QP10

Two long horizontal test tracks at Edwards Air Force base, running parallel and next to each other, were used to compare the performance of a rocket motor and a jet motor. The rocket motor started from rest and accelerated constantly along the first track until it reached exactly half the measured test distance $L/2$ at t_1. At this point the rocket ran out of fuel and then continued at constant speed to the end of the track, over a further distance of $L/2$. A jet motor was started at the same instant as the rocket, at the same starting coordinates $s = 0$ along the second track and ran along the track with constant acceleration for the whole length L. It was observed that both the rocket and the jet motors covered the test distance in exactly the same time T.

a) (2 points) Find t_1/T for the rocket.

b) (2 points) Find the ratio of the acceleration of the jet motor a_2 to the rocket motor a_1.

c) (2 points) Make a plot of the rocket's position as a function of time $s_1(t)$ and the jet's position $s_2(t)$, showing all main features of the motion.