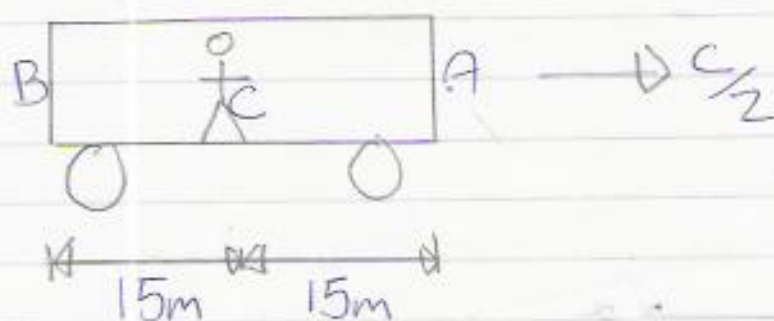


3)



$$a) i) s = vt$$

$$t_A = \frac{s}{v} = \frac{15 \text{ m}}{3 \times 10^8 \text{ m/s}} = 5 \times 10^{-8} \text{ s} \quad \checkmark$$

$$ii) t_B = \frac{s}{v} = \frac{15 \text{ m}}{3 \times 10^8 \text{ m/s}} = 5 \times 10^{-8} \text{ s} \quad \checkmark$$

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$$iii) t_{AC} = \frac{s}{v} = \frac{30 \text{ m}}{3 \times 10^8 \text{ m/s}} = 1 \times 10^{-7} \text{ s} \quad \checkmark$$

$$iv) t_{BC} = \frac{s}{v} = \frac{30 \text{ m}}{3 \times 10^8 \text{ m/s}} = 1 \times 10^{-7} \text{ s} \quad \checkmark$$

To obtain full credit you must explain what you are doing, not just present equations & numbers.

$$b) t_{AC} = \frac{t'_A}{\sqrt{1 - v^2/c^2}}$$

Take Cheryl's frame as the unprimed frame and Dan's frame as the primed frame.

$$\text{Then } t_A = \frac{t'_A}{\sqrt{1 - v^2/c^2}} \quad \times \quad \text{correct answer } 8.66 \times 10^{-8} \text{ s}$$

$$= \frac{5 \times 10^{-8} \text{ s}}{\sqrt{1 - (0.5c)^2/c^2}} = 5.77 \times 10^{-8} \text{ s} \quad \times$$

$$t_B = \frac{t'_B}{\sqrt{1 - v^2/c^2}}$$

$$= \frac{5 \times 10^{-8} \text{ s}}{\sqrt{1 - (0.5c)^2/c^2}} = 5.77 \times 10^{-8} \text{ s}$$

$$t_{AC} = \frac{t'_{AC}}{\sqrt{1 - v^2/c^2}}$$

$$= \frac{1 \times 10^{-7} \text{ s}}{\sqrt{1 - (0.5c)^2/c^2}} = 1.154 \times 10^{-7} \text{ s} \quad \checkmark$$

$$t_{BC} = \frac{t'_{BC}}{\sqrt{1 - v^2/c^2}} = 1$$

value only because in this case $x = 0$.

If you need to use the Lorentz transformation

$$\times \quad t' = \frac{t - vx/c^2}{\sqrt{1 - v^2/c^2}}$$

p34 Unit 12

See over page code.

\times This gives the correct numerical