Understanding Seasons (page 1)

NGSS MS-ESS1-1

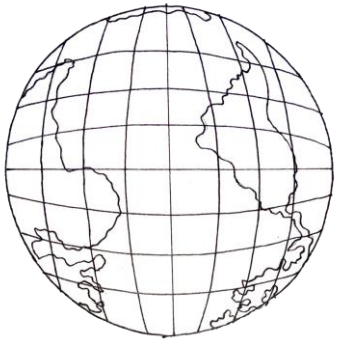
Activity

Introduction: What causes the weather to change? Although we can see that the air can get hot or cold and it rains on some days, these are not the reasons for the change in weather. Energy is needed to move the air or the water, and this energy comes from the sun. Solar radiation is continuously emitted from the sun and the Earth is continuously revolving around the sun and rotating along its axis. This movement of the Earth constantly changes the distribution of energy on the Earth's surface and causes differences in weather in different areas. The more direct the sunlight, the more intense the heat, and that is the summer months in a given geography.

Lesson Objective: To understand why the Earth has seasons:

i. Analyze how the sunlight hits different parts of the planet differently based on the area of surface exposure

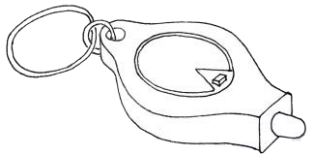
ii. Model the rotation of the Earth around the sun throughout the year and visualize how the sun's rays warm the planet differently based on various conditions



GLOBE

GLOBE STAND

WOODEN SKEWER



KEYCHAIN FLASHLIGHT

Materials:

1. Foam Globe
2. Wooden Skewer
3. Keychain flashlight
4. Globe stand

Conduct this activity in a dimly lighted room

Understanding Seasons (page 2)

NGSS MS-ESS1-1

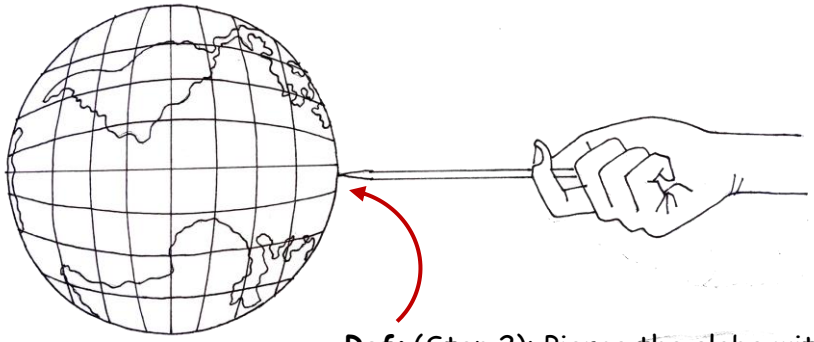
Activity

Objective i: Analyze how the sunlight hits different parts of the planet differently based on the area of surface exposure

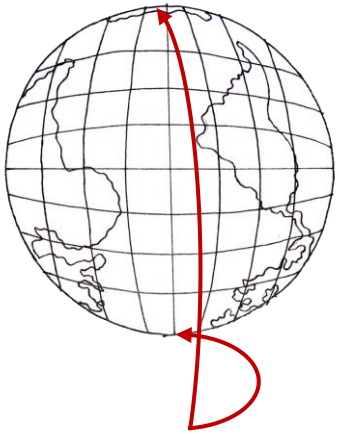
Preparation:

1. Take the globe and identify the point for the north pole and the south pole

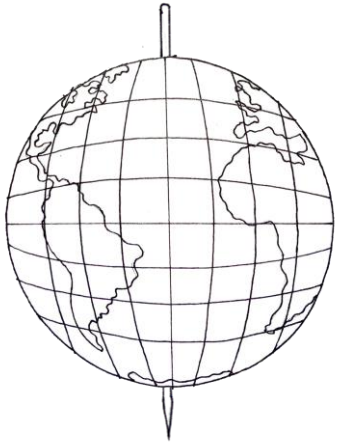
2. Take the wooden skewer and carefully pierce it into the north pole and bring it out from south pole



Ref>(Step 2): Pierce the globe with the wooden skewer (axis of the Earth)

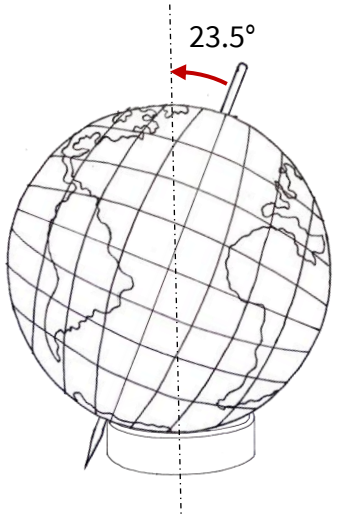


Ref>(Step 1): Identify the north pole and the south pole



3. Place the pierced sphere on the globe stand. **Approximate** such that the axis is tilted at 23.5° from the vertical

Conduct this activity in a dimly lighted room



Understanding Seasons (page 3)

