8. Climate

8. Describe how the tilt of Earth's axis helps determine the climate of a region near the equator, near the poles, and across the area in between.

Recall that weather is the condition of the atmosphere over a particular area for a short time. Climate is the average of the weather over a region for a longer time, such as 30 years or more. The word climate comes from the Greek word klima, meaning "angle." This name was used because the angle at which the sun strikes Earth largely determines the climate. At the equator, the sun is nearly straight overhead most of the year, so most of the equatorial region is hot. In the polar regions, the opposite is true. Poleward from the equator, the climate gradually shifts from hot to cold. In between are what we call the temperate zones.

While most of the United States is in the temperate zones, Hawaii is in the tropics and Alaska is in the polar and subpolar regions.



We have seasons because Earth's axis is tilted relative to the plane of its orbit around the sun. This tilt (about 23.5 degrees from the perpendicular) remains the same all year as seen from deep space (top) but changes relative to the sun (bottom). At the summer solstice (the first day of summer, bottom left), the North Pole tilts toward the sun, and the sun reaches its northernmost point in the sky. This is the longest day of the year in the Northern Hemisphere. The North Pole is in constant daylight, while the South Pole is in constant darkness. Everything is reversed at the winter solstice (the first day of winter, bottom, second from right). Ihe South Pole tilts toward the sun, and the Southern Hemisphere has long days and warm weather as the sun appears at its southernmost point in the sky. In between, during the autumnal equinox and spring equinox, sunshine is evenly distributed across both hemispheres.

In Peru at 10,000 feet to 15,000 feet above sea level, the sun can make it quite warm during the day, but at night it gets very cold.

Many other factors influence climate, of course. No definite rule can be made for a part of the world simply because it is a certain distance from the equator. Altitude affects climate, for example. Many high peaks are covered in snow all year, despite their location close to the equator.

Ocean currents and ocean temperature can make a major difference as well. England is as far north as part of the Canadian province of Newfoundland and Labrador, but the frequent west wind blowing across the relatively warm water of the North Atlantic Ocean moderates the winters in England so that they are warmer on average than those in New York City, which is significantly south of England. Climate information helps experts lay out airport runways and determine heating and cooling needs for houses, factories, or the shipment of goods.