In this activity, you will work in groups of up to four people to model the way sunlight strikes the Earth during different times (seasons) of the year.

**Materials**

1 flashlight

1 model of a globe (tennis ball)

Tennis Ball Stand with 23.5o axis tilt.

4 index cards

**Background Information**

The earth rotates on its axis counterclockwise while looking down from the top.

The earth revolves around the sun counterclockwise also.

The earth has a 23.5o tilt on its axis.

**Procedure**

1. During this lab, please keep the flashlight off as much as possible. This saves the batteries for other classes.
2. The flashlight will represent the sun. Place the flashlight in the center of your table, but do not turn it on yet. The light beam emitted by the flashlight will represent the most direct rays of sunlight.
3. Use four index cards to represent four locations in Earth’s orbit. One of these must face the wall marked “North Star”. (Your teacher will designate a place for the North Star).
4. Label the four cards “A,” “B,” “C,” and “D.” “A” is the card that faces the North Star. “B” is to the right of “A,” and so on. Each card should be 90o from the previous card.

 **D**

**C**

**A**

 **B**

1. **Prediction**.

Predict which season (Winter, Summer, Spring, Fall) each card represents.

|  |  |
| --- | --- |
| **Card Label** | **Predicted Season** |
| A |  |
| B |  |
| C |  |
| D |  |

1. Place the tennis ball on card **“A”**. Point the “**North**” (**N**) part of the “globe” towards the North Star.
2. Turn on the flashlight and direct the beam towards the tennis ball. Which season does this represent for the **Northern Hemisphere**? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Move the tennis ball to the next card **(“B”)** (counterclockwise from the top). Make sure the North part of the globe still faces the wall with the North Star on it.
4. Rotate the flashlight and shine it on the tennis ball. Which season does this represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Move the tennis ball to the next card **(“C”)** (counterclockwise from the top). Make sure the North part of the globe still faces the wall with the North Star on it.
6. Rotate the flashlight and shine it on the tennis ball.

Which season does this represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Move the tennis ball to the next card **(“D”)** (counterclockwise from the top). Make sure the North part of the globe still faces the wall with the North Star on it.
2. Rotate the flashlight and shine it on the tennis ball.

Which season does this represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Use the tennis ball and the flash light to represent a 24 hour day, remember to rotate the ball counterclockwise from the top.
2. Turn off the flashlight.

**Follow up / Review Questions (Write your answers in complete sentences)**

1. Which orbit location produced the most direct sunlight for the Northern Hemisphere? What season does this location represent?
2. Which orbit location produced the least direct sunlight for the Northern Hemisphere? What season does this location represent?
3. Which orbit locations would have solstices?
4. Which orbit locations would have equinoxes?
5. If Earth were not tilted on its axis, how would your findings be different?
6. If the Earth was tilted 90o on its axis, how would your findings be different?