

Latihan Soal FKKG

Gornain A.
21/481767/TK/53170

1) $m_1 = 50 \text{ kg}$
 $m_2 = 100 \text{ kg}$
 $r = 0,005 \text{ m}$
 $G = 6,67 \cdot 10^{-11}$

$$F_{1on2} = F_{2on1} = \frac{G m_1 m_2}{r^2}$$

$$= \frac{6,67 \cdot 10^{-11} \cdot 100 \cdot 50}{(0,005)^2}$$

$$= 1334 \cdot 10^{-5} \text{ N}$$

2)

$M_{\text{Planet X}} = M_{\text{Planet}}$
 $R_{\text{Planet X}} = R_{\text{Planet}}$

$T_x = 2 \text{ jam} \times 3600 = 43200$

Hukum Kepler:

$$\left(\frac{T_x}{T}\right)^3 = \left(\frac{R_x}{R}\right)^3$$

$$\left(\frac{43200}{T}\right)^3 = \left(\frac{1}{2}\right)^3$$

$T = 86400\sqrt{2} ; \sqrt{2} = 1,4$

$T = 122188,0518 //$ detik

3)

a) Temukan kecepatan moncong minimum saat $h = R_E$

$E_{k1} + E_{p1} = E_{k2} + E_{p2}$

$$\frac{1}{2} m V_1^2 + \left(-\frac{GMm}{R_E}\right) = \frac{1}{2} m V_2^2 + \left(-\frac{GMm}{2R_E}\right)$$

$$\frac{1}{2} V_1^2 - \frac{GM}{R_E} = \frac{1}{2} V_2^2 - \frac{GM}{2R_E}$$

$$\frac{1}{2} V_1^2 = \frac{1}{2} V_2^2 - \frac{GM}{2R_E} + \frac{GM}{R_E}$$

$$\frac{1}{2} V_1^2 = \frac{1}{2} V_2^2 + \frac{GM}{2R_E}$$

$$V_1^2 = V_2^2 + \frac{GM}{R_E}$$

$$V_1 = \sqrt{V_2^2 + \frac{GM}{R_E}}$$

b) Temukan kecepatan moncong minimum yang memungkinkan sebuah cangkang lepas dari bumi sepenuhnya.

$R_E = 6,38 \times 10^{-6} \text{ m}$

$M_E = 5,97 \times 10^{24} \text{ kg}$

$E_{k1} + E_{p1} = E_{k2} + E_{p2}$

Ketika benda berada jauh sekali dari bumi, maka E_{k2} dan E_{p2} menjadi 0.

$$\frac{1}{2} m V^2 + \left(-\frac{GM_E m}{R_E}\right) = 0 + 0$$

$$\frac{1}{2} V^2 - \frac{GM_E}{R_E} = 0$$

$$\frac{1}{2} V^2 = \frac{GM_E}{R_E} \rightarrow V^2 = \frac{2GM_E}{R_E}$$

$$V = \sqrt{\frac{2GM_E}{R_E}} = 1,11726 \times 10^{-14} \frac{\text{m}}{\text{s}}$$