Standards: S6E1.d, S6E2.c

The Seasons

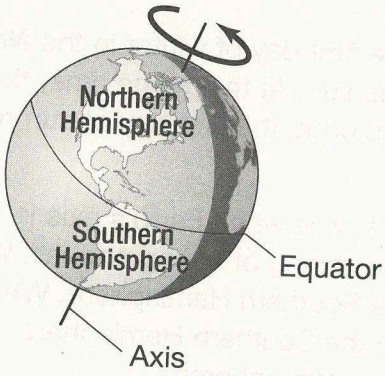
Key Word • hemisphere

Getting the Idea

In many places on Earth, one season follows the other. Spring follows winter. Summer follows spring. Fall follows summer. Winter follows fall. This cycle of the seasons continues from year to year. But what causes Earth's different seasons? In this lesson, you will learn how Earth's motion causes the change in Earth's seasons.

What Causes Earth's Seasons?

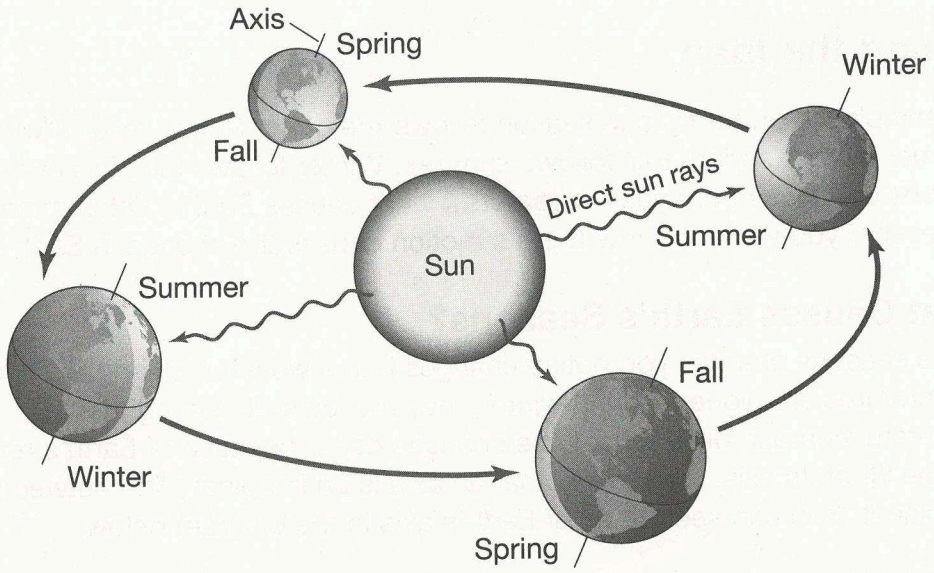
As the seasons change, you notice changes in the weather. During the summer, temperatures are higher. During winter, they are lower. In spring and fall, temperatures are in between. These changes occur because of Earth's revolution and the tilt of its axis. Remember that an axis is an imaginary line between the center of a planet. You can see the tilt of Earth's axis in the diagram below.



Earth can be divided into two halves, or **hemispheres**, by the equator. The half north of the equator is called the Northern Hemisphere. The half south of the equator is called the Southern Hemisphere. The seasons are not the same on all parts of Earth at the same time. When it is summer in the Northern Hemisphere, it is winter in the Southern Hemisphere.

The combined effects of Earth's orbit and the way that Earth tilts on its axis cause the seasons. As Earth revolves around the sun, it stays tilted on its axis. This means the sun's rays strike Earth unevenly—at different angles at different times of the year.

e diagram below shows the position of Earth at the start of each season. Find the position when the Northern Hemisphere tilts toward the sun. At that point in Earth's revolution, it is summer in the Northern Hemisphere. At that same time, the Southern Hemisphere tilts away from the sun. When it is the first day of summer in the Northern Hemisphere, it is the first day of winter in the Southern Hemisphere. The hemisphere of Earth that tilts toward the sun has summer, while the hemisphere that tilts away from the sun has winter.



