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Motions of the Earth

Q: Briefly explain what effects are produced due to Rotation & Revolution of Earth (CSS-2017)

The Earth is constantly in motion, revolving around the Sun and rotating on its axis. These motions account for many of the phenomenon we see as normal occurrences: night and day, changing of the seasons, and different climates in different regions. With a globe ball properly mounted and rotating on its axis, the movements of the Earth around the Sun may be illustrated accurately.

Rotation

The Earth spins on its axis from West to East (counter-clockwise). It takes the Earth 23 hours, 56 minutes, and 4.09 seconds to complete one full turn. Day and night are produced by the rotation of the Earth. The speed of rotation at any point upon the equator is at the rate of approximately 1,038 miles per hour, decreasing to zero at the poles.

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Effects of Earth's Rotation

1. Temperature: As the Earth spins around, the sun is evenly shining on all parts of the earth. This creates an exact temperature on Earth at the same latitude. Other planets such as Venus that have the same rate of spin as its revolution. This makes it so that it is extremely hot on one side of Venus and very cold on the other side since the sun only shines on one side of the planet.

2. Coriolis Effect: The Coriolis Effect is responsible for the rotation of cyclones, wind, and currents because of this, winds rotate counter clockwise in the Northern Hemisphere and clockwise in the Southern hemisphere. If someone were to launch something into the atmosphere for say a rocket, the Earth might rotate and the rocket would land that many degrees in the direction earth rotated away from the primary target.

3. The Foucault pendulum: As the Earth turns, the pendulum that is suspended above the floor swings freely. Since the Earth is turning sand or dominos are put under the pendulum to track its progress. As the earth turns the floor moves beneath the pendulum eventually causing a domino to get knocked over or sand to get scraped in a new place. This proved the rotation of Earth and the Coriolis effect.

4. Night and Day: While it seems like the sky moves above you it's actually the Earth moving. As the Earth rotates the Sun Shines on all parts of the earth except for one of the poles. While Earth is moving the Sun will eventually stop shining on one part of it since the Earth is turned away. This is what makes night.

5. The direction of the sunrise and sunset: The Earth rotates counterclockwise, if viewed form the North Pole. The rotation causes us to see the Sun rise in the east and set in the west.

Revolution:

While the Earth is spinning on its axis, it is revolving around the Sun in a counter-clockwise direction. It takes the Earth one full year to complete one full revolution around the Sun. This path is known as the Earth's orbit. It is very near a circle. The mean distance of the Earth from the Sun is about 93 milling miles and the distance varies by 3 million miles, forming a slightly oval path.The revolution of the Earth around the Sun traverse a distance of 595 million miles in 365 days, 6 hours, 9 minutes and 9.5 seconds. This means a speed of 18 miles a second (or 66,000 miles per hour) while at the same time rotating once each twenty-four hours.

The Seasons

The seasons occur because the axis on which Earth turns is tilted with respect to the plane of Earth's orbit around the Sun. Earth's tilt causes the North Pole to be tilted toward the Sun for half of the year, and the South Pole to be tilted toward the Sun for the other half of the year. The hemisphere that is tilted toward the Sun has a longer day, receives more of the Sun's rays, and receives the Sun's rays more directly than the hemisphere tilted away from the Sun. When it is summer in the Northern Hemisphere, this hemisphere is tilted toward the Sun; this corresponds to winter in the Southern Hemisphere, when the Southern Hemisphere is tilted away from the Sun. If Earth's axis was not tilted, each night and day everywhere on Earth would always be 12 hours long and there would be no seasons. The axis of the planet Mars is also tilted with respect to the plane of Mars's orbit around the Sun, so Mars experiences seasons much like those of Earth

