



Get the Data

Visit EOSS <http://1.usa.gov/MrzOYj> to recreate the scene on the right. Recommended operating system: MS Vista or later; Browser: MS Internet Explorer 8 or later.

**Step 1** – Click on the ‘Visual Controls’ tab and make sure that the following items are selected with a ‘white spot’: spacecraft, planets, labels, orbit lines, trails and metric.

**Step 2** - Activate the Distance Measuring tool and measure the distance between Aura and Earth.

On July 15, 2004 the Aura satellite was launched into low Earth orbit. The drawing on the left shows the 15-meter long solar panel and the spacecraft.

Answering Questions

**Problem 1** – The solar panel is rectangular in shape. If its length is 1496 centimeters and as the drawing shows, there are 22 solar cells arranged side-by-side along this length, how wide is a single solar cell in the Aura panel?

**Problem 2** – The spacecraft orbits 728 km above the surface of Earth. For a comparison, the distance between Washington DC and Baltimore is about 56 kilometers (35 miles). How many times farther from Washington DC is the Aura satellite when it flies over Washington DC than the distance between Washington DC and Baltimore?

**Problem 3** – The orbit period of Aura is 100 minutes. The mission is expected to last for 6 years. How many orbits will Aura make in this time?

Math Challenge

**Suppose that the circumference of the Aura orbit is 44,652 kilometers. If the speed of the Aura satellite is 446 kilometers per minute, what is its speed in kilometers per hour?**

**Answer Key**

**Problem 1** – The solar panel is rectangular in shape. If its length is 1496 centimeters and as the drawing shows, there are 22 solar cells arranged side-by-side along this length, how wide is a single solar cell in the Aura panel?

Answer:  $1496 \text{ cm} / 22 \text{ cells} = \mathbf{68 \text{ centimeters}}$ .

**Problem 2** – The spacecraft orbits 728 km above the surface of Earth. For a comparison, the distance between Washington DC and Baltimore is about 56 kilometers (35 miles). How many times farther from Washington DC is the Aura satellite when it flies over Washington than the distance between Washington Dc and Baltimore?

Answer:  $728 \text{ km} / 56 \text{ km} = \mathbf{13 \text{ times}}$ .

**Problem 3** – The orbit period of Aura is 100 minutes. The mission is expected to last for 6 years. How many orbits will Aura make in this time?

Answer: The number of minutes in a year is  $60 \times 24 \times 365 = 525,600$  minutes. In 6 years there are  $6 \times 525,600 = 3,153,600$  minutes. One orbit = 100 minutes, so the number of orbits is just  $3153600 \text{ minutes} / 100 \text{ minutes} = \mathbf{31,536 \text{ orbits}}$ .

**Challenge Question:** Suppose that the circumference of the Aura orbit is 44,652 kilometers. If the speed of the Aura satellite is 446 kilometers per minute, what is its speed in kilometers per hour?

Answer: There are 60 minutes in an hour, so multiplying 446 by 60 you get

**26,760 km/hour.**

**Note to Teacher** – Since 1 kilometer is  $3/5$  of a mile, the speed in miles per hour is **16,056 miles/hour.**