Read Unit 3 (*SRQM by Ruler&Compass*) thru page 36. Study Lecture 25-29

H*ow long does it take to get to* α*-Centauri in 6 months?*

1. Suppose we define a velocity we will call $v_{ignorant}$ as that speed that someone ignorant of relativity would say a spaceship had to go to get to a distant star in a given time. For example, if we ask how fast a ship would have to go to get to α-Centauri (~4 light years away) in 6 months then the "ignorant" person would say it had to go $v_{ignorant} = 8c$, that is, eight times the speed of light. So if super-luminal travel is prohibited, then 6 months seems too short.

But the relativity expert says that there is a speed v_{expert} which will get the ship to α-Centauri in 6 months according to the ship's passengers, who, after all, are the ones really counting their time.

(a) Compute v_{expert} for α-Centauri trip and derive general algebraic relations giving v_{expert} in terms of $v_{ignorant}$ and vice-versa.

(b) How long does it really take to get to α-Centauri in 6 months? (Lighthouse time.)

2. Consider a more realistic project discussed recently in the New York Times.
This involves sending a package that would get to α-Centauri in 16 years (its time) by blasting it up to necessary speed with powerful lasers. This one can be plotted on a Minkowski graph such as can be made using the Relawavity website.
Do a plot and make an event table involving departure and arrival space-time events. Find $v_{ignorant}$ and v_{expert}.
If upon arrival the package sends a message back, when should we expect to hear from it if we had sent it out today?

http://www.uark.edu/ua/modphys/markup/RelaWavityWeb.html?plotType=8l8&velocity=-0.25