



The Milky Way Lesson Plan

Time: 40 minutes

Goals: To gain an understanding of the size and structure of our Milky Way Galaxy and how we came to know how big it is.

Objectives: Students will:

- Watch the “The Milky Way” segment of the “How far away is it” video book
- Calculate the distance to a photographic point outside the galaxy
- Take a short quiz

Materials:

- Internet connection with a computer for viewing [“The Milky Way” segment on YouTube](#)

Directions:

- Introduce the Milky Way segment as our final segment in the Milky Way Chapter. Point out that we will be covering the supermassive black hole at the center of the galaxy, the spiral arms in the galaxy’s disk, and the galactic halo.
- Show the video.
- Review what they saw:
 - What the central area of our galaxy looks like.
 - How we determined that there is a supermassive black hole at the center.
 - How many spiral arms there are in the galaxy’s disk, and how we are in the Orion spur off of one of them - Sagittarius.
 - How vast the galactic halo is, and how it is spinning in two directions.
 - Why we think there is Dark Matter around us.
 - How small the solar system is when viewed as part of the whole galaxy.

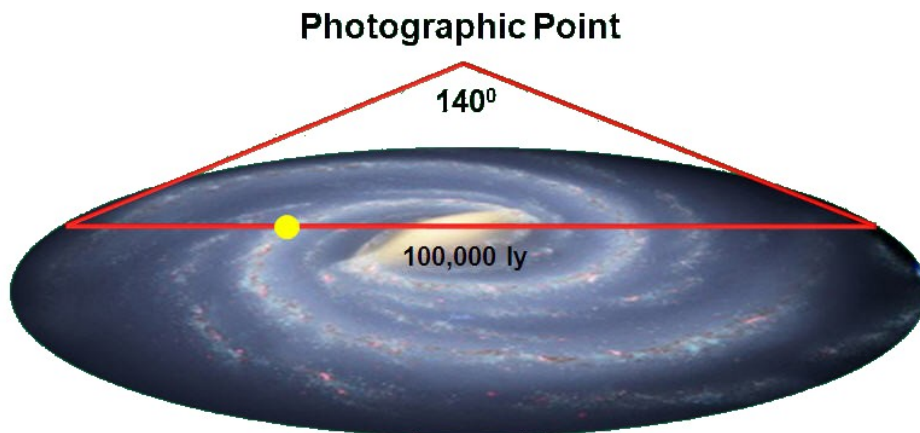


Assessment options: Here are two assessment options based on prerequisites:

Without Trigonometry: Take a simple quiz. Print and distribute the quiz on page 4. Here are the answers:

- What do we call a celestial object that has collapsed into a singularity because of gravity?
Answer: d) Black Hole
- Which of these galactic components is the largest? **Answer:** c) the halo
- Can we see through the galactic center to examine the stars on the other side?
Answer: No.

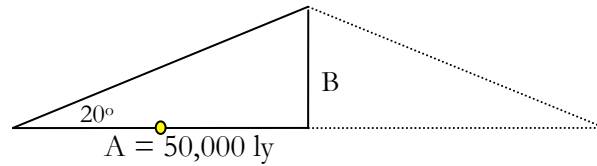
With Trigonometry: Calculate the distance in light years from the Sun to the photographic point identified in this picture, remembering that the Sun is 26,000 light years from the galactic center.





Step 1

- Drop a line from the photographic point to the center of the galaxy. The length of the bottom line in this right triangle is 50,000 light years - half the diameter of the galaxy.

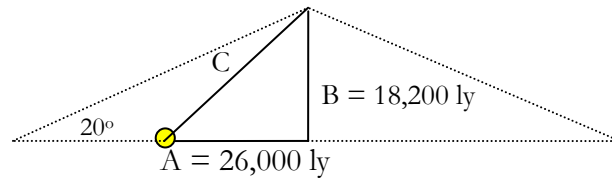


$$\tan(20^\circ) = B/A$$

$$B = A \tan(20^\circ) = 50000 \text{ ly} \times .364 = 18200 \text{ ly}$$

Step 2

- Connect the Sun to the photographic point.



$$C^2 = A^2 + B^2$$

$$C^2 = (26000)^2 + (18200)^2 = 676000000 + 331240000 = 1007240000$$

$$C = \sqrt{1007240000} = 31737 \text{ ly}$$

This exercise is repeated without the solution on page 5.



The Milky Way quiz

- What do we call a celestial object that has collapsed into a singularity because of gravity?
 - a) White dwarf
 - b) Neutron star
 - c) Pulsar
 - d) Black Hole

- Which of these galactic components is the largest:
 - a) Central core
 - b) Disk
 - c) Halo
 - d) Globular clusters

- Can we see through the galactic center to examine the stars on the other side?





The Milky Way Exercise

Calculate the distance in light years from the Sun to the photographic point identified in this picture, remembering that the Sun is 26,000 light years from the galactic center.

