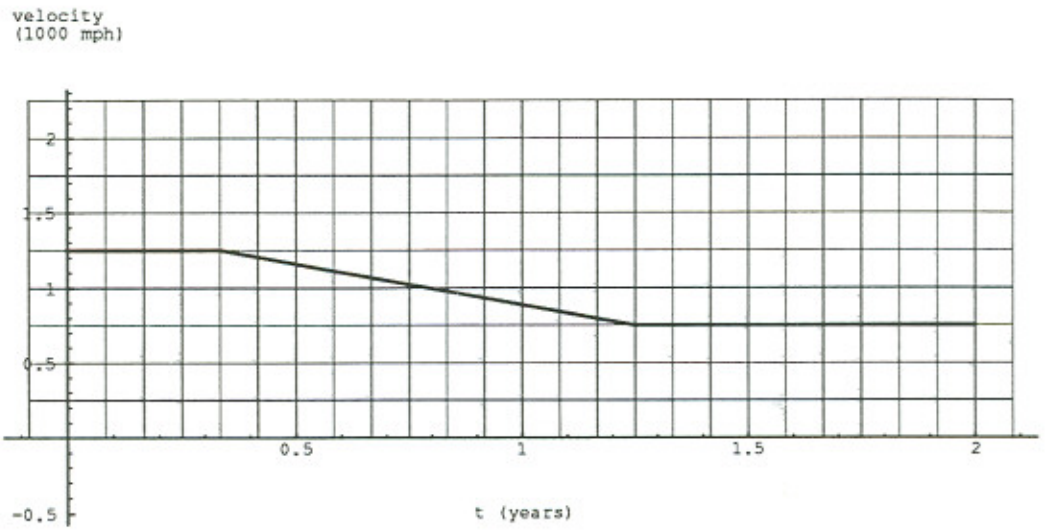
Rescuing a satellite

We will investigate whether or not it is possible to rescue an interplanetary probe. The satellite is currently 100,000 miles away from earth. The graph below gives its velocity for the next two years. (After two years the satellite will be useless unless it can be fixed.) The satellite is traveling in a straight line away from earth.

The rescue ship leaves now and its velocity is $v(t) = \sqrt{t + 0.1}$ thousand miles per hour in t years. The rescue ship will also travel in a straight line away from earth, and this is the same as the line on which the satellite is travelling.



Velocity

Your group must decide whether the rescue ship will catch up with the satellite and if so when.

Part A

From the group: Devise a breakdown, (top-down analysis), of how to solve the problem.

From each individual: Use Riemann sums to estimate how far from earth each ship is at certain times. Use $\Delta t = 1$ month.

First member:

the rescue ship after 6 months and the satellite after 18 months, using right-hand endpoints;

the rescue ship after 6 months and the satellite after 18 months, using left-hand endpoints;

the actual position of the satellite after 18 months.

Second member:

the satellite after 6 months and the rescue ship after 18 months, using right-hand endpoints;

the satellite after 6 months and the rescue ship after 18 months, using left-hand endpoints;

the actual position of the satellite after 6 months.

Third member:

the satellite after 12 months and the rescue ship after 12 months, using right-hand endpoints;

the satellite after 12 months and the rescue ship after 12 months, using left-hand endpoints;

the actual position of the satellite after 12 months.

Part B

Your final report should include:

All the data from part A;

Graphs and rules for the velocities and distances of the satellite and rescue ship, in terms of time.