Follow the Sunlight

Model how sunlight changes during one orbit.

E.7.9C.1 "Construct models and diagrams to illustrate how the tilt of Earth's axis results in differences in intensity of sunlight on the Earth's hemispheres throughout the course of one full revolution around the Sun."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the first mention of each of the four orbit stops in the passage. Beside each underlined name, write N if the Northern Hemisphere gets more direct sunlight, S if the Southern Hemisphere does, or = if matching latitudes in both hemispheres get sunlight at similar angles.

A Globe's Trip Around a Lamp

1. Imagine placing a lamp at the center of a table and moving a small globe around it. The globe's axis, an imaginary line through both poles, is tilted about 23.5 degrees. Keep that axis pointing in the same direction as the globe travels. Light that strikes a surface more directly is packed into a smaller area, so it is more intense. Light that arrives at a slant spreads over a larger area. This difference, not a major change in Earth's distance from the Sun, helps explain the seasons.

2. Begin at the June solstice. The Northern Hemisphere tilts toward the Sun, so its sunlight is more direct than the Southern Hemisphere's. On a model, aim the north end of Earth's axis toward the lamp. About a quarter of an orbit later comes the September equinox. The axis still points in the same direction, but neither hemisphere tilts toward the Sun. At matching latitudes north and south of the equator, sunlight arrives at similar angles. A model should show similar-sized patches of light on matching surfaces in the two hemispheres.

3. After another quarter orbit comes the December solstice. Earth's axis still points the same way in space, but now the Southern Hemisphere tilts toward the Sun. Its light is more direct, while sunlight spreads over a larger area in the Northern Hemisphere. The March equinox follows about a quarter orbit later. Neither hemisphere tilts toward the Sun then, and matching latitudes receive light at similar angles again. One more quarter orbit returns Earth to the June solstice. A full orbit changes which hemisphere gets more direct sunlight without flipping Earth's axis.

2 ANSWER WITH EVIDENCE

Use the passage

1. In a model of the June solstice, which way should the north end of Earth's axis point relative to the Sun? Which hemisphere should have the smaller patch of sunlight?

2. Your model moves from the June solstice to the September equinox. How should the sunlight patches at matching northern and southern latitudes compare now?

3. In a model of the December solstice, which hemisphere should have the larger patch of sunlight? What should happen to the direction Earth's axis points in space?

4. How would you label the sunlight at matching latitudes in a model of the March equinox? Explain how that model differs from the December solstice model.

3 YOUR TURN

Your own words

In the box, draw the Sun and four Earth positions in this order: June solstice, September equinox, December solstice, March equinox. Draw Earth's axis pointing in the same direction at every stop, label which hemisphere gets more direct sunlight at each stop, and write one sentence explaining the pattern.

ANSWER KEY

Follow the Sunlight

GRADE 7 · E.7.9C.1

PART 1 · READ AND MARK

Underline the first mention of each of the four orbit stops in the passage. Beside each underlined name, write N if the Northern Hemisphere gets more direct sunlight, S if the Southern Hemisphere does, or = if matching latitudes in both hemispheres get sunlight at similar angles. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In a model of the June solstice, which way should the north end of Earth's axis point relative to the Sun? Which hemisphere should have the smaller patch of sunlight?	**The north end points toward the Sun. The Northern Hemisphere has the smaller patch because its light is more direct.**
2	Your model moves from the June solstice to the September equinox. How should the sunlight patches at matching northern and southern latitudes compare now?	**The patches should be similar in size because neither hemisphere tilts toward the Sun and light arrives at similar angles.**
3	In a model of the December solstice, which hemisphere should have the larger patch of sunlight? What should happen to the direction Earth's axis points in space?	**The Northern Hemisphere should have the larger patch. Earth's axis should keep pointing in the same direction in space.**
4	How would you label the sunlight at matching latitudes in a model of the March equinox? Explain how that model differs from the December solstice model.	**Label the sunlight similar in angle or intensity at matching latitudes. In December, the Southern Hemisphere gets more direct sunlight.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The drawing shows the Sun and four Earth positions labeled in the required order, with all four axes parallel. June is labeled north more direct; September and March are labeled similar at matching latitudes; December is labeled south more direct. Sentence: As Earth orbits the Sun, its axis keeps pointing in the same direction, changing which hemisphere tilts toward the Sun.

Accept any clear four-position layout if the stops are in order and the axes remain parallel. At the equinoxes, accept labels such as neither hemisphere or similar sunlight at matching latitudes.