

Our Neighborhood in the Milky Way



The Milky Way galaxy is a flat disk about 100,000 light years in diameter and 1000 light years thick. All of the bright stars, clusters and nebula we see are actually very close-by. Let's have a look at a few of these familiar landmarks!

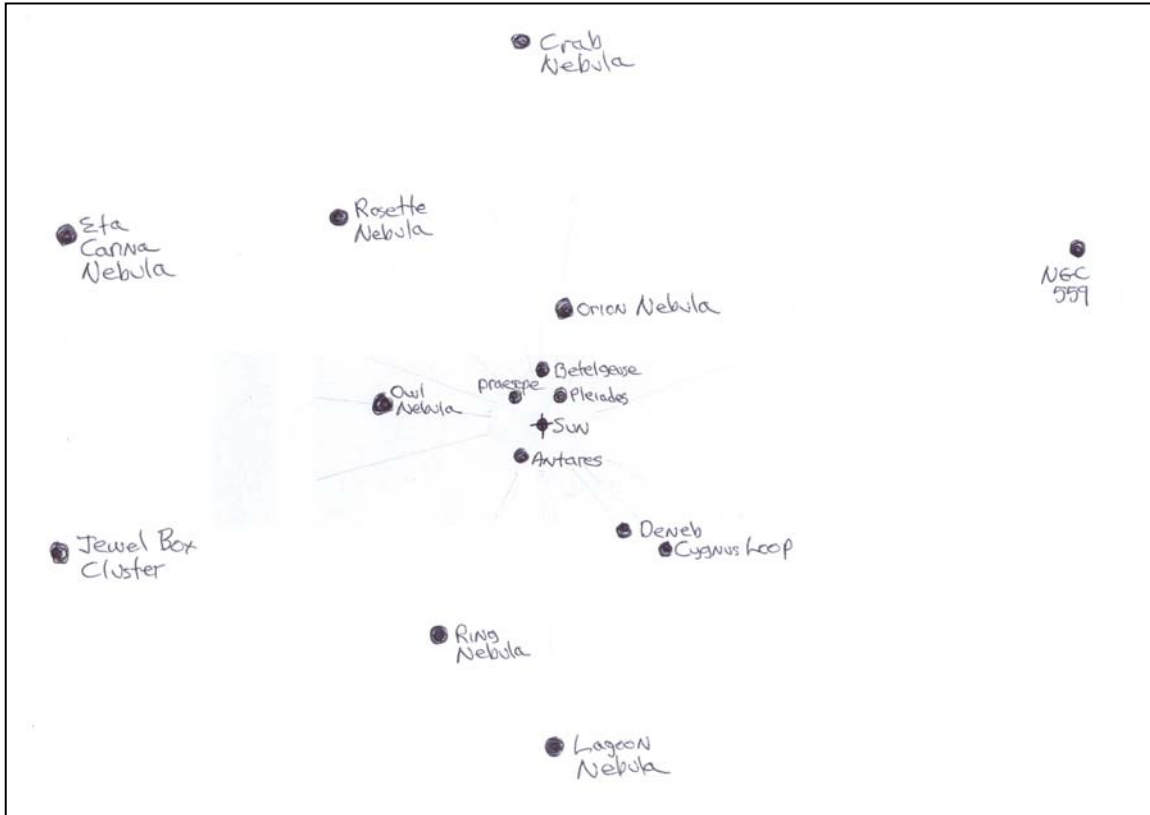
The table below gives the distances and angles to a few familiar nebulae and star clusters within 7,000 light years of the sun. Plot them on a paper with a scale of 1 centimeter = 500 light years, and with the sun at the origin.

Object	Type	Distance	Angle
Pleiades	cluster	410 ly	60
Orion Nebula	nebula	1500	80
Betelgeuse	star	650	90
Deneb	star	1600	310
Antares	star	420	245
NGC-559	star cluster	7000	20
Cygnus Loop	supernova	2000	315
Ring Nebula	nebula	2300	280
Owl Nebula	nebula	1900	170
Crab Nebula	supernova	6300	80
Praesepe	star cluster	520	130
Rosette Nebula	nebula	3,600	100
Eta Carina	nebula	7,000	160
Lagoon Nebula	nebula	4,000	270
Jewel Box	star cluster	6,500	190

Problem 1 - If you only wanted to visit the three bright stars, how many light years would you have to travel for a round-trip tour?

Problem 2 - If you only wanted to visit all of the nebulae how long would your round-trip journey be?

Problem 3 - A very fast spacecraft could reach 99.99% the speed of light. That equals about 33,000 times faster than the speed of the Space Shuttle. Thanks to Einstein's Laws of Relativity, at that speed, one year of time aboard the ship would equal 70 years for someone remaining behind on earth. The earthlings would see the ship take about 70 years to travel to a star 70 light years away, but the ship time that passed would only be 1 year. From your answer to Problem 2, how many years of ship's time would pass for the scientists studying the nearby nebulae?



Problem 1 - Sun - Betelgeuse - Deneb - Antares - sun would measure 10 centimeters, and from the scale of 1 cm=500 ly, it would be a **5,000 light year journey**.

Problem 2 - One possibility would be Sun - Cygnus Loop - Lagoon Nebula - Ring Nebula - Owl Nebula - Eta Carina Nebula - Rosette Nebula - Crab Nebula - Orion Nebula - Sun. This would be a journey of 45 centimeters or $45 \times 500 =$ **22,500 light years**.

Problem 3 - On earth, it would take the travelers about 22,500 years to return home, but on the ship, $22,500/70 =$ **320 years** would have passed.