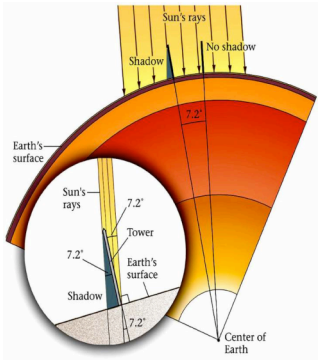
Measuring the Earth

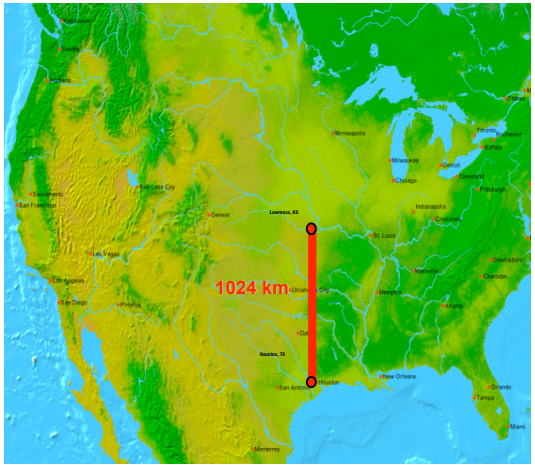
A joint exercise of the University of Houston and the University of Kansas

Eratosthenes' Observation

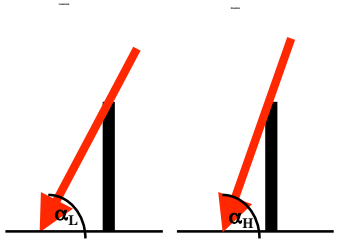


- Eratosthenes calculated the circumference of the Earth at 24,421 miles in ~ 200 B.C.
- In Alexandria, he noted the sun angle the same day there was no shadow in a deep well in Syene.
- He calculated that the distance between the two locations was 1/50th of Earth's circumference.

Geography



Measure the angles at the two locations



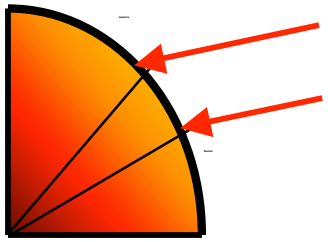
Potential sources of error:

1) Length of shadow
2) Height of stick
3) Stick not vertical
4) Distance between locations

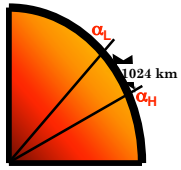
Requirements of the method

1) Stations should be directly N-S of each other.
2) Measurements should be made at local noon.
3) Need to know the distance between stations.

Assume parallel rays from the Sun



Calculate the circumference



$$\frac{\alpha_L - \alpha_H}{360} = \frac{1024}{circumference}$$