Name _____ Date _____
Earth Science Lab: Sun's Path and Seasons

Introduction: Part A
The sun's path is an apparent path across the sky. Each day, the sun appears to move in an arc across the sky at a rate of 15°/hour, the rate that the Earth rotates on its axis. The sun is at its highest point at Solar Noon.

In this lab, you will use a plastic hemisphere to represent the dome of the sky. You will need to imagine that you are at the center of the base of the dome. The border around your globe, where it touches the table is your horizon. The arc across the sky represents the apparent path of the sun at this location.

Objectives:
- To plot several positions of the sun along the apparent path at different times
- To measure the altitude of the noon sun at different latitudes or locations
- To determine which season the location your hemisphere is representing (in the Northern Hemisphere)

Materials: per pair of students
- Plastic Hemisphere
- External Protractor
- Masking Tape
- Metric Ruler

Procedure:
1. Record the code number of your plastic hemisphere on the data sheet.
2. Look at the location of the **10 AM** spot on the sun's apparent path.
3. Since the sun appears to move across the sky at 15°/hour, determine how many degrees the sun has appeared to move from 10 AM to the following times: 12 PM, 1 PM, 2 PM and 3 PM. Record these on the data table.
4. On your plastic hemisphere, place the masking tape along the sun's apparent path so it extends to about an inch from each horizon.
5. Put a mark showing the **10 AM** location on the tape.
6. Using the external protractor, measure the angle from 10 AM to 2 PM and mark **2 PM** on the tape. (or 12, 1 or 3 PM)
7. Remove the masking tape from the plastic hemisphere and place it in the box below.

8. Measure the distance between 10 AM and 2 PM (or 12, 1 or 3 PM). Record this to the nearest tenth of a centimeter on the data table.
9. Answer the questions that follow.

Data Table:

Hemisphere Code	
Degrees from 10 AM to 12 PM	_____°
Degrees from 10 AM to 1 PM	_____°
Degrees from 10 AM to 2 PM	_____°
Degrees from 10 AM to 3 PM	_____°
DISTANCE from 10 AM to 2 PM	_____ cm (nearest tenth)

Questions:

1. What is the altitude of an object if it is at the Zenith position? _____°
2. How many degrees is the noon sun on your plastic hemisphere from the Zenith position? _____°
3. How many hours have elapsed between 10 AM and 2 PM? _____ hours
4. What is the fractional part of the day shown by your measurement? _____
5. Based on your answer in #4, what fraction of the whole circle must your centimeter distance from 10 AM to 2 PM represent? _____
6. Using your answer from #5, and your distance value from the data table, determine the circumference of your plastic globe (to the nearest tenth of a centimeter). _____ cm.
7. The correct, or true, value for the circumference of your hemisphere is _____ centimeters.
8. Using the formula below, determine the percent error for the actual and your expected values of circumference.

$$\text{Percent Error} = \frac{\text{Difference between the experimental and actual values}}{\text{Actual (correct) Value}} \times 100\%$$

Percent Error = _____%

Introduction: Part B

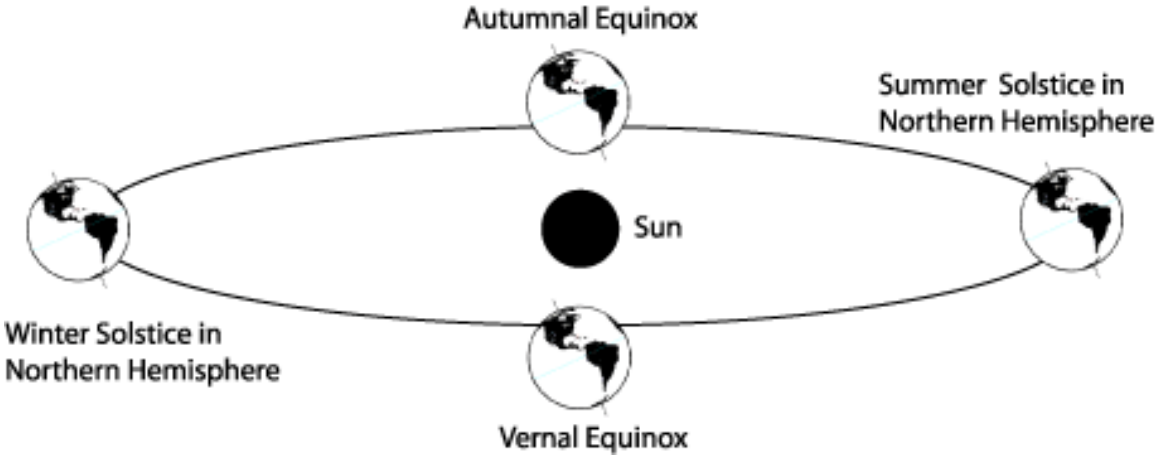
Our seasons are caused by the combination of:

1. the revolution of the Earth around the Sun on its orbit
2. the tilt of the Earth on its axis

In this activity, you will be visualizing the position of the Earth at four different seasons.

Procedure:

Use the diagram below to answer the following questions.



1. Draw arrows on the diagram t show the direction of the Earth's revolution around the Sun.
2. Lightly shade the portions of the Earth that are experiencing darkness on the above dates.
3. Complete the table below based on the diagram above.

	Date	Latitude of Direct Sunlight (degrees & N/S)	Relative Length of Daylight (short, med., long)
Summer Solstice			
Autumnal Equinox			
Winter Solstice			
Vernal Equinox			