

### Greek Cosmology—31 Aug

- Finish 51 Peg
- What did Greek cosmologists study?
- Eratosthenes measures the Earth
- Hipparchus measures the distance of the moon

### Orbit of 51 Peg

- How big is the orbit?
- Speed is 60m/s. Period is 4day 5hr = 101hr.
- Circumference is  
 $60\text{m/s} \times (3600\text{s/hr}) \times 101\text{hr} = 22,000\text{km}$
- Circumference of Earth is 40,000km
- Sun is 100 times bigger.
- Planet causes 51 Peg to move  $1/200^{\text{th}}$  of its radius.

### What did Greek cosmologists study (200BC-200AD)

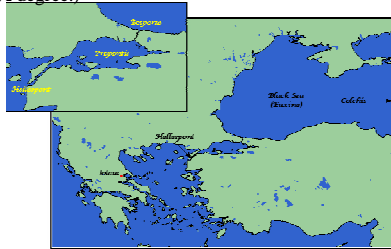
- Cosmology is the study of the universe at the largest scales

### Erathosthenes ~200 BC

- A correspondent in Syene reports that at noon on the summer solstice, the sun illuminates the bottom of a well. In Alexandria (where Erathosthenes lived), a stick makes a  $7^\circ$  shadow.
- It takes a camel 50 days to travel from Syene to Alexandria. A camel can travel 100 stadia/day.
- “A clear picture is 90% of clear thinking.”
- Draw a picture to show the relationship between the sun, the well, the stick, and the two locations.
- What is the distance between Alexandria & Syene in km?

### Hipparchus measures the moon's distance~200BC

- At the Hellespont, the solar eclipse of 189BC was total.
- In Alexandria, the moon covered  $\frac{1}{4}$  of the sun.
- "A clear picture is 90% of clear thinking."
- Draw a picture to show the relationship between the sun, the moon, the two locations, and the difference between a total &  $\frac{1}{4}$  eclipse. (The diameter of the sun is  $\frac{1}{2}$  degree.)



[http://mkatz.web.wesleyan.edu/medea\\_lecture/hellespont.gif](http://mkatz.web.wesleyan.edu/medea_lecture/hellespont.gif)

### Summarizing questions

- What two quantities did Eratosthenes need to measure the size of the Earth?
- If the shadow were longer, would the Earth be bigger or smaller?
- What is the key drawing for Hipparchus's method of measuring distances?