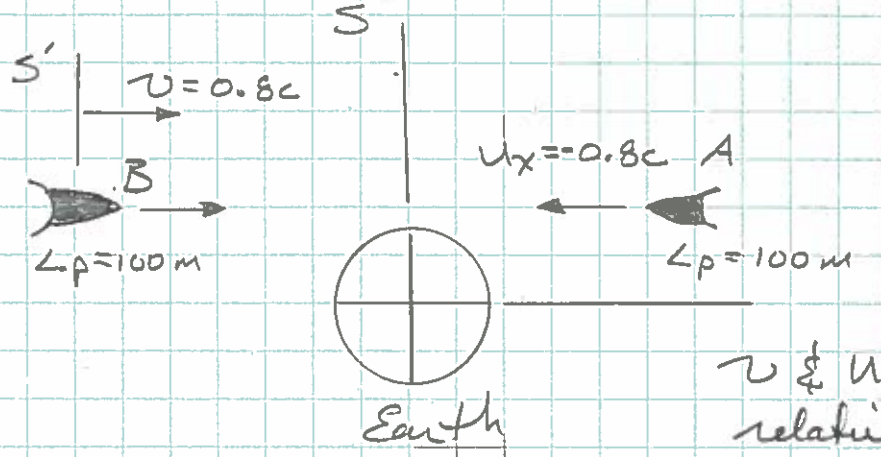
3.6-55



Find, the length of A as measured by observer in B.

First, we have to find the relative speed of A & B.

Lorentz Velocity Transformation:

$$u_x' = \frac{u_x - v}{1 - \frac{u_x v}{c^2}} = \frac{-0.8c - 0.8c}{1 - \frac{(-0.8c)(0.8c)}{c^2}}$$

$$= \frac{-1.6c}{1 + (.8)^2}$$

$$= -0.9756c$$

And relative speed, $u' = 0.9756c$

Now, observer in B measure a contracted length

$$L' = \frac{1}{\gamma} L_p \qquad \gamma = \frac{1}{\sqrt{1 - \frac{u^2}{c^2}}} = 4.555$$

$$\therefore L' = 21.96 \text{ m}$$