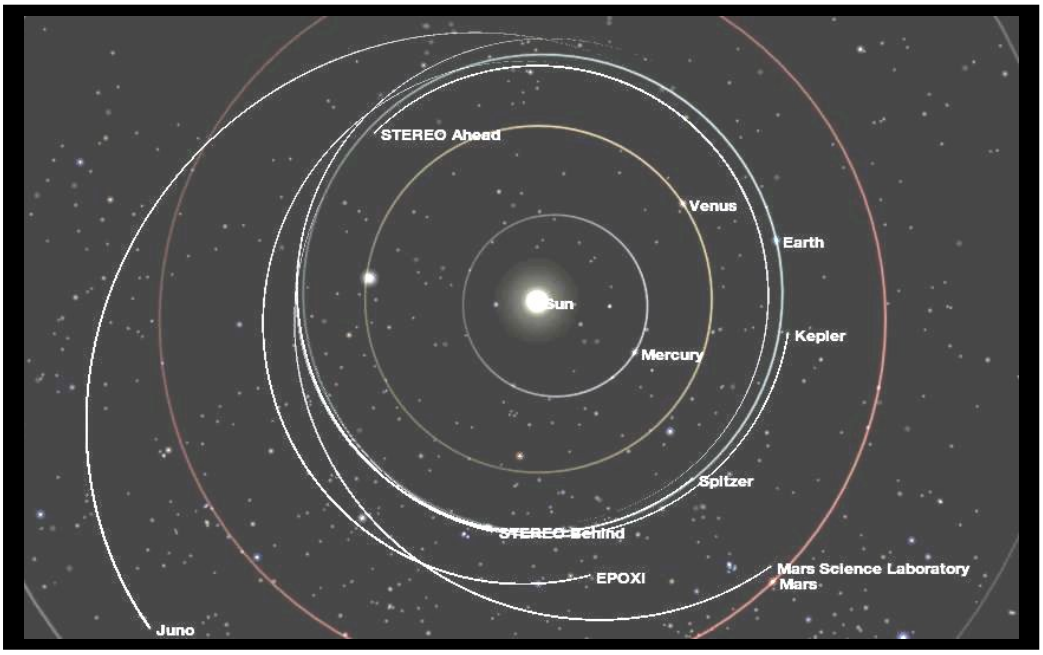
Eye Spy – Seeing the Sun in STEREO



Get the Data

Visit EOSS **http://1.usa.gov/Ne3sAz** to recreate the scene above. 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 STEREO-Ahead and Earth.

Answering Questions

On October 26, 2006 the STEREO A and B spacecraft were launched into orbit around the sun in nearly the same orbit as Earth. The STEREO-A (Ahead) spacecraft orbits faster than Earth, while STEREO-B (Behind) orbits slower and constantly falls behind Earth in its orbit.

Problem 1 – The STEREO-Ahead spacecraft travels 1/6 the circumference of Earth's orbit each year. How far along Earth's orbit will it be when the mission ends in August 2013 after 5 5/6 years?

Problem 2 – Each spacecraft travels about 2 2/3 million kilometers each month along the circumference of Earth's orbit. How far from Earth will each spacecraft have traveled after 5 5/6 years? Give your answer as a simplified mixed number.

Math Challenge

As viewed from Earth, STEREO-Ahead travels counter-clockwise and STEREO-Behind travels clockwise along Earth's orbit. Both spacecraft were launched from Earth in October 2008. If both spacecraft travel about 1/6 of the circumference of Earth's orbit each year A) When will the spacecraft be close to each other on the opposite side of Earth's orbit around the sun? B) When will they form an equilateral triangle with Earth's location? Express your answers as mixed numbers.

Answer Key

Problem 1 – The STEREO-Ahead spacecraft travels 1/6 the circumference of Earth's orbit each year. How far along Earth's orbit will it be when the mission ends in August 2013 after 5 5/6 years?

Answer: Distance = Speed x Time so

= 1/6 x (5 5/6)

= 1/6 x 35/6

= **35/36 of the circumference**.

Problem 2 – Each spacecraft travels about 2 2/3 million kilometers each month along the circumference of Earth's orbit. How far from Earth will each spacecraft have traveled after 5 5/6 years?

Answer: Distance = speed x time

= 2 2/3 million km/month x 5 5/6 years x (12 months/1 year)

= 8/3 x 35/6 x 12 million kilometers

= 8/3 x 70 million kilometers

= 560/3 million kilometers

= **186 2/3 million kilometers**.

Challenge Problem: As viewed from Earth, STEREO-Ahead travels counter-clockwise and STEREO-Behind travels clockwise along Earth's orbit. Both spacecraft were launched from Earth in October 2008. If both spacecraft travel about 1/6 of the circumference of Earth's orbit each year A) When will the spacecraft be close to each other on the opposite side of Earth's orbit around the sun? B) When will they form an equilateral triangle with Earth's location? Express your answers as mixed numbers (Example: The date, June 2010 is the year 2010 ½)

Answer: A) They will be close to each other after traveling 3/6 of the circumference. This will take 3 years, so the date will be 2008 + 10/12 + 3 = **2011 5/6**.

Answer: B) To form an equilateral triangle, the spacecraft need to be 1/3 of the circumference from Earth. Since 1/3 = 2/6, this will take 2 years after launch or 2008 5/6 + 2 = **2010 5/6**. After traveling an additional 1/3 of the circumference, the spacecraft will again be at an equilaterial configuration, so the next date will be 2010 + 5/6 + 2 = **2012 5/6**.