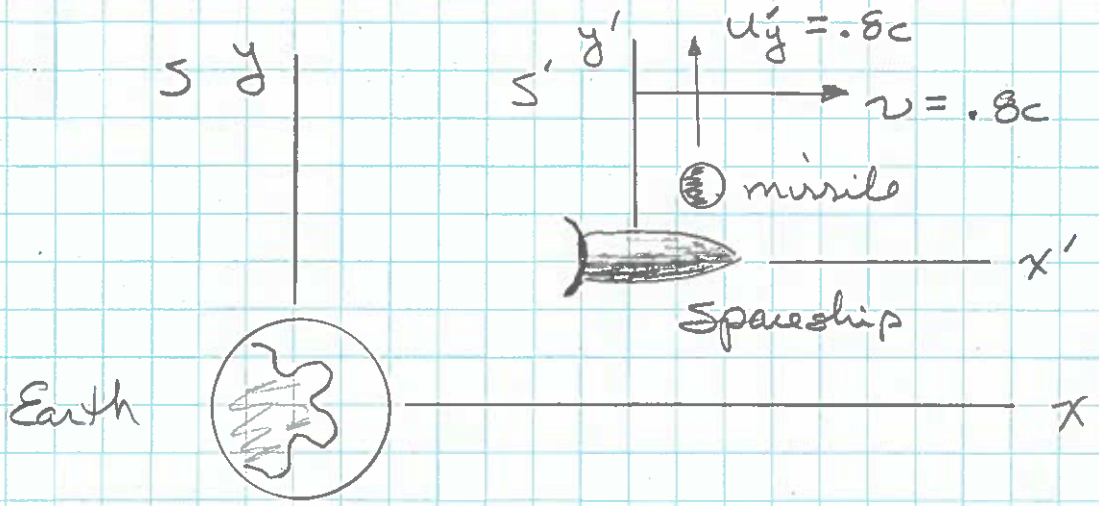

Velocities: v = velocity of S' relative to S

$\vec{u}'$ = velocity of missile relative to S'

$u_x' = 0$

$u_y' = 0.8c$

$\vec{u}$ = velocity of missile relative to S

So: LVT:

$$u_x = \frac{u_x' + v}{1 + \frac{v u_x'}{c^2}} = v = \underline{0.8c}$$

$$u_y = \frac{u_y'}{\gamma\left(1 + \frac{v u_x'}{c^2}\right)}$$

$$\gamma = \frac{1}{\sqrt{1 - v^2/c^2}} = 1.667$$

$$u_y = \frac{.8c}{\gamma(1 + 0)} = \underline{0.48c}$$

So in frame S: speed $u = \sqrt{u_x^2 + u_y^2}$

$$= c\sqrt{.8^2 + .48^2}$$

$$= \underline{0.933c}$$