

Sunlight Season Loop

Trace how Earth's tilt shapes a year.

S6E2.c "Analyze and interpret data to relate the tilt of the Earth to the distribution of sunlight throughout the year and its effect on seasons."

NAME _____

DATE _____

1 LABEL THE MODEL _____ Word bank below

Write one process from the word bank in each numbered arrow box. Follow the arrows around the cycle from stage to stage. This is a simplified cause-and-season loop, not four equal time intervals. Earth's axis stays tilted in the same direction as Earth orbits; it does not tip back and forth. Use the data journal after the model.

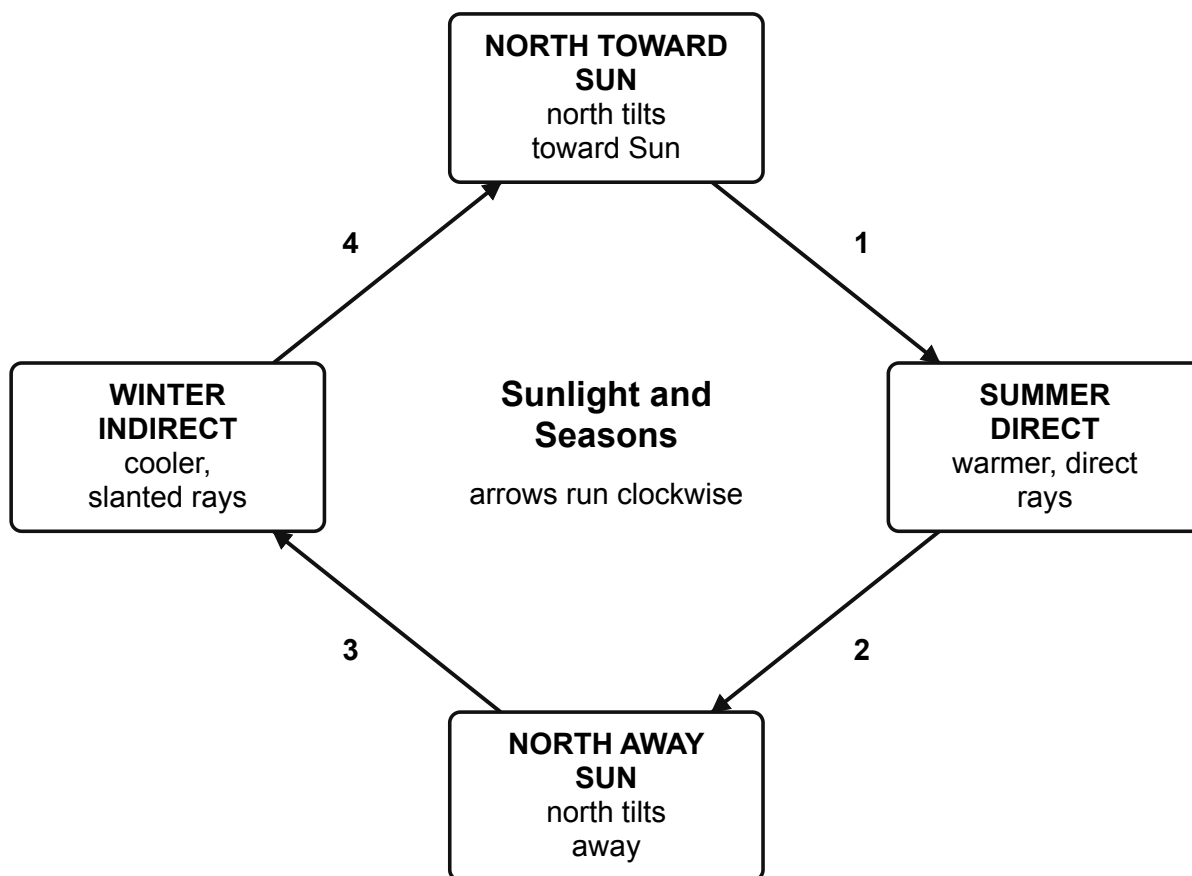
WORD BANK

Earth travels half its orbit

Earth travels next half orbit

Sunlight becomes less direct

Sunlight becomes more direct



Arrow numbers match the response boxes on the next student section.

Label the arrows

Use the word bank to write the process for each numbered arrow.

Arrow 1

Arrow 2

Arrow 3

Arrow 4

2 RUN THE MODEL _____ Use your finished diagram

1 Which process connects NORTH TOWARD SUN to SUMMER DIRECT?

2 How is the sunlight in SUMMER DIRECT different from the sunlight in WINTER INDIRECT?

3 What stage comes right after NORTH AWAY SUN?



CHECK IT

Before you turn it in

- ☐ I placed one process on each arrow.
- ☐ I traced the arrows in cycle order.
- ☐ I compared the Sun-angle data and connected tilt to sunlight and seasons.

TEST THE MODEL

What season or sunlight change does this model leave out?

