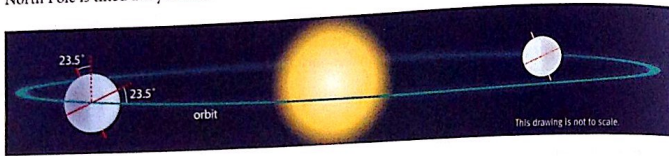


Tilt-a-Whirl

What conditions are affected by the tilt of Earth's axis?

Earth's axis is tilted at 23.5°. Earth's axis always points toward the North Star as Earth revolves around the sun. Thus, during each revolution, the North Pole may be tilted toward the sun or away from the sun, as seen below. When the North Pole is tilted toward the sun, the Northern Hemisphere (HEHM•ih•sfeer) has longer periods of daylight than does the Southern Hemisphere. When the North Pole is tilted away from the sun, the opposite is true.

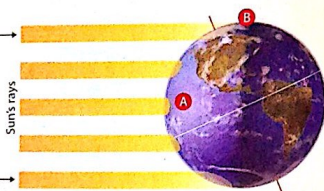
The direction of tilt of Earth's axis remains the same throughout Earth's orbit around the sun.



Temperature

The angle at which the sun's rays strike each part of Earth's surface changes as Earth moves in its orbit. When the North Pole is tilted toward the sun, the sun's rays strike the Northern Hemisphere more directly. Thus, the region receives a higher concentration of solar energy and is warmer. When the North Pole is tilted away from the sun, the sun's rays strike the Northern Hemisphere less directly. When the sunlight is less direct, the solar energy is less concentrated and the region is cooler.

The spherical shape of Earth also affects how the sun warms up an area. Temperatures are high at point A in the diagram. This is because the sun's rays hit Earth's surface at a right angle and are focused in a small area. Toward the poles, the sun's rays hit Earth's surface at a lesser angle. Therefore, the rays are spread out over a larger area and the temperatures are cooler.



Visualize It!

8 Apply Which location on the illustration of Earth below receives more direct rays from the sun?

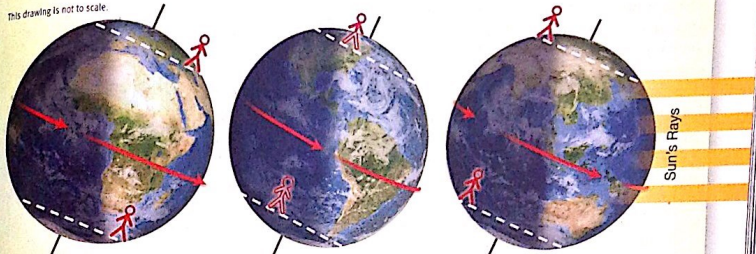
- A
- B
- They receive equal amounts.

9 Identify Which location is cooler?

Daylight Hours

All locations on Earth experience an average of 12 hours of light a day. However, the actual number of daylight hours on any given day of the year varies with location. Areas around Earth's equator receive about 12 hours of light a day. Areas on Earth's surface that are tilted toward the sun have longer days. This is because these areas travel a longer path through the lit part of Earth than areas at the equator. Areas on Earth's surface that are tilted away from the sun have shorter than 12-hour days. This is because these areas travel a shorter path through the lit part of Earth, as shown below.

This drawing is not to scale.



During summer in the Northern Hemisphere, a person has already had many daylight hours by the time a person in the Southern Hemisphere reaches daylight.

About 6 hours later, both people are on the other side of Earth. The person in the Northern Hemisphere is still in daylight, while the person in the Southern Hemisphere is already in darkness.

And 6 hours after that, the person in the Northern Hemisphere is close to daylight again, while the person in the Southern Hemisphere still has many hours of darkness left.

Midnight Sun

In summer in the Northern Hemisphere, daylight length increases as you move north of the equator. Areas north of the Arctic Circle receive 24 hours of daylight, called the "midnight sun," for many days in summer, as seen in the photo. At the same time, areas south of the Antarctic Circle receive 24 hours of darkness, or "polar night." In winter in the Northern Hemisphere, the polar areas experience the other condition.

This composite image shows that the sun never sets on this Arctic summer day.

Visualize It! Inquiry

10 Synthesize Why isn't the area in the photo very warm even though the sun is up all night long?