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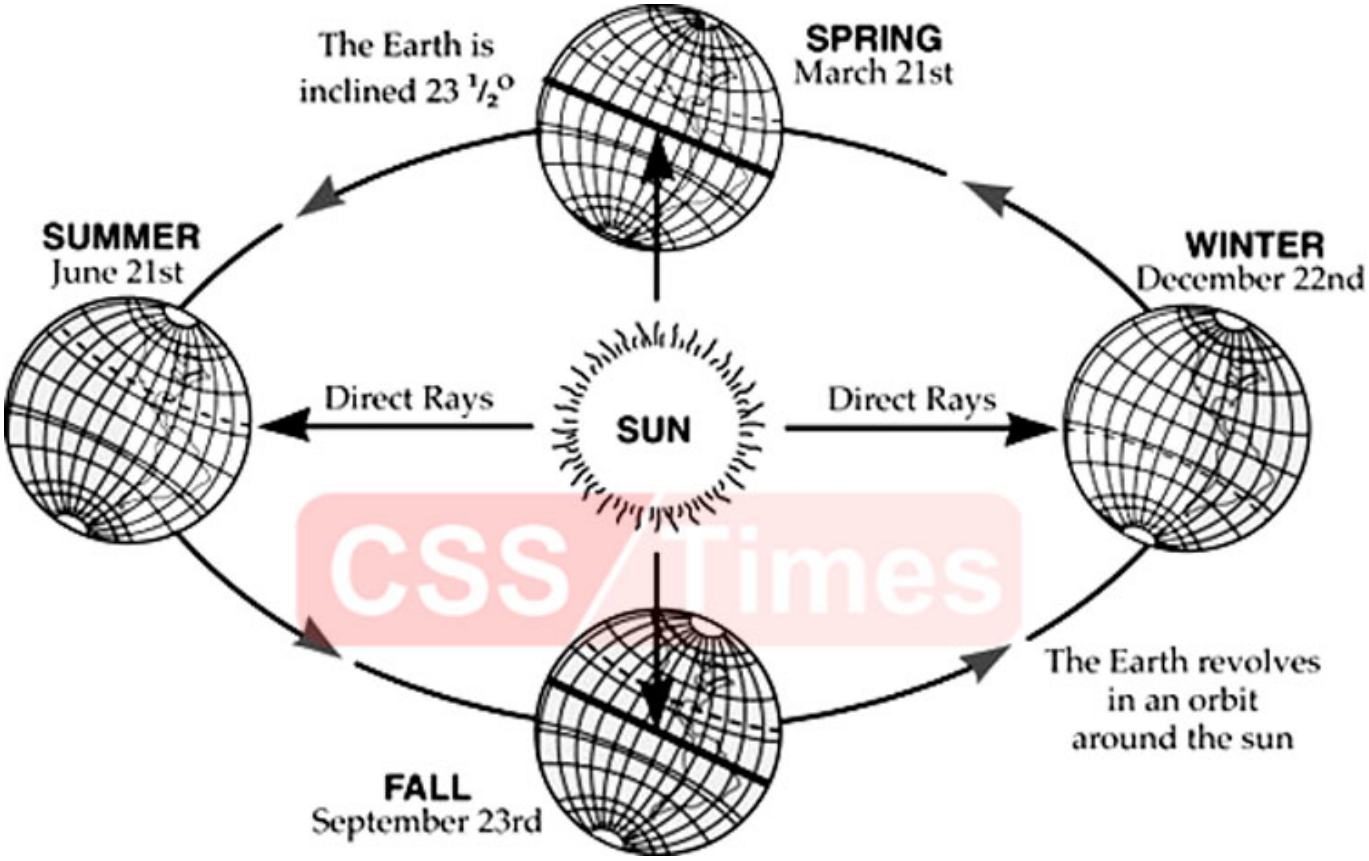

The seasons have an unequal number of days because Earth's orbit is slightly elliptical, or oval shaped, and the Sun is not exactly at the center of the orbit. Earth moves slightly faster when it is close to the Sun than when it is farther away, so the seasons that occur when Earth is close to the Sun pass more quickly. Earth is closest to the Sun in January and farthest away in July, so the summer is longer than the winter in the Northern Hemisphere. In the Southern Hemisphere, the winter is longer than the summer.

