Fall equinox levels the sunlight playing field all around the world

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Sunset over the southern part of the Atlantic Ocean. Photo taken from the International Space Station. Photo by: Johnson Space Center/NASA

September 22 marks the fall equinox. Bringing in the year's best season on a day where everyone on the globe receives the same exact amount of sunlight — 12 hours.

Many people who live north of the equator in the Northern Hemisphere start noticing the days get shorter right about now. In truth, this has been happening for months. It started on June 21. This is the longest day of the year also known as the summer solstice.

But for most of us, the speed at which daylight is dying is faster now than at any other time of the year.

Daylight hours are spread over a year from March to March. The number of daylight hours act like a curve on a graph. Daylight hours peak in the summer. The longest day of the year is on June 21. Daylight hours begin to diminish in the winter. They reach their lowest amount on the shortest day of the year, December 21.

Dark And Light Extremes

The amount of daylight a location has depends on its latitude — how far north it is. Likewise, the height and depth of the curve will correspond to that latitude. In places close to the equator, such as Quito, Ecuador, the curve essentially flattens out to a straight line. Days near the equator last roughly 12 hours all year long. Farther north in places such as Juneau, Alaska, the curve gets very high and low. That is because days are extremely long in the summer and extremely short in the winter.

Even further north — above the Arctic Circle, the curve gets blown out completely. In towns such as Barrow, Alaska, the sun never sets for part of the summer. While in the winter, the sun never rises for parts of it.

One cool thing to note is the lines all converge, or match up, around the two equinoxes. There is one in the fall and spring. They fall on September 22 and March 20. On those days, every place on earth gets the exact same amount of sunlight. NASA explains, "At an equinox, the Earth's terminator — the dividing line between day and night — becomes vertical and connects the north and south poles." To better imagine it, picture one-half of the Earth in shadow or night and one-half in light or daytime. On the equinox that dividing line is perfectly straight, whereas in between the equinoxes, the line tilts.

This shift happens because the Earth sits at a natural 23.5-degree tilt orbiting around the sun. This occurs in a flat plane as if it were a straight line. This means that for half the year the Northern Hemisphere located north of the equator tilts away from the sun causing colder weather. During the other half it is tilted toward the sun causing warmer weather.

No Seasons Without Axial Tilt

At this time of year, the daily change in the amount of daylight differs dramatically by latitude. On the equator, the rate of change is essentially zero. Places along the equator will have about 12 hours of sunlight today, and 12 hours of sunlight tomorrow, too. But as you trek north up the globe, that rate changes.

Miami, for instance, is losing about 1 1⁄2 minutes of daylight now, every single day; Washington's losing 2 1⁄2 minutes; where I live in Red Lake Falls, Minnesota, we're losing nearly 3 1⁄2 minutes of light each day.

As you get to the Arctic Circle, the loss in daylight becomes extreme. Barrow, Alaska, is losing nearly 10 minutes a day. In the now-abandoned settlement of Etah, Greenland, the daylight is dying at a rate of more than 15 minutes a day. In other words, winter is coming.

For the places south of the equator in the Southern Hemisphere, this trend is reversed — the further south you go from the equator, the longer the days are getting.

Again, this all goes back to axial tilt — without that 23.5-degree offset, we'd have no seasons. The weird thing about this tilt is that it changes slightly over 40,000-year periods, varying between 22.1 and 24.5 degrees. Our current tilt is somewhere in the middle of that range and headed toward the low end of it. Scientists believe this difference will result in less extreme differences in seasons — if we're still around to notice it.

Quiz

1 In the sections "Dark And Light Extremes" and "No Seasons Without Axial Tilt," the author explains that daylight hours in different places differ because of the tilt of the Earth.

Which city would show the fastest change in daylight hours as seasons change?

(A) Miami

(B) Red Lake Falls

(C) Quito

(D) Washington

2 Read the section "Dark And Light Extremes."

Select the sentence that explains WHY every place on Earth has 12 hours of sunlight on the fall equinox.

(A) The amount of daylight a location has depends on its latitude — how far north it is.

(B) On those days, every place on Earth gets the exact same amount of sunlight.

(C) This shift happens because the Earth sits at a natural 23.5-degree tilt orbiting around the sun.

(D) This means that for half the year the Northern Hemisphere located north of the equator tilts away from the sun causing colder weather.

3 Read the selection from the introduction [paragraphs 1-4].

> *The longest day of the year is on June 21. Daylight hours begin to diminish in the winter. They reach their lowest amount on the shortest day of the year, December 21.*

Which of the following words, if it replaced the word "diminish" in the sentence above, would CHANGE the meaning of the sentence?

(A) decrease

(B) lengthen

(C) dwindle

(D) lessen

4 Read the paragraph from the section "Dark And Light Extremes."

> *The amount of daylight a location has depends on its latitude — how far north it is. Likewise, the height and depth of the curve will correspond to that latitude. In places close to the equator, such as Quito, Ecuador, the curve essentially flattens out to a straight line. Days near the equator last roughly 12 hours all year long. Farther north in places such as Juneau, Alaska, the curve gets very high and low. That is because days are extremely long in the summer and extremely short in the winter.*

Which phrase from the paragraph helps you understand that there is a relationship between latitude and daylight hours?

(A) how far north it is

(B) correspond to

(C) flattens out

(D) last roughly