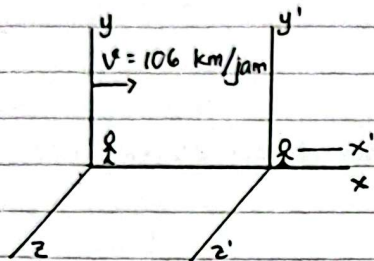


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Kelas : 23 A

1.



Diket: $v = 106 \text{ km/jam} = 29.4 \text{ m/s}$

$t = 30 \text{ detik}$

$s = 1 \text{ km} = 1000 \text{ m}$

Ditanya: a. Pengamat di stasiun

b. Pengamat dalam kereta

$$\Rightarrow \text{a. } x = x' + vt$$

$$= 1000 \text{ m} + 29.4 \text{ m/s} \cdot 30 \text{ s}$$

$$= 1000 \text{ m} + 882 \text{ m}$$

$$= \underline{\underline{1882 \text{ m}}}$$

$$\text{b. } x = x' - vt$$

$$= 1000 \text{ m} - 29.4 \text{ m/s} \cdot 30 \text{ s}$$

$$= 1000 \text{ m} - 882 \text{ m}$$

$$= \underline{\underline{118 \text{ m}}}$$

2. Diketahui: $v_b = 15 \text{ m/s}$ (berlawanan arah gerak kereta)

$v_k = 72 \text{ km/jam} = 20 \text{ m/s}$

Ditanya: v oleh pengamat diam di stasiun?

$$\Rightarrow v = v_k - v_b$$

$$= 20 \text{ m/s} - 15 \text{ m/s}$$

$$= \underline{\underline{5 \text{ m/s}}}$$

3. Diketahui: $v_A = 60 \text{ km/jam}$

$v_B = 40 \text{ km/jam}$

Ditanya: a. Laju mobil A terhadap mobil B

b. Laju mobil B terhadap mobil A

$\Rightarrow \text{a. } \Delta v = \text{kecepatan relatif}$

$$\Delta v = v_A - v_B$$

$$= 60 \text{ km/jam} - 40 \text{ km/jam}$$

$$= \underline{\underline{20 \text{ km/jam}}}$$

$$\text{b. } \Delta v = v_B - v_A$$

$$= 40 \text{ km/jam} - 60 \text{ km/jam}$$

$$= \underline{\underline{-20 \text{ km/jam}}}$$



4. Diketahui : Panjang truk = 5 km

Kecepatan truk = 36 km/jam

$$u = 36 \times \frac{1000}{3600} = 10 \text{ m/s}$$

$$t = 5 \text{ s}$$

$$x = 5 \text{ m}$$

Ditanya: a. Mahasiswa diatas truk (0')

b. Temannya di pinggir jalan (0)

$\Rightarrow x' = 5 \text{ m}$ (karena truk adalah acuan diam dalam sistem ini)

a. $(x', y', z', t') = (5 \text{ m}, 0, 0, 5 \text{ s})$

b. $x = u \times t$

$$x = 10 \times 5$$

$$= 50 \text{ m}$$

$$(x, y, z, t) = (50 \text{ m}, 0, 5 \text{ s})$$

5. Diketahui : $V_a = 60 \text{ m/s}$

$$V_p = 80 \text{ m/s}$$

$$d = 100 \text{ m}$$

$$\theta = 53^\circ$$

Ditanya: a. tegak lurus terhadap arus

b. membentuk sudut 53° terhadap arah arus

$\Rightarrow$ a. $t = \frac{\text{Jarak}}{\text{kecepatan tegak lurus}}$

$$t = \frac{d}{V_p} = \frac{100}{80}$$

$$t = 1,25 \text{ s}$$

Karena terdapat arus sungai ($V_a = 60 \text{ m/s}$) ~~perenang~~ akan terdorong sejauh:

$$\text{Jarak hanyut} = V_a \times t$$

$$= 60 \times 1,25$$

$$= 75 \text{ m}$$

b. Komponen tegak lurus terhadap arus $V_I = V_p \sin 53^\circ$

Komponen sejajar arus

$$V_{II} = V_p \cos 53^\circ$$

Nilai trigonometri

$$\sin 53^\circ \times 0,798, \cos 53^\circ \times 0,6$$

$$V_I = 80 \times 0,798 = 63,84 \text{ m/s}$$

$$V_{II} = 80 \times 0,6 = 48 \text{ m/s}$$



Waktu yang di butuhkan (menyebrang sungai)

$$t = \frac{d}{v_i}$$

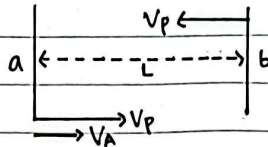
$$= \frac{100}{63.84}$$

$$= 1.57 \text{ s}$$

6. Diketahui: $v_p = c$

$$v_A = u$$

$$\text{Jarak} = L$$



Ditanya: t_{pp} ?

(i) Gerak bolak balik sejajar aliran arus

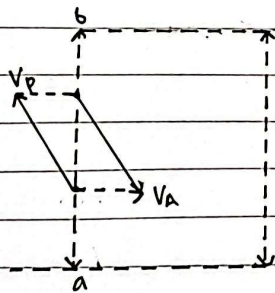
$$t_{ab} = \frac{L}{v_{ab}} = \frac{L}{v_p + v_A} = \frac{L}{c + u} \quad \text{dan} \quad t_{ba} = \frac{L}{v_{ba}} = \frac{L}{v_p - v_A} = \frac{L}{c - u}$$

$$\text{Jadi, } t_{pp} = t_{ab} + t_{ba}$$

$$= \frac{L}{c+u} + \frac{L}{c-u} = \frac{L(c-u) + L(c+u)}{c^2 - u^2}$$

$$= \frac{2Lc}{c^2 - u^2} = \frac{2L}{c} \frac{1}{(1 - u^2/c^2)}$$

(ii) Gerak bolak balik tegak lurus aliran



Langkah 1) Menentukan v_{ab}

Menggunakan dalil Pythagoras

$$v_{ab} = \sqrt{v_p^2 - v_A^2} = \sqrt{c^2 - u^2}$$

2) Menentukan t_{ab}

$$t_{ab} = \frac{L}{v_{ab}} = \frac{L}{\sqrt{c^2 - u^2}}$$

$$\text{Karena } t_{ab} = t_{ba} \text{ maka } t_{pp} = 2 t_{ab} = \frac{2L}{\sqrt{c^2 - u^2}} \quad \text{atau} \quad t_{pp} = \frac{2L}{c} \frac{1}{\sqrt{1 - u^2/c^2}}$$