Seasonal Sun-Angle Data

NAME _____ DATE _____

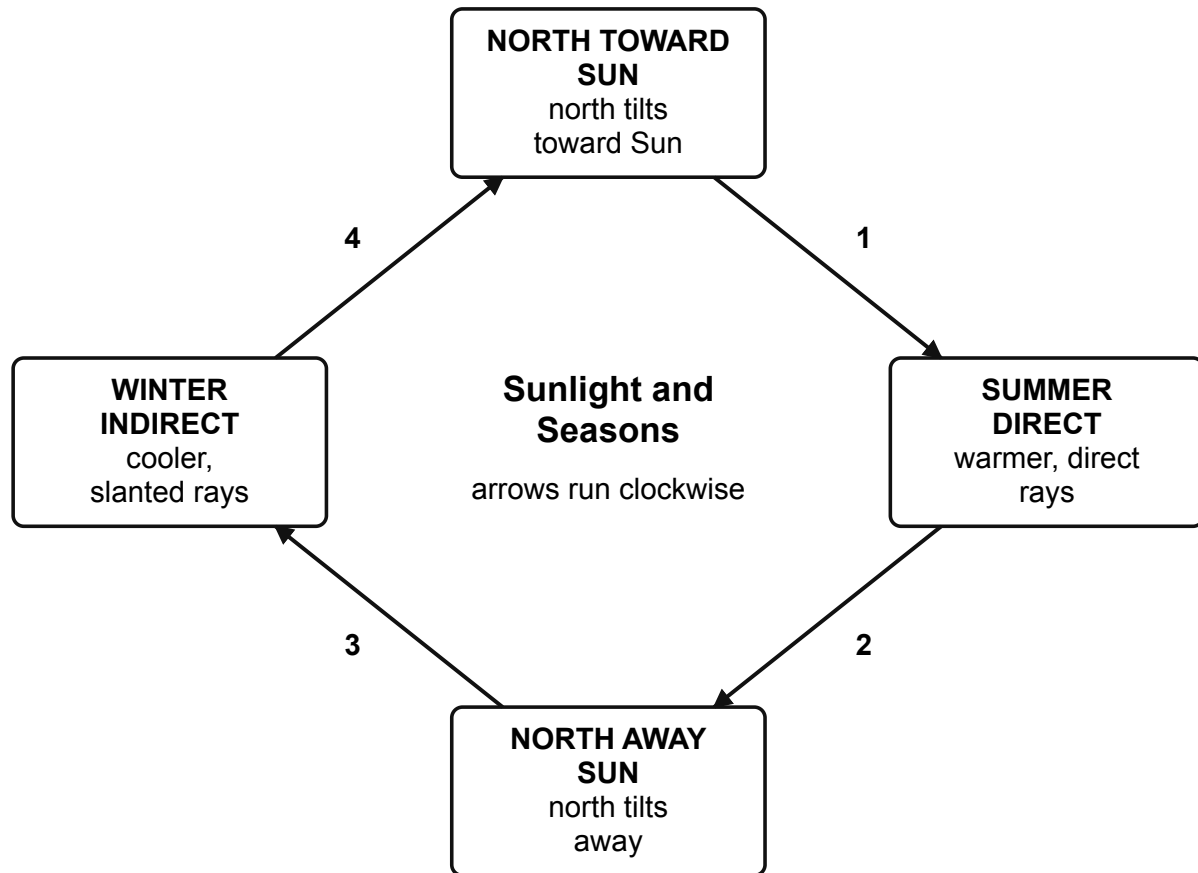
Ideal geometry model at 40° N latitude: Earth tilt 23.5°. At local solar noon, angle above the horizon = 90° minus the difference between latitude and the latitude receiving direct overhead sunlight. These are calculated model records, not today's measurements.

Data: March equinox 50°; June solstice 73.5°; December solstice 26.5°. Copy one date and angle per row. Compare June with December: calculate the difference, describe which rays are more direct, and explain how tilt changes solar energy received and northern seasons. In the last column write your evidence-based comparison/explanation across the rows.

Seasonal date	Noon Sun angle above horizon	Comparison and tilt explanation

Never look directly at the Sun. Higher noon Sun plus longer summer daylight increases energy received; clouds and other factors still affect a particular day's temperature.

PART 1 • COMPLETED MODEL

**Arrow 1**

Sunlight becomes more direct

Arrow 2

Earth travels half its orbit

Arrow 3

Sunlight becomes less direct

Arrow 4

Earth travels next half orbit

PART 2 • RUN THE MODEL

1. **Sunlight becomes more direct.** (Which process connects NORTH TOWARD SUN to SUMMER DIRECT?)
2. **Summer has more direct sunlight. Winter has less direct, more slanted sunlight.** (How is the sunlight in SUMMER DIRECT different from the sunlight in WINTER INDIRECT?)
3. **WINTER INDIRECT** (What stage comes right after NORTH AWAY SUN?)

TEST THE MODEL (SAMPLE ANSWERS)

- It leaves out spring and fall.
- It leaves out changes in the length of daylight.

The orbit arrows each represent about half of Earth's yearly trip around the Sun. The model simplifies the annual pattern by leaving out spring and fall. Data journal required: March 50° , June 73.5° , December 26.5° ; June–December= 47° . At 40°N , $90-(40-23.5)=73.5$, $90-40=50$, $90-(40+23.5)=26.5$. June's higher noon angle makes rays more direct on a horizontal surface and concentrates incoming energy; December's lower angle spreads it over more area. The fixed axial tilt relative to orbital position produces northern summer/winter, with longer summer daylight also contributing. Ask for two numerical records and the causal link, not only copying angles. Do not infer today's temperature from angle alone or suggest distance causes seasons. Model angles follow NASA EO Kids, All About that Tilt: Sun and Seasons; the teacher's calculations use 40°N rather than the source example 45°N . Existing four nodes and three keys are correct conceptual simplifications; the two half-orbit arrows show the changes between solstice conditions, while local tilt-to-sunlight arrows are causal, not additional elapsed half-orbits.