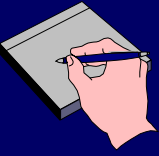# Length Contraction

Example

People on ship and on earth agree on relative velocity v = 0.95 c. But they disagree on the time (4.5 vs 1.4 years). What about the distance between the planets?

Earth/Alpha $L_0 = v\,t = .95\,(3 \times 10^8\,\text{m/s})\,(4.5\ \text{years})$

$= 4 \times 10^{16}\,\text{m}$ (4.3 light years)

Ship $L = v\,t_0 = .95\,(3 \times 10^8\,\text{m/s})\,(1.4\ \text{years})$

$= 1.25 \times 10^{16}\,\text{m}$ (1.3 light years)

Length in moving frame

Length in object's rest frame

$$L = L_0 \sqrt{1 - \frac{v^2}{c^2}}$$