Lesson 2

The Position of the Solar System

S6E1b
S6CS3a, S6CS5a, S6CS6c, S6CS9d

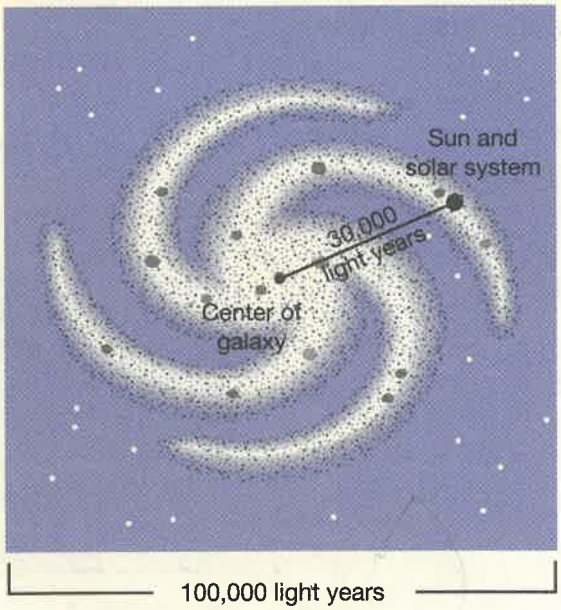
GETTING THE IDEA

Our solar system is located in the Milky Way Galaxy, one of over a hundred billion galaxies which make up the universe.

The most distant objects observed from Earth are about 13.6 billion light years away. A **light year** is the distance light travels in a year. Measured in kilometers (km), this distance is about 9.5 trillion kilometers. That means that Earth, our solar system, and the Milky Way Galaxy are about 129 billion trillion kilometers from the edge of the known universe.

Galaxies come in all sizes and shapes. Our galaxy, the Milky Way Galaxy, is shaped like a giant flattened disc with a bulge in the middle. You might think of its shape as that of a sunny-side-up fried egg. However, unlike a fried egg, the Milky Way Galaxy is not solid from edge to edge. Spiral arms spin out into space from its center.

Milky Way Galaxy



The Milky Way Galaxy is thought to be about 100,000 light years (9.5 million trillion km) in diameter. It is between 1,000 and 3,000 light years (9.3 million billion km to 31.0 million billion km) thick. It is thickest at its center.

The sun and its solar system are located on one of the outer arms of the galaxy. The distance from the sun to the center of the galaxy is about 30,000 light years. All objects in the galaxy revolve around its center. The sun and our solar system take about 240 million years to make one trip around the center of the galaxy.

Scientists use various units to measure the great distances in space. If you read books about astronomy you may come across one or more of these units. The table below shows you how these units relate to one another. Values for kilometers and miles are rounded. You already know what a light year is. An **astronomical unit** is the average distance between the sun and Earth.

Units Used in Astronomy

Unit	Light Years	Astronomical Units	Kilometers	Miles
Parsec (pc)	3.26	206,265	31 trillion	19 trillion
Light Year	------	63,240	9.5 trillion	6 trillion
Astronomical Unit (AU)	0.000016	------	150,000,000	93,000,000

Notes: 1 light year is the distance light travels in a year.
1 astronomical unit is the average distance between the sun and Earth.

Choose the best answer for each question. Fill in the circle in the spaces provided on your answer sheet.

1. A light year is a unit of
   A. time.
   B. distance.
   C. volume.
   D. speed.

THINK STEP
I should review the definition of a light year.

2. If a space probe were able to move at half the speed of light, how long would it take the probe to travel from Earth to the center of the Milky Way Galaxy?
   A. 15,000 years
   B. 30,000 years
   C. 60,000 years
   D. 120,000 years

THINK STEP
I must reason this way: Earth is 30,000 light years from the center of the galaxy. That means that if the probe traveled at the speed of light, it would make the trip in 30,000 years. But since the probe is traveling at half that speed it would take twice as long.

3. Light travels about 300,000 km a second. The sun is about 150,000,000 km from Earth. About how long does light take to travel from the sun to Earth?
   A. 8 seconds
   B. 8 minutes
   C. 8 hours
   D. 8 years

4. The nearest star outside our solar system is about 4.2 light years away. About what distance would this be in kilometers?
   A. 4 trillion
   B. 40 trillion
   C. 400 trillion
   D. 4,000 trillion

When answering mathematical questions, estimation can often eliminate wrong answers.

1. Ⓐ Ⓑ Ⓒ Ⓓ	3. Ⓐ Ⓑ Ⓒ Ⓓ
2. Ⓐ Ⓑ Ⓒ Ⓓ	4. Ⓐ Ⓑ Ⓒ Ⓓ