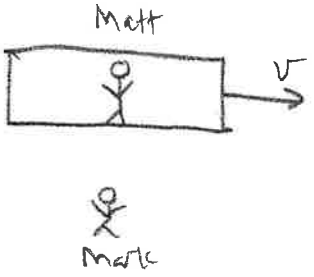
Ex 30.3



L_0 = length of train according to Matt.

a) Δt = time between when Mark passes front & back of train, according to Matt.

$$\Delta t = L_0 / v$$

b) $\Delta t'$ = time interval between when front & back of train pass mark, according to mark

$$\Delta t' = \Delta t_0 = \Delta t / \gamma = \sqrt{1-(v/c)^2}\,\Delta t$$

c) Matt & Mark agree on their relative velocity, but not on the amount of time it takes for mark to pass the train: $\Delta t \neq \Delta t'$

d) the length of the train, according to mark is

$$\Delta x' = v \Delta t'$$

$$= v \Delta t / \gamma$$

$$= v \frac{L_0}{v} \frac{1}{\gamma}$$

$$\Delta x' = L_0 / \gamma$$

e) If $L_0 = 100\text{m}$ & $v = 0.6c$, then $\gamma = 5/4$ and

$$\Delta x' = \boxed{L = 80\text{m}}$$