# Think, Pair, Share

**Watch the video below and summarize the changes that occur and the cause of the changes.**

One Year in 40 seconds

# Essential Question: What are the reasons for the seasons?

**Standard:**

**S6E2c. Relate the tilt of the earth to the distribution of sunlight throughout the year and its effect on climate.**

# Important Vocabulary

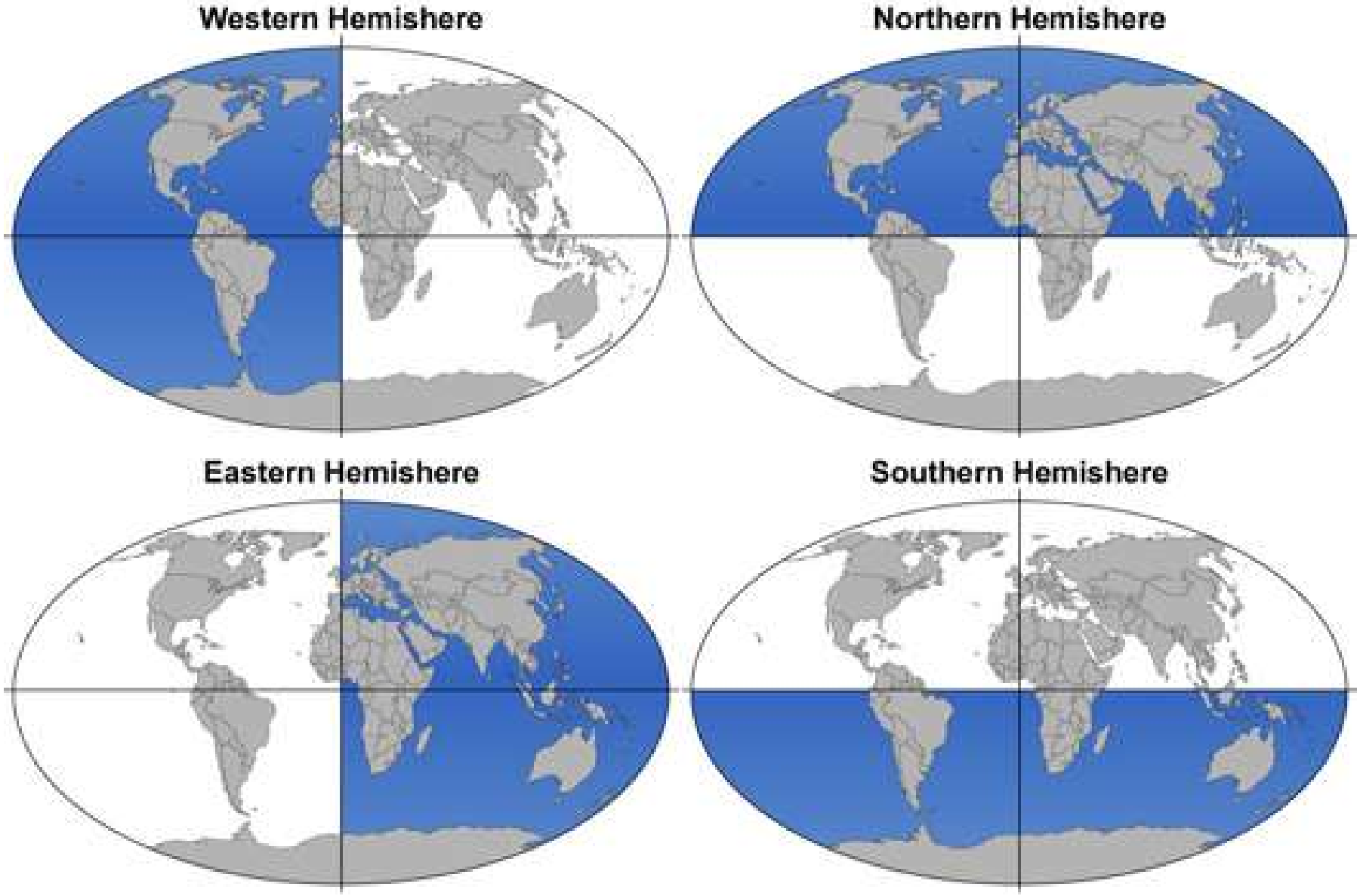
- The Earth's **Axis** is the imaginary vertical line around which the Earth spins
- The Earth **rotates** on its axis once every 24 hours causing day and night (**rotation**)
- The Earth **revolves** around the Sun once every year (**revolution**)
- The Earth follows a path around the Sun known as an **orbit**