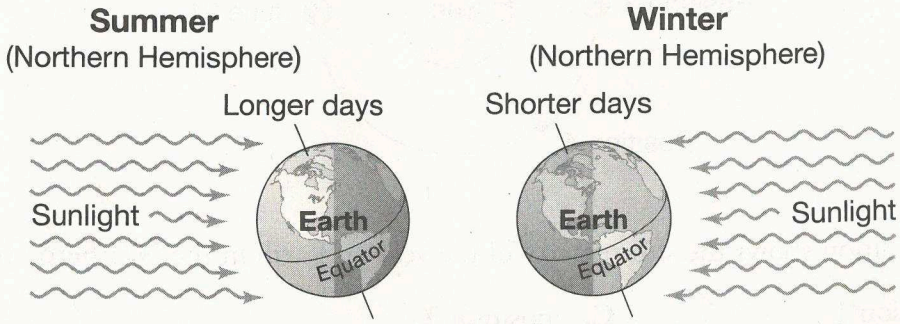
Now locate the position for the first day of winter in the Northern Hemisphere. The Northern Hemisphere tilts away from the sun. At that same time, the Southern Hemisphere tilts toward the sun. At this point in Earth's orbit, the first day of summer has arrived in the Southern Hemisphere.

There are two points in Earth's orbit when Earth's axis is not tilted toward or away from the sun. These points mark the beginning of spring and fall. When spring comes to the Northern Hemisphere, fall comes to the Southern Hemisphere. When fall comes to the Northern Hemisphere, spring comes to the Southern Hemisphere. The seasons are always opposite in Earth's Northern and Southern Hemispheres.

Temperature Differences

How does Earth's tilt cause the difference in temperatures from one season to the next? It affects the angle of the sun's rays striking Earth. Think of a hot summer day when the sun shines down on you from straight overhead. The sun's rays are direct, and they make you feel hot. The sun's rays deliver the most energy when they are direct. When the sun is lower in the sky, sunlight is less direct. When it is winter in an area, the area gets less energy from the sun.

The amount of daylight also changes with the seasons. This has an effect on the temperatures of the seasons. In summer, there are more hours of daylight than there are in winter. So the sun heats Earth's surface for a longer amount of time each day. In winter, there are fewer hours of daylight. As a result, temperatures are lower in winter. In the Northern Hemisphere, the period of daylight gets longer every day from December 21 to June 21. Then the period of daylight gets shorter from June 21 to December 21.



Many parts of Earth do not have four distinct seasons. For example, the areas near Earth's equator never tilt very much toward or away from the sun. These areas get direct sunlight all year long. This is why temperatures near the equator stay hot throughout the year. The north and south poles, even when they tilt toward the sun, get less direct sunlight than areas farther from the poles. So, even in summer, it is still cold at the poles.

Discussion Question

Explain why when it is summer or winter in the Northern Hemisphere, it is the opposite season in the Southern Hemisphere.

The Seasons

1. What part of Earth has little or no change in temperature from season to season?

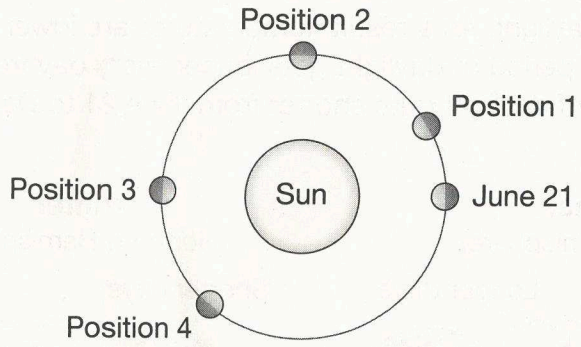
   A. the part near the equator

   B. the part near Earth's poles

   C. the Northern Hemisphere

   D. the Southern Hemisphere

The diagram below shows different positions of Earth during its revolution around the sun. Use the diagram to answer questions 2 and 3.



