Celebrating Science: Solar Eclipse

Description:

The Egypt exploration has begun! You are ready to virtually follow a team of astronomers and teachers as they travel throughout Egypt. On Wednesday, March 29th the team will view the total solar eclipse and broadcast the video for students to enjoy. In the interactive session, students will learn what the experience was like for expedition members and follow-up with their questions and predictions.

Preparation for the Excursion

To ensure the most meaningful learning experience for your students, it is recommended that students engage in activities prior to the excursion. The video resources provide students with a context for the virtual excursion. The additional resources and activities offer opportunities for curricular connections and integration within your larger unit of study. The excursion is intended to complement a comprehensive unit.

Video Link:

http://easylink.playstream.com/21_CenturyLearning/journeys/egypt/Egypt1.rm

Celebrating Science: Egypt – Solar Eclipse

Application Activity

(This lab has been modified from the book "Conceptual Physics")

Name__________ Date __________ Period ________

Essential Question: Does the temperature of the earth decrease when viewing a solar eclipse?

Purpose: To find the amount of solar energy reaching the earth's surface and relate it to the amount of solar energy during a solar eclipse.

Materials:

- Thermometer
- Triple Beam Balance

. • Graduated cylinder
. • Water
. • Blue and green food coloring
. • Plastic wrap
. • Rubber band
. • Thermometer in (Celsius)
. • Meter stick

Safety: DO NOT LOOK DIRECTLY INTO THE SUN

Background: How do we know how much total energy the sun emits each day? First we assume that, on the average, the sun emits (or gives off) energy equally in all directions. Imagine a heat detector so big that it completely surrounds the sun, like a really big basketball. Then the amount of heat reaching the detector would be the same as the total solar output. Or if our detector were like half a basketball and caught half the sun' radiant energy, then we would multiply the detector reading by 2 to find the total solar output. If our detector encompassed a quarter of the sun and caught one fourth its energy, then its total output would be 4 times the detector reading.

Now that you have the idea, suppose that our detector is the surface area of a Styrofoam cup here on earth facing the sun. Then it comprises only a tiny fraction of the space that surrounds the sun. If you figure what that fraction is and also measure the amount of energy captured by your cup, you can tell how much total energy the sun emits.

In this experiment you will calculate the solar energy at your school, and the Astronomy team will calculate the solar energy in Egypt before and during the Eclipse.

Hypothesis:

1. 1. What do you predict the temperature at 12:00 noon to be?
2. 2. What do you predict the amount of energy that will be captured by the sun to be?
3. 3. What do you predict the amount of energy that will be captured by the sun before the solar eclipse to be?
4. 4. What do you predict the amount of energy that will be captured by the sun during the solar eclipse?

Procedure:

1. 1. Measure and record the amount of water needed to fill a Styrofoam cup.
2. 2. Nest the cup in a second Styrofoam cup. Fill it with the recorded amount of water. Add equal amounts of blue and green food coloring to the water until dark liquid results. The dark liquid will be a good absorber of the sun's energy.
3. 3. Record information in the chart below.
4. 4. Measure the water temperature and record it. Cover the cup with plastic wrap sealed with a rubber band. This is the Initial water temperature in C.
5. 5. Record information in the chart below
6. 6. Put the cup in the sunlight for 10 minutes
7. 7. Remove the plastic wrap, Stir the water in the cup gently with the thermometer, and record the final water temperature in the chart below.
8. 8. Find the difference in the temperature of the water before and after it was set in the sunlight. Record information in the chart below
9. 9. Measure and record the diameter of the top of the cup in centimeters.

10. 10. Compute the surface area of the top of the cup in square centimeters. Record information in the chart below

11. 11. Compute the energy in calories that was collected in the cup. Record information in the chart below. Assume that the specific heat of the mixture is the same as the specific heat of the water.

Data Record

Volume of water

Mass of water

Initial temperature

Final temperature

Difference (initial temp – final temp)

Cup diameter
Surface diameter

E= ____________Cal (show your work)