http://www.britannica.com/EBchecked/topic/175962/Earth/images-videos/159380/earth-earths-rotation-on-its-axis-and-its-revolution-around-the-sun

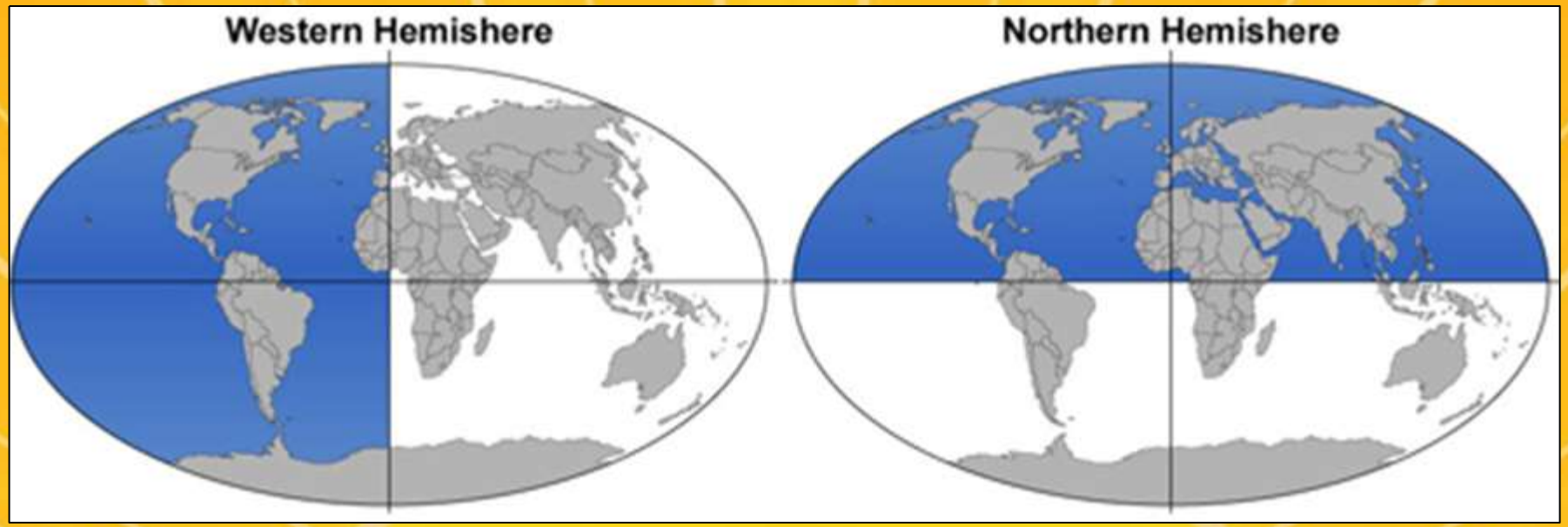
Turn to a partner and use each of the following words in a sentence: Rotation, Revolution, Axis, and Orbit

# Important Vocabulary

- A hemisphere is a half of the Earth
- The Earth can be divided into four hemispheres: Eastern Hemisphere, Western Hemisphere, Northern Hemisphere, and Southern Hemisphere


Western Hemishere
Northern Hemishere
Eastern Hemishere
Southern Hemishere

# Turn to a partner and identify the two hemispheres in which we live.



# Show what you already know…

- The Earth's ___rotation___ on its ___axis___ causes day and night.
- The Earth's ___revolution___ on its ___orbit___ around the ___Sun___ takes a year.
- The Earth can be divided into ___hemispheres___ or halves. I live in the ___Western & Northern___