2. Which position shows the shortest day of the year on Earth in the Northern Hemisphere?

   A. position 1 **C.** position 3

   B. position 2 **D.** position 4

3. Which season is it in the Southern Hemisphere at position 1?

   A. spring **C.** fall

   B. summer **D.** winter

4. Why is it warmer in summer than in winter in Georgia?

   A. because Georgia is closer to the sun in summer than in winter

   B. because the ocean is warmer in the summer than in winter

   C. because Earth's tilt causes Earth to revolve more slowly in summer

   D. because Earth's tilt makes Georgia receive more direct sunlight in summer

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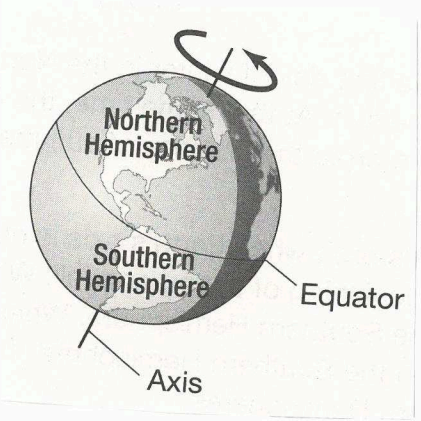
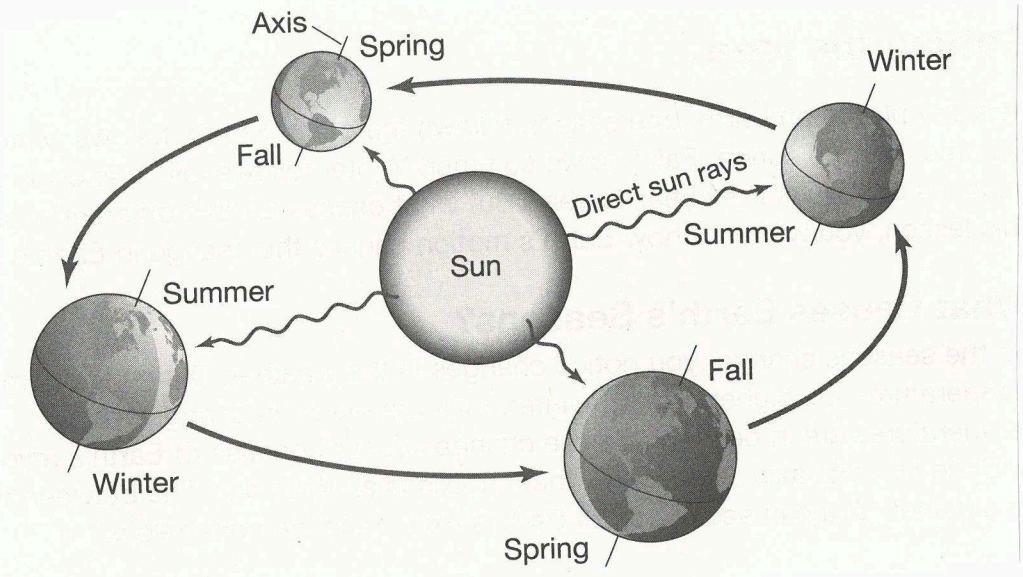
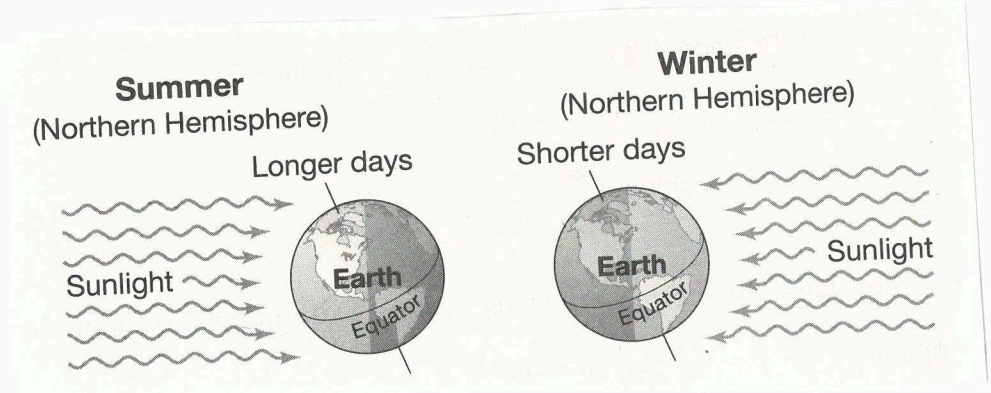

Northern Hemisphere
Southern Hemisphere
Equator
Axis


Axis
Spring
Winter
Fall
Direct sun rays
Summer
Sun
Summer
Fall
Winter
Spring


Summer
(Northern Hemisphere)
Longer days
Sunlight
Earth
Equator
Winter
(Northern Hemisphere)
Shorter days
Earth
Equator
Sunlight