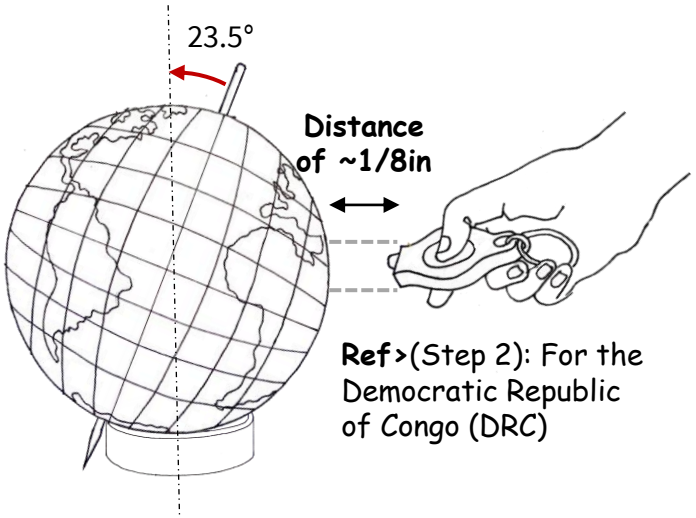
NGSS MS-ESS1-1

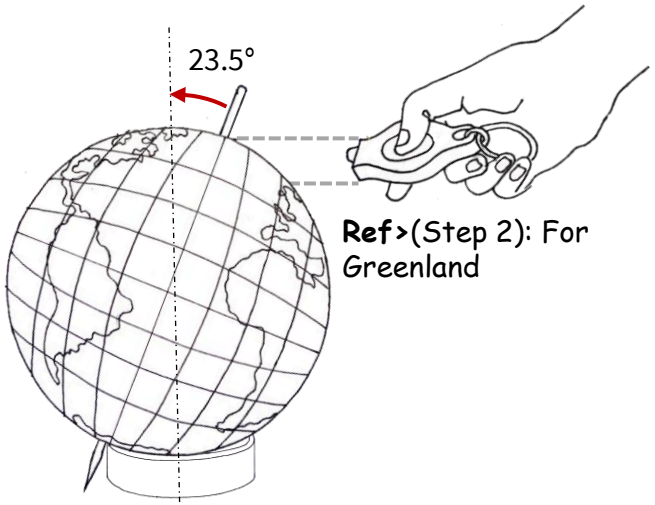
Activity

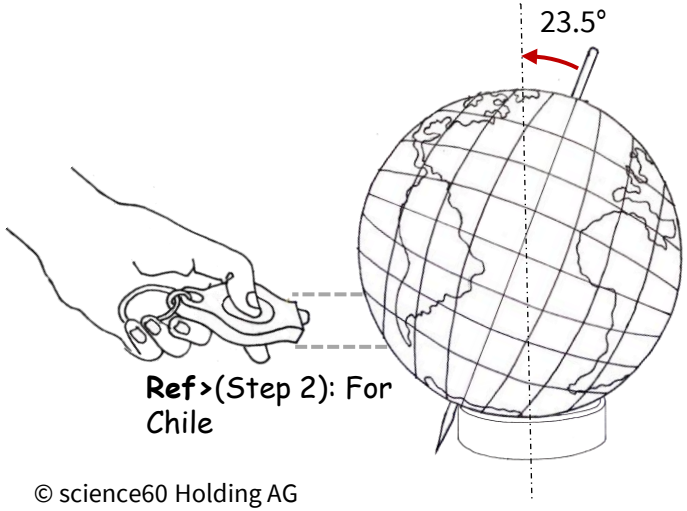
Procedure:

1. Identify the following countries on the globe: Democratic Republic of Congo (DRC), Ecuador, Greenland, Chile

2. Hold the flashlight **horizontally** in front of the countries as shown in the pictures below







Understanding Seasons (page 4)

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Activity

3. Complete Data Table 1 below by carefully observing the shape of the area covered by the light beam of the flashlight

Data Table 1

Country	Shape of Area Covered by the Core Light Beam on the Globe's Surface	Rays are Concentrated On Larger or Smaller Surface Area	What can you Conclude About the Climate of this Country?
DRC			
Ecuador			
Greenland			
Chile			

Understanding Patterns and Pattern Recognition

We find patterns everywhere in nature and in manmade objects. Patterns are important in science because they trigger questions based on our observations and calculations. **You used your own power of pattern recognition to make conclusions in Data Table 1.**

Understanding Seasons (page 5)

