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Quarterly Problem

- Math Edition -

Measuring the Earth's Circumference



An ancient Greek mathematician, geographer, and astronomer named Eratosthenes of Cyrene was the first person to determine the size of the Earth using the principles of geometry and astronomy. Around 240 B.C., he achieved this remarkable feat by designing an experiment that involved observation, imagination, planning/carrying out investigations, interpreting data, and using mathematics for constructing explanations.

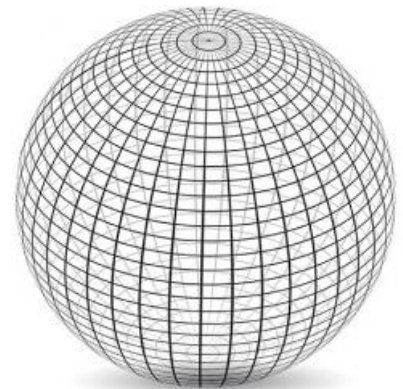
Eratosthenes noticed that at noon on the summer solstice (around June 21st), the sun was directly overhead in the Egyptian city of Syene (modern-day Aswan). This was evident from the fact that vertical objects cast no shadows at that time. Eratosthenes planned an investigation to observe the sun's angle at noon on the summer solstice in two different cities – Syene and Alexandria - which were located at the same longitude. At noon on a summer solstice, he measured the angle of elevation of the Sun from the city of Alexandria by making an angle of about 7.2 degrees. Using this information, the distance between these two cities, and his geometrical knowledge, Eratosthenes was able to calculate the Earth's circumference.

Let's do research to find out how Eratosthenes designed and carried out his experiment:

- Why did he choose Syene and Alexandria for his experiment?
- How did he measure the Earth's circumference, how close is this to the actual size of the Earth? What would be reasons for this small difference?
- How long do you think this experiment take place?

Brainstorm-Box

How would you design an experiment to measure the Earth's circumference?



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Design an experiment to measure the circumference of the Earth!

- Design an experiment to measure the circumference of the Earth! You may carry out this experiment with one of your friends in different cities.
- Develop and use models to replica Eratosthenes' experiment to measure the circumference of the models.