Answer on Question #67703, Physics / Mechanics | Relativity

the speed of a spacecraft moving between Earth and Mars at an instant when earth and mars are 2.4into10^11 m apart is v=0.8c. the distance between them measured from the frame where they are at rest.what is the distance between E and M in the spacecraft frame.and what time elapses betewen crossing E and reaching M.

Find: L – ? t – ?

Given:

$L_0=2.4\times10^{11}$ m

v=0.8 c

$c=3\times10^8$ m/s

Solution:

Length contraction: $L = L_0\sqrt{1-\frac{v^2}{c^2}}$ (1)

Of (1) $\Rightarrow$ $L=1.44\times10^{11}$ m

Time: $t = \frac{L_0}{v}$ (2)

Of (2) $\Rightarrow$ $t=10^3$ s

Answer:

1.44×10^{11} m

10^3 s