Solstices

At solstice , the day and night are of unequal length A solstice is an astronomical event that occurs twice each year as the Sun reaches its highest or lowest excursion relative to the celestial equator on the celestial sphere. Solstice is derived from two Latin words: "sol" meaning sun, and "sistere" to cause to stand still. The Sun is said to be at a solstice when the difference between the distances from each pole to the Sun is at its greatest. The solstices usually occur on December 21 or 22 and June 21 or 22. In December, the South Pole is tilted farther toward the Sun than it is at any other time of the year and the North Pole is tilted farther away from the Sun; the Southern Hemisphere has its summer solstice and the Northern Hemisphere has its winter solstice. In June, during the Southern Hemisphere's winter solstice and the Northern Hemisphere's summer solstice, the North

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Pole is at its most direct tilt toward the Sun, and the South Pole tilts away from the Sun. The hemisphere most tilted toward the Sun on the solstice experiences its longest day of sunlight and its shortest night. The other hemisphere experiences its shortest day of sunlight and its longest night.

Equinox

"Equinox" means "equal night" in Latin. But even if the name suggests it and it's widely accepted, it isn't entirely true that day and night are exactly the same on the equinox all over the world – only nearly.

In late March and late September both hemispheres are the same distance from the Sun and the Sun is said to be at an equinox. The Northern Hemisphere's vernal equinox usually occurs on March 20 or 21 and marks the beginning of spring. The Northern Hemisphere's autumnal equinox usually occurs on September 22 or 23 and marks the beginning of autumn.

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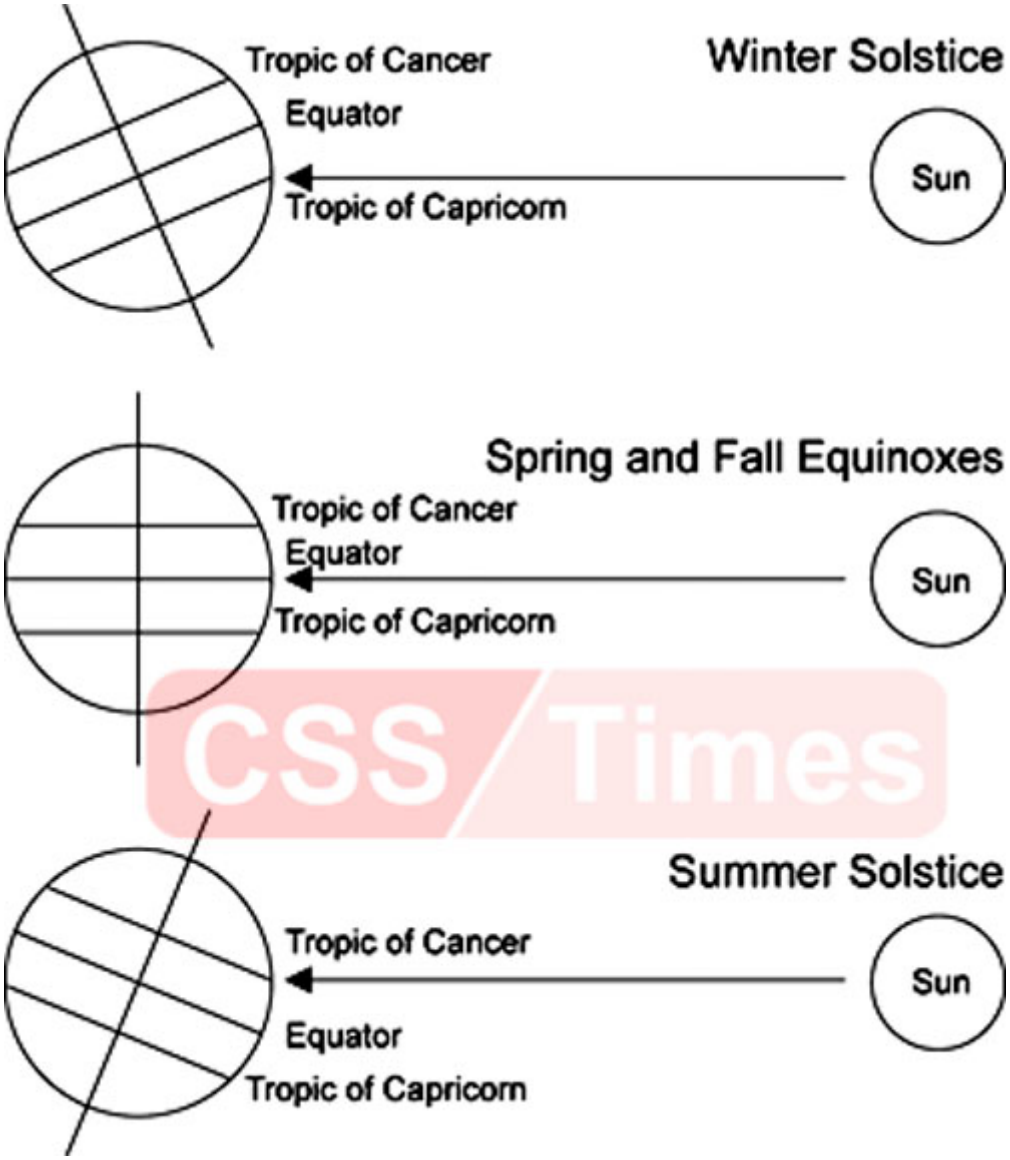

