Study Questions for Earth-Sun Relations Animation (Pearson)

Link: <https://mediaplayer.pearsoncmg.com/assets/KYNa1ou7Im5RkQpxOkD5i6lG7iVAR6e2>

**I strongly recommend that you print this out and then have it front of you as you view the video that is referenced in the Unit 2 powerpoints (Earth Sun Relations). Some of these questions and/or ones like them will appear on Exam 1.**

Change of Seasons:

Change of daylength and angle of incoming sunlight are due to four characteristics of the earth in its position relative to the sun.

1. The earth orbits around the sun, completing one \_\_\_\_\_\_\_\_\_\_ each year. (one word only)
2. The earth spins on its axis, completing one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ each day. (one word only)
3. The earth’s axis is tilted \_\_\_\_\_\_\_\_ degrees to its orbital plane (sometimes referred to as the plane of the ecliptic).
4. The earth’s axis is always pointed the same direction in relation to the \_\_\_\_\_\_\_\_\_. (one word ending in an s) (in our era it is also currently pointed to Polaris, aka North Star.)

What is the “fundamental” cause of the change of the seasons, as demonstrated by the June and December Solstices?

For example - at the June Solstice, which latitude receives the completely vertical rays of the sun? (90 degree angle from the horizon – same thing as saying the sun is directly overhead)

For the December Solstice, which latitude receives the completely vertical (90 degree angle) rays of the sun? For the March Equinox, what latitude receives the completely vertical rays of the sun?

For the September Equinox, what latitude receives the completely vertical rays of the sun?

Something to think about related to the above question. If the sun is directly overhead (90 degrees) at the Equator, and you were standing just one degree north or south of the Equator, the sun would not be directly overhead, but almost. So the ***solar altitude*** there would be just one degree less than 90 degrees, making it \_\_\_\_\_ degrees above the horizon (fill in the blank with a two digit number).

Given what you just thought about in the previous question, what solar altitude would you observe if you were at 10 degrees North latitude on an Equinox (the time when the sun is directly overhead at the Equator)?

We have used an intuitive approach to get a start on how to calculate solar altitude (how many degrees the sun is above the horizon in the exact middle of the day): The basic approach is to figure out how many degrees of latitude separate the observer from the latitude where the sun is currently directly overhead. If the sun is directly overhead at the Equator, and you are say…five degrees of latitude north of the Equator, then you are five degrees away from where the sun is directly overhead. 90 – 5 = 85 degrees. So your observed solar altitude is \_\_\_ degrees! (yes the answer is eighty-five) We will come to this again shortly.

Length of day in Solstices and Equinoxes:

What is daylength everywhere on Earth on the March Equinox? \_\_\_\_\_ hours.

Note changes in the size of the area illuminated in the Arctic (north of Arctic Circle), as the year progresses:

between March Equinox and June Solstice: (increases or diminishes)

between June Solstice and September Equinox: (increases or diminishes)

Note changes in the size of the area of darkness in the Arctic (north of Arctic Circle), as the year progresses:

between September Equinox and December Solstice: (increases or diminishes)

between December Solstice and March Equinox: (increases or diminishes)

What is daylength everywhere on Earth on the September Equinox? \_\_\_\_\_ hours.

Of the two solstices and equinoxes, which one has the longest days in the Northern Hemisphere? (the half of the Earth “above” or north of the Equator)

Of the two solstices and equinoxes, which one features the longest days in the Southern Hemisphere?

Following the passage of the Earth through its September Equinox, on what date does the sun rise again at the North Pole? (December Solstice, March Equinox, June Solstice)

On what date does the sun set at the North Pole?

How long of a period, then, does the sun provide for 24 hour days at the North Pole? (express as approximate number of months)

On the flip side of the above question, on what day does the sun set at the South Pole?