NGSS MS-ESS1-1

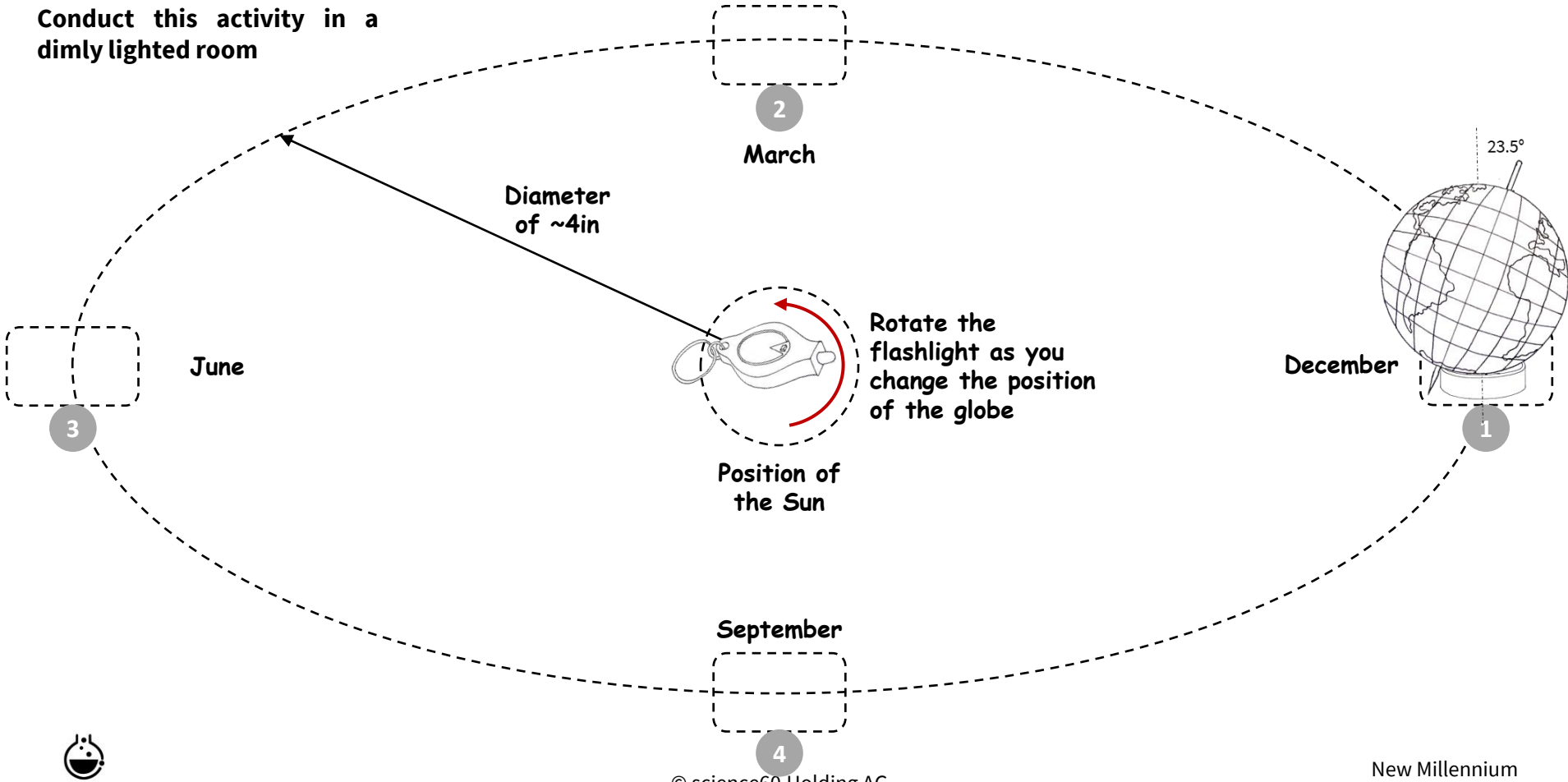
Activity

Objective ii: Model the rotation of the Earth around the sun throughout the year and visualize how the sun's rays warm the planet differently based on various conditions

Preparation:

1. The Earth revolves around the sun in a slightly elliptical orbit. The following is the set up for the visualization:

Conduct this activity in a dimly lighted room



Understanding Seasons (page 6)

NGSS MS-ESS1-1

Activity

Procedure:

1. Complete Data Table 2 below by carefully observing and concluding about the various conditions

Data Table 2

Position of the Globe	Which Hemisphere Gets More Sunlight? (Northern or Southern or Both)	Is There a Solstice or an Equinox? Identify Summer or Winter Solstice	Compare the Length of the Day and the Night? (Longer Day or Longer Night or Equal Day and Night)
1. December		Northern Hemisphere:_____ Southern Hemisphere:_____	Northern Hemisphere:_____ Southern Hemisphere:_____
2. March		Northern Hemisphere:_____ Southern Hemisphere:_____	Northern Hemisphere:_____ Southern Hemisphere:_____
3. June		Northern Hemisphere:_____ Southern Hemisphere:_____	Northern Hemisphere:_____ Southern Hemisphere:_____
4. September		Northern Hemisphere:_____ Southern Hemisphere:_____	Northern Hemisphere:_____ Southern Hemisphere:_____

Additional activity: The area around the south and the north poles experience extreme changes in sunlight between the summer and the winter months. Using the setup of this activity, can you confirm the following:

i. The sun never really sets near the north pole in the summer?

ii. The sun never really rises near the south pole in the summer?