Stars don't stay in one place all the time, but move through space. Over time, our night sky will look very different than it does today. One thing that will change pretty soon is the answer to the question, 'Which star is the closest to our sun?' The figure shows the distances to several nearby stars from 20,000 years ago to 80,000 years in the future, based upon detailed studies of the speeds and current distances of these stars. The picture, by the way, is of the star Proxima Centauri taken by the Hubble Space Telescope. It is currently the closest star to our sun at a distance of 4.243 light years or 40.14 trillion kilometers (24.94 trillion miles).

Problem 1 – For the star Alpha Centauri in the graph, what does its curve represent?

Problem 2 – What will be the distances to the seven stars at a time 30,000 in the future?

Problem 3 – Create a timeline that gives the absolute minimum distances to each star over the next 80, 000 years.

Figure from Wikipedia – 'Proxima Centauri'
Matthews, R. A. J. (1994), "The Close Approach of Stars in the Solar Neighborhood", Quarterly
Journal of the Royal Astronomical Society 35: 1–9

http://www.nasa.gov/content/goddard/hubbles-new-shot-of-proxima-centauri-our-nearest-neighbor/index.html
Hubble's New Shot of Proxima Centauri, our Nearest Neighbor
November 1, 2013

Problem 1 – For the star Alpha Centauri in the graph, what does its curve represent?

Answer: The student should mention that it is a mathematical model of the distance between the Sun and Alpha Centauri as it changes between 20,000 years ago and 80,000 into the future.

Problem 2 – What will be the distances to the seven stars at a time 30,000 in the future?

Answer: Students draw a line vertically from the point 'Time=30' and note the distances at which the curves for the stars cross this line:

Alpha Centauri	**D = 3.125 ly**
Proxima Centauri	**D = 3.188 ly**
Ross 248	**D = 3.500 ly**
Lalande 21185	**D = 5.625 ly**
Gliese 445	**D= 6.785 ly**
Ross 128	**D = 8.125 ly**
Barnards Star	**D = 10.00 ly**

Problem 3 – Create a timeline that gives the absolute minimum distances to each star over the next 80, 000 years.

Answer:

Barnards Star	**10,000**	**3.69 ly**
Lalande 21185	**21,000**	**4.69 ly**
Proxima Centauri	**25,000**	**3.13 ly**
Alpha Centauri	**30,000**	**3.13 ly**
Ross 248	**37,000**	**3.00 ly**
Gliese 445	**46,000**	**3.44 ly**
Ross 128	**75,000**	**6.13 ly**