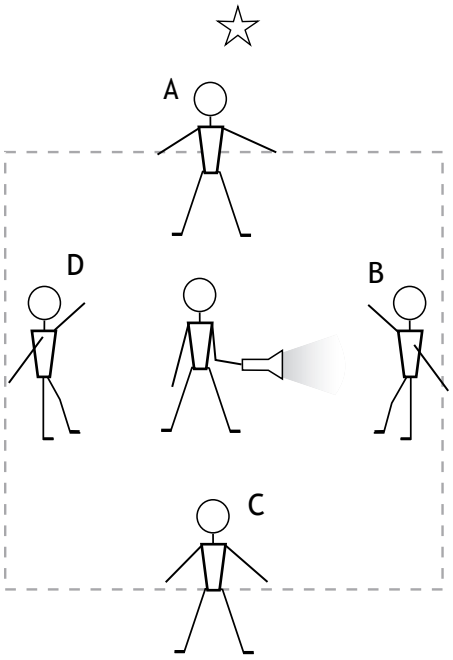
Modeling Sunlight on Earth

In this activity, you will work in groups of six to model the way sunlight strikes Earth during different times of the year.

Materials
1 flashlight
1 globe
4 sets of sticker dots (about a dozen dots per set, each set a different color)



Procedure

1. Have one student represent the Sun by holding the flashlight at waist height. The light beam emitted by the flashlight represents the most direct rays of sunlight.
2. Have four students represent four locations in Earth's orbit by forming a square, facing inward, around the student with the flashlight. One of the four students should stand with his or her back to the North Star. (The teacher will designate a place for the North Star).
3. Designate the four students "A," "B," "C," and "D." "A" is the student with his or her back to the North Star. "B" is to the right of "A," and so on.
4. The sixth student in the group acts as the recorder. One set of colored dots should be assigned to each orbit location: A, B, C, and D.
5. Have "A" hold the globe, waist-high, with the North Pole pointed towards the North Star, representing Earth's tilt.
6. Shine the flashlight toward the globe. Keeping the axis pointed toward the North Star, "A" should be able to spin the globe in place. As "A" rotates the globe on its axis to represent one day, the recorder should mark the top and bottom of the brightest band of light (using the assigned colored dots) around the globe. This is the latitude range of the most direct sunlight.
7. Repeat steps 5 and 6 for the remaining three locations of Earth's orbit, using the other three sets of colored dots.
8. Fill in the second and third columns of the data table below: dot color and latitude range.

9. Complete the third column: season in the Northern Hemisphere.

Orbit Location	Dot Color	Latitude Range	Season in Northern Hemisphere (spring, summer, autumn, winter)
A			
B			
C			
D			

Questions

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. How does the range of latitudes for the brightest light shift throughout Earth's orbit?

4. What can be said about surface heating and the length of daylight for different locations on Earth at different points in its orbit? Discuss and compare how sunlight (or lack of sunlight) might affect equatorial regions, North America, and polar regions.

5. If Earth were not tilted on its axis, how would your findings be different?