# What are Seasons?

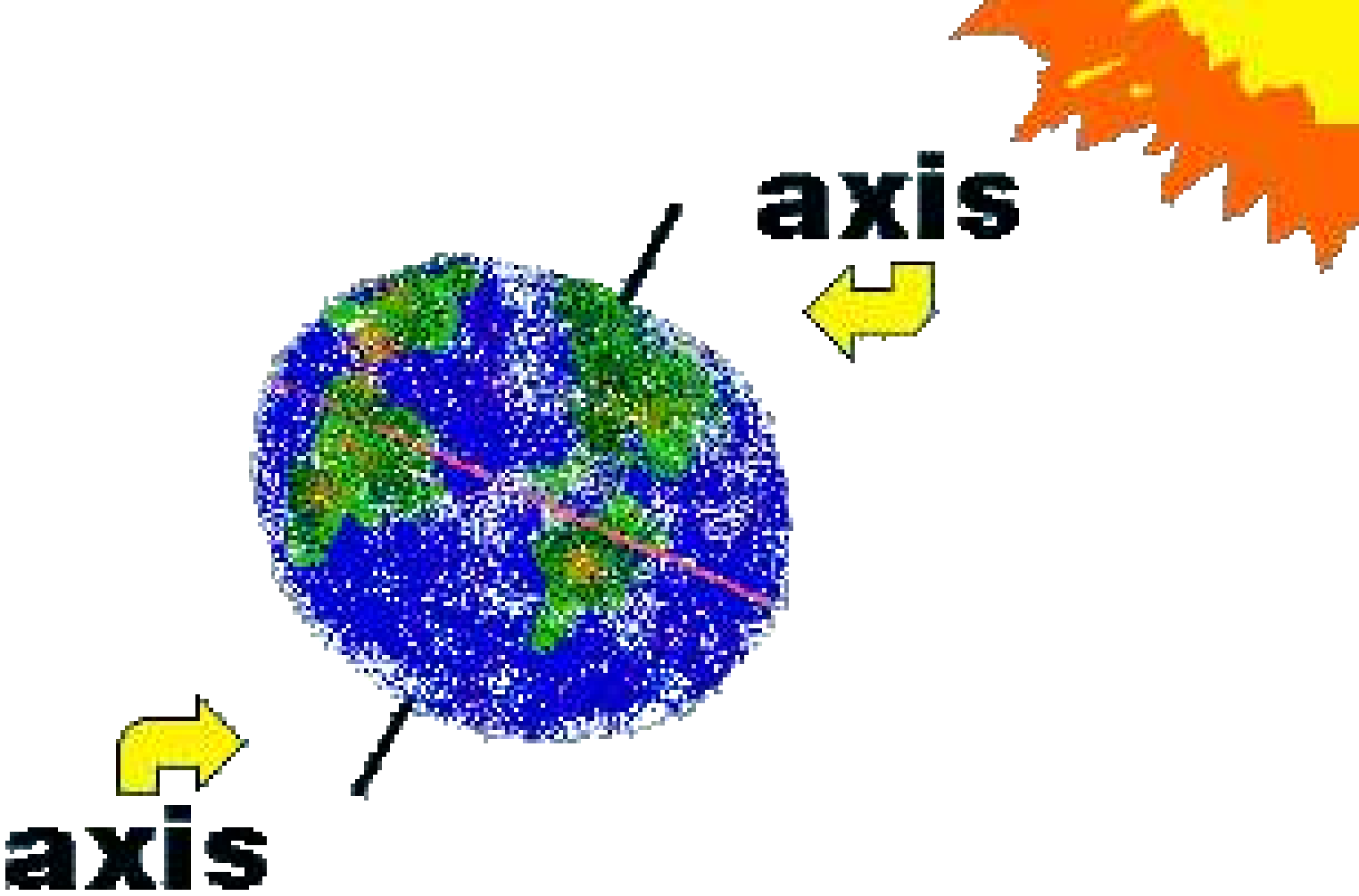
Seasons are short periods of climate change caused by changes in the amount of solar radiation (sunlight) an area receives.

