



Reason for the Seasons

Mission: Many adults think summer happens because Earth is closer to the Sun. The weather station wants you to test that idea. Move Earth around its orbit, turn the tilt on and off, and collect sunlight evidence for Indiana and Australia.

Big question: What causes Earth's seasons?

★ Warm-up: Fix the mistake

Each idea is a common mistake. Correct it.

"It is summer because Earth is closest to the Sun." ✓ **Earth is actually closest in January. Tilt causes seasons.**

"Everyone on Earth has summer in July." ✓ **Australia has winter in July.**

Key vocabulary

Axis tilt	Earth's axis leans 23.5°.
Direct sunlight	Light hitting at a high angle, concentrated on a small area.
Hemisphere	Half of Earth (northern or southern).
Solstice	The longest or shortest day of the year.

1 Box 1

Seasons data

Record Indiana's data (real tilt).

Month	Sun height (°)	Daylight (h)
June	from simulator	from simulator
September	from simulator	from simulator
December	from simulator	from simulator

2 Box 2

Spread-out sunlight

Look at the sunlight panel. Why is December sunlight weaker?

☐ The low Sun spreads the same light over a bigger area ☐ The Sun makes less light in winter ☐ Clouds block it

✓ **The low Sun spreads the same light over a bigger area**

3 Box 3

Check Australia

In the simulator: Set the month to **December** and compare Sydney.

In December, the Sun is high in Sydney but low in Indiana. What season is Sydney having?

☐ Summer ☐ Winter ☐ The same as Indiana

✓ **Summer**

4 Box 4

Remove the tilt

In the simulator: Choose **No tilt** and move through the months.

With no tilt, what happens to Indiana's Sun height and daylight across the year?

- ☐ They stay the same every month: no seasons ☐ Summer gets hotter ☐ Winter lasts all year

✓ **They stay the same every month: no seasons**

5 Box 5

Test the myth

Earth is actually closest to the Sun in early January. What does this tell you about the "distance" idea?

- ☐ Distance does not cause seasons; tilt does ☐ Winter should be hottest ☐ Earth doesn't orbit the Sun

✓ **Distance does not cause seasons; tilt does**

6 Box 6

Legend: equator 🏆 Legend only

Why do places near the equator have almost no seasons?

- ☐ The Sun is high all year there, and day length barely changes ☐ They are closer to the Sun
☐ The equator has no tilt

✓ **The Sun is high all year there, and day length barely changes**

7 Box 7

Correct the myth (CER)

What causes Earth's seasons?

Claim

Look for: Names the tilt; at least 6 words

Evidence

Look for: Compares to December; Uses Australia or the no-tilt test; a number from the simulator; at least 14 words

Reasoning

Look for: Explains direct sunlight; Explains day length; at least 12 words

Exit ticket: answer the big question in your own words

What causes Earth's seasons?

Look for: Seasons are caused by Earth's 23.5° tilt, not its distance from the Sun. When Indiana tilts toward the Sun (June), sunlight hits more directly (concentrated) and days are longer, so it is warmer. At the same time, Australia tilts away and has winter. With no tilt, there would be no seasons.

Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

Level	Code starts with
 Explorer	1RC-E
 Investigator	162-I
 Legend	8ZU-L

! Watch for these misconceptions

- "There is no gravity in space." Gravity reaches across space; astronauts float because they are falling around Earth.
- "Moon phases are caused by Earth's shadow." Only lunar eclipses involve Earth's shadow.
- "Summer happens when Earth is closest to the Sun." Earth is closest in January. Tilt causes seasons.