In the Southern Hemisphere, the vernal equinox occurs in September and the autumnal equinox occurs in March. At the equinoxes, the Sun appears to be directly over Earth's equator. The lengths of day and night are then equal over almost all Earth, except at the poles. At the North Pole and South Pole, Earth's atmosphere bends the Sun's rays enough to make the Sun visible throughout the day and night, even during the 12 hours the Sun is below the horizon.

The changes in temperature and in the length of daylight that accompany the seasons differ greatly at different latitudes. At the poles, summer is three months of daylight and winter is three months of darkness. Near the equator, however, days and nights remain about 12 hours long throughout the year. The Arctic and Antarctic circles, at latitude 66°30' north and 66°30' south respectively, mark the farthest points from the poles at which there can be

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24 hours of daylight or 24 hours of darkness. Midway between the poles and the equator, the length of daylight varies from about 8 hours in winter to about 16 hours in summer.

The Length of day and Temperature

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Difference *between* Rotation of Earth *and* Revolution of Earth

Rotation	Revolution
Rotation means “to spin.” This is the cause of day and night. Earth rotates on its axis (an imaginary line running through the center of the Earth from the North Pole to the South Pole)	Revolution means “to go around something.” This is the cause of four seasons. A synonym for revolution is orbit. (*revolution = orbit*)
The Earth rotates counterclockwise	The Earth revolves (*goes around*) the sun counterclockwise.
Earth completes 1 rotation (spin) every 24 hours..	It takes Earth 365 days (or 1 year) to make one complete revolution around the sun.
Day and night are caused by Earth’s rotation (spin) on its axis. When ½ of the Earth is facing the sun it is DAY. When ½ of the Earth is facing away from the sun it is NIGHT.	Earth’s seasons are caused by 1) Earth’s titled axis and 2) Earth’s revolution (orbit) around the sun. When the Northern Hemisphere is tilted toward the sun we have summer. When the Northern Hemisphere is titled away from the sun we have winter.

In brief: The basic difference between the two movements is the nature of the movement. The rotation means to circle around one’s own axis while the revolution means to circle around any other object. The second difference is the velocity of the objects. The velocity of the object which rotates can be different from the object that revolves. The revolution and rotation co-exist in space while they can also be seen differently. Their co-existence is the reason why we see our earth as stationary object. The rotation is the movement that covers lower distance than revolution. For example, earth completes its rotation in almost 30 days, while the same earth completes its revolution in 365 days.

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