# Four Main Seasons

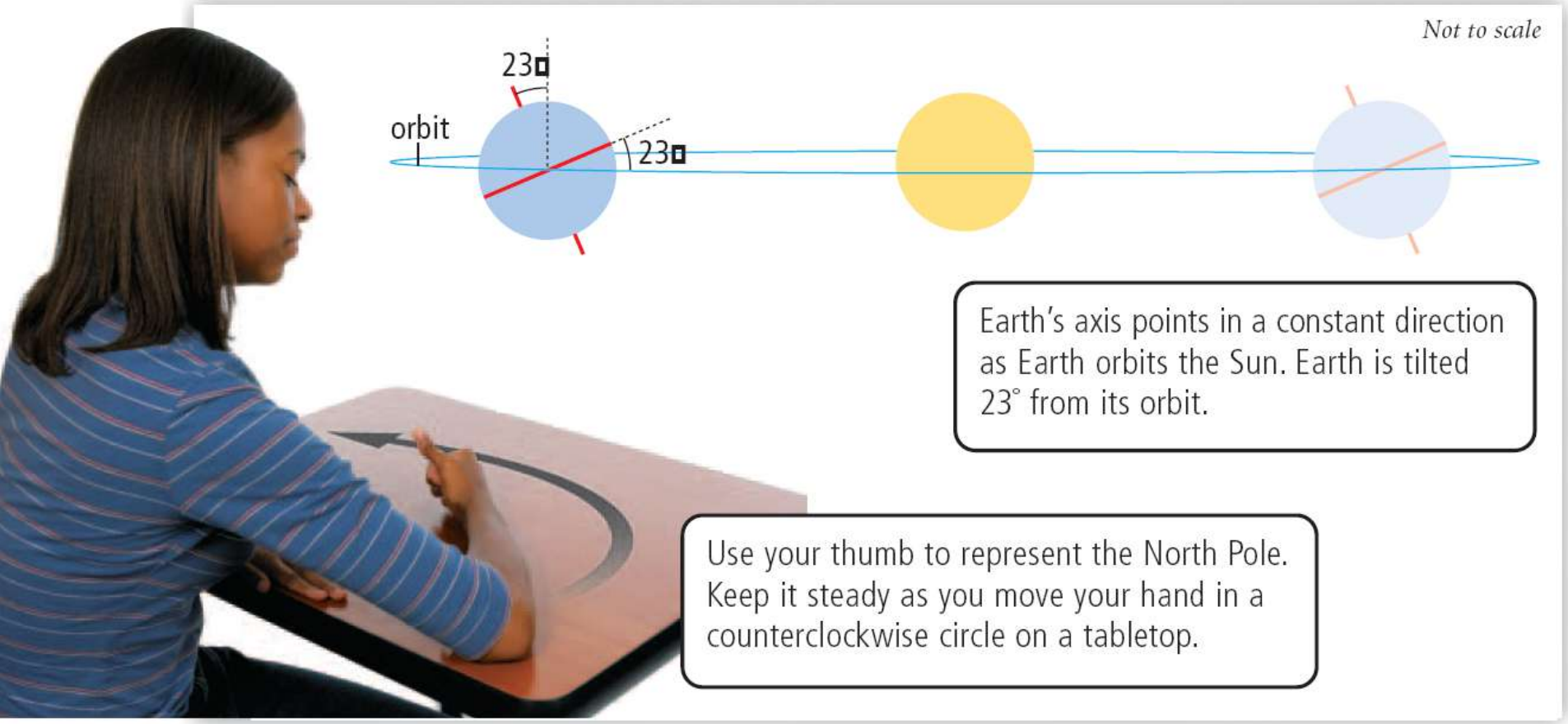
# What is your favorite season and why?

