

1) a. $\vec{F}_B = 10\hat{i} + 10\hat{j}$

b. ~~t_{PB}~~ $t_{PB} = \frac{10}{5} + \frac{\pi \cdot 10}{2} \times \frac{1}{5} = 2 + \pi$ sekon

c. $\vec{v}_{rata-rata} = \frac{\vec{r}_B - \vec{r}_P}{2 + \pi} = \frac{10\hat{j}}{2 + \pi} \text{ m/s}$

d. laju rata-rata = $\frac{10}{2 + \pi} \text{ m/s}$

2) a. $\omega = \sqrt{\frac{k}{m}}$

$$\omega^2 = \frac{k}{m}$$

$$(2\pi f)^2 = \frac{k}{m}$$

$$4\pi^2 f^2 = \frac{k}{m}$$

$$k = 4\pi^2 f^2 m = 4\pi^2 \cdot 2^2 \cdot 1 = 16\pi^2 \text{ N/m}$$

$$x(t) = A \cos(4\pi t + \phi)$$

$$v(t) = -4\pi A \sin(4\pi t + \phi)$$

$$\Rightarrow 5\sqrt{3} \times 10^{-2} = A \cos(4\pi + \phi)$$

$$\Rightarrow -20\pi \times 10^{-2} = -4\pi A \sin(4\pi + \phi)$$

$$5 \times 10^{-2} = A \sin(4\pi + \phi)$$

$$\Rightarrow (5\sqrt{3} \times 10^{-2})^2 + (5 \times 10^{-2})^2 = A^2$$

$$75 \times 10^{-4} + 25 \times 10^{-4} = A^2$$

$$100 \times 10^{-4} = A^2$$

$$A = 10 \times 10^{-2} = 0,1 \text{ m}$$

b. $5 \times 10^{-2} = 0,1 \sin(4\pi + \phi)$

$$0,5 = \sin(4\pi + \phi) = \sin \phi$$

$$\phi = \frac{\pi}{6}$$

$$x(t) = 0,1 \cos(4\pi t + \frac{\pi}{6})$$

3) a) $E_p \text{ pegas} = EK$

$$\frac{1}{2} k x^2 = \frac{1}{2} m v_p^2$$

$$v_p^2 = \frac{k}{m} x^2$$

$$v_p^2 = \frac{50}{2} (5 \times 10^{-2})^2$$

$$v_p = 25 \times 10^{-2} \text{ m/s}$$

$$= 0,25 \text{ m/s}$$

b) lenting sempurna:

$$v_p - v_q = v_q' - v_p'$$

$$v_p = v_q' - v_p'$$

$$0,25 = v_q' - v_p'$$

$$\Rightarrow v_p' = 0, v_q' = 0,25$$

~~H. Kekekalan~~ H. Kekekalan momentum:

$$m v_p + m v_q = m v_p' + m v_q'$$

$$v_p = v_p' + v_q'$$

$$0,25 = v_p' + v_q'$$

$$c) * f = ma$$

$$\mu N = ma$$

$$\mu mg = ma$$

$$a = \mu \cdot g = 0,2 \cdot 10 = 2 \text{ m/s}^2$$

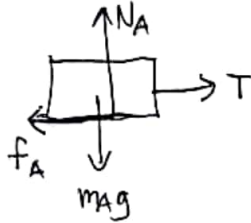
$$* V_t^2 = V_0^2 - 2a s_{BC}$$

$$0 = V_0'^2 - 2a s_{BC}$$

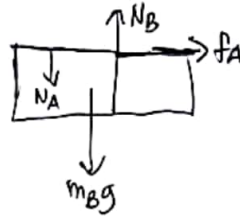
$$0 = \frac{1}{16} - 2 \cdot 2 \cdot s_{BC}$$

$$s_{BC} = \frac{1}{64} \text{ m}$$

4) a. Benda A



Benda B



Benda C



b. Andaikan A dan B bergerak bersama, maka

$$\text{Benda A: } T - f = m_A a$$

$$\text{Benda B: } f = m_B a$$

$$\text{Benda C: } m_C g - T = m_C a$$

$$\Rightarrow m_C g = (m_A + m_B + m_C) a$$

$$30 = 11a$$

$$a = \frac{30}{11} \text{ m/s}^2$$

$$\Rightarrow f = m_B a$$

$$\mu s \cdot m_A g = m_B a$$

$$0,2 \cdot 3 \cdot 10 = m_B \cdot \frac{30}{11}$$

$$m_B = 2,2 \text{ kg (berbeda)}$$

\therefore Tidak mungkin bergerak bersama.

$$c. * m_C g - f = (m_A + m_C) a_C$$

$$30 - 0,1 \cdot 30 = 6 \cdot a_C$$

$$27 = 6 a_C$$

$$a_C = \frac{9}{2} \text{ m/s}^2$$

$$a_C = 4,5 \text{ m/s}^2$$

$$* f = m_B a_B$$

$$0,1 \cdot 30 = 3 \cdot a_B$$

$$a_B = 1 \text{ m/s}^2$$

5) a. * Lintasan 1 : $W_{OB} = \int_{L_1} \vec{F} \cdot d\vec{r}$

$$= \int_0^2 -4x \, dx$$

$$= -2x^2 \Big|_0^2$$

$$= -8$$

↳ Lintasan 2 : $W_{OB} = W_{OA} + W_{AB}$

$$= \int_0^2 -4x \, dx + \int_0^4 0 \, dy$$

$$= -8$$

b. Konservatif, karena lintasan berbeda menghasilkan ~~gas~~ usaha yang sama