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Kelas : 23A

1. Dik : $v = 106 \text{ km/jam} = \frac{106 \times 1000}{3600} = 29,44 \text{ m/s}$

$t = 30 \text{ s}$

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

dit : a.) koordinat kilatan menurut pengamat di stasiun (x, t)

b.) koordinat kilatan menurut pengamat dalam kereta (x', t')

Jawab : a.) $x = 0 \rightarrow (x, t) = (1000 \text{ m}, 30 \text{ s})$

b.) $x' = x - vt$

$= 1000 \text{ m} - (29,44 \text{ m/s})(30 \text{ s})$

$= 1000 \text{ m} - 883,2 \text{ m}$

$= 116,8 \text{ m}$

$t' = t = 30 \text{ s}$

$(x', t') = (116,8 \text{ m}, 30 \text{ s})$

2. Dik : $v_{\text{kereta}} = 72 \text{ km/jam} = \frac{72 \times 1000}{3600} = 20 \text{ m/s}$

$v_{\text{bola}} = -15 \text{ m/s}$ (negatif karena bertlawanan arah dengan kereta)

dit : kecepatan bola menurut pengamat diam di stasiun (v_t)

Jawab : $v_t = v_k + v_b'$
 $= 20 + (-15)$
 $= 5 \text{ m/s}$

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

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

dit : a.) v_{AB}

b.) v_{BA}

Jawab : a.) $v_{AB} = v_A - v_B$

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

$= 20 \text{ km/jam}$

b.) $v_{BA} = v_B - v_A$

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

$= -20 \text{ km/jam}$ (bertlawanan arah)

4. Dik : $k' = 5 \text{ m}$

$v = 36 \text{ km/jam} = 10 \text{ m/s}$

$t' = 5 \text{ s}$

dit : a.) (x', t')

b.) (x, t)

Jawab : a.) $(x', t') = (5 \text{ m}, 5 \text{ s})$

b.) $x = x' + (v \cdot t')$



$$\begin{array}{|l}
 = 5 + (10 \cdot 5) \\
 = 5 + 50 \\
 = 55 \text{ m}
 \end{array}
 \quad
 \begin{array}{|l}
 t = t' = 5 \text{ s} \\
 (x, t) = (55 \text{ m}, 5 \text{ s})
 \end{array}$$

5. dik: $d = 100 \text{ m}$
 $v_{\text{anis}} = 60 \text{ m/s}$
 $v_{\text{perenang}} = 80 \text{ m/s}$

dit: a.) Perenang berenang tegak lurus (t_1)

b.) Perenang membentuk sudut 53° terhadap anis (t')

Jawab: a.) $t = \frac{d}{v} = \frac{100}{52,92} = 1,89 \text{ s}$

$$\begin{aligned}
 v_{\text{ak}} &= \sqrt{v_p^2 - v_A^2} \\
 &= \sqrt{80^2 - 60^2} \\
 &= \sqrt{2800} = 52,92 \text{ m/s}
 \end{aligned}$$

b.) $v_x = v_p \cos 53^\circ = 80 \times 0,6 = 48 \text{ m/s}$

$$\begin{aligned}
 v_y &= v_p \sin 53^\circ \\
 &= 80 \times 0,798 \\
 &= 63,84 \text{ m/s}
 \end{aligned}$$

$$t' = \frac{d}{v_y} = \frac{100}{63,84} = 1,57$$

6. dik: $C = C$
 $u = u$
 $L = 2L$

dit: a.) t total anis?

b.) t total anis : t total tegak lurus?

Jawab: $v_{\text{terlawanan}} = C - u$

a.) $t_{\text{pergi}} = \frac{L}{C - u}$

$$v_{\text{searah}} = C + u$$

$$t_{\text{kembali}} = \frac{L}{C + u}$$

$$\begin{aligned}
 t_{\text{total}} &= \frac{L}{C - u} + \frac{L}{C + u} \\
 &= \frac{L(C + u) + L(C - u)}{(C - u)(C + u)} \\
 &= \frac{LC + Lu + LC - Lu}{C^2 - u^2} \\
 &= \frac{2LC}{C^2 - u^2}
 \end{aligned}$$

b.) $c^2 = v^2 + u^2$

$$v^2 = c^2 - u^2$$
$$v = \sqrt{c^2 - u^2}$$

$$t_{\text{seberang}} = \frac{L}{\sqrt{c^2 - u^2}}$$

$$t_{\text{total tegak lurus}} = 2 \times \frac{L}{\sqrt{c^2 - u^2}}$$

$$t_{\text{total ames}} = \frac{2L}{c^2 - u^2}$$

$$t_{\text{total } \perp} = \frac{2 \times L}{\sqrt{c^2 - u^2}}$$

$$= \frac{c}{c^2 - u^2} \times \sqrt{c^2 - u^2}$$

$$= \frac{c \sqrt{c^2 - u^2}}{c^2 - u^2}$$

$$= \frac{c}{\sqrt{c^2 - u^2}}$$

$$t_{\text{total ames}} > t_{\text{total } \perp}$$