# Reasons for the Seasons

It is the tilt of the Earth and its revolution around the Sun that causes seasons

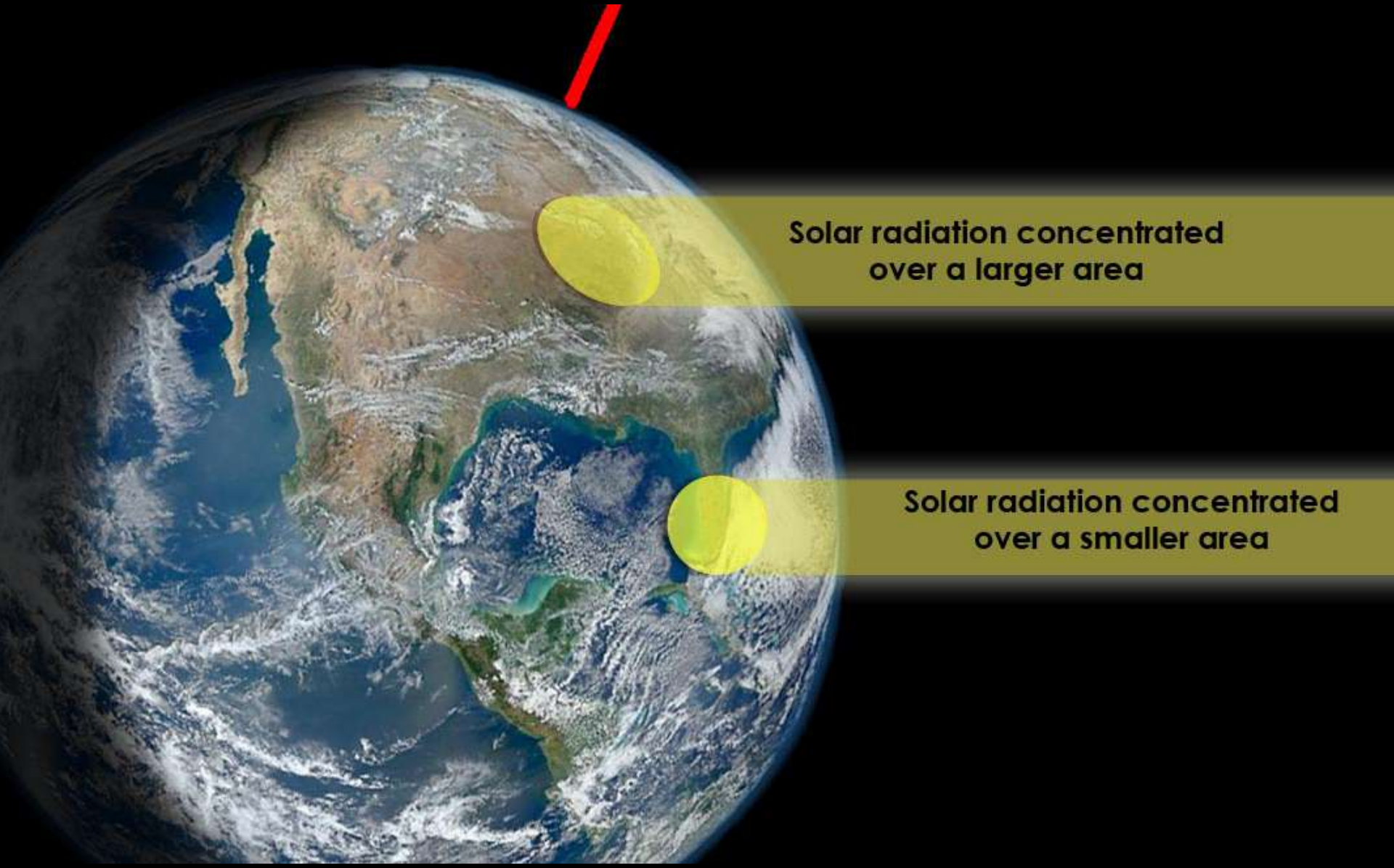


