gmR}{3}}$ //

$= \frac{GMm}{3R}$

$= \frac{g(3R)^2 m}{\cancel{3R}}$

$= 3Rmg$ //

(2)



$g = 10\,N\,kg^{-1}$

$r = 6400\,km$

By $F = ma$ ↓

$\frac{GMm}{h^2} = \frac{m \times v^2}{h}$

$v^2 = \frac{GM}{h} = gh$ //

$T = \frac{2\pi}{\omega} = \frac{2\pi h}{v}$

Since $T = 24hr$, $24 \times 3600 = \frac{2\pi h}{\sqrt{gh}}$ $\Rightarrow$ $h = \frac{(12 \times 3600)^2 \times 10}{\pi^2}$

Let $\pi^2 = 10$

$\therefore h = (12 \times 3600)^2 =$

$h = 1.86 \times 1$

$\therefore$ From the earths surface $= 1.85984 \times 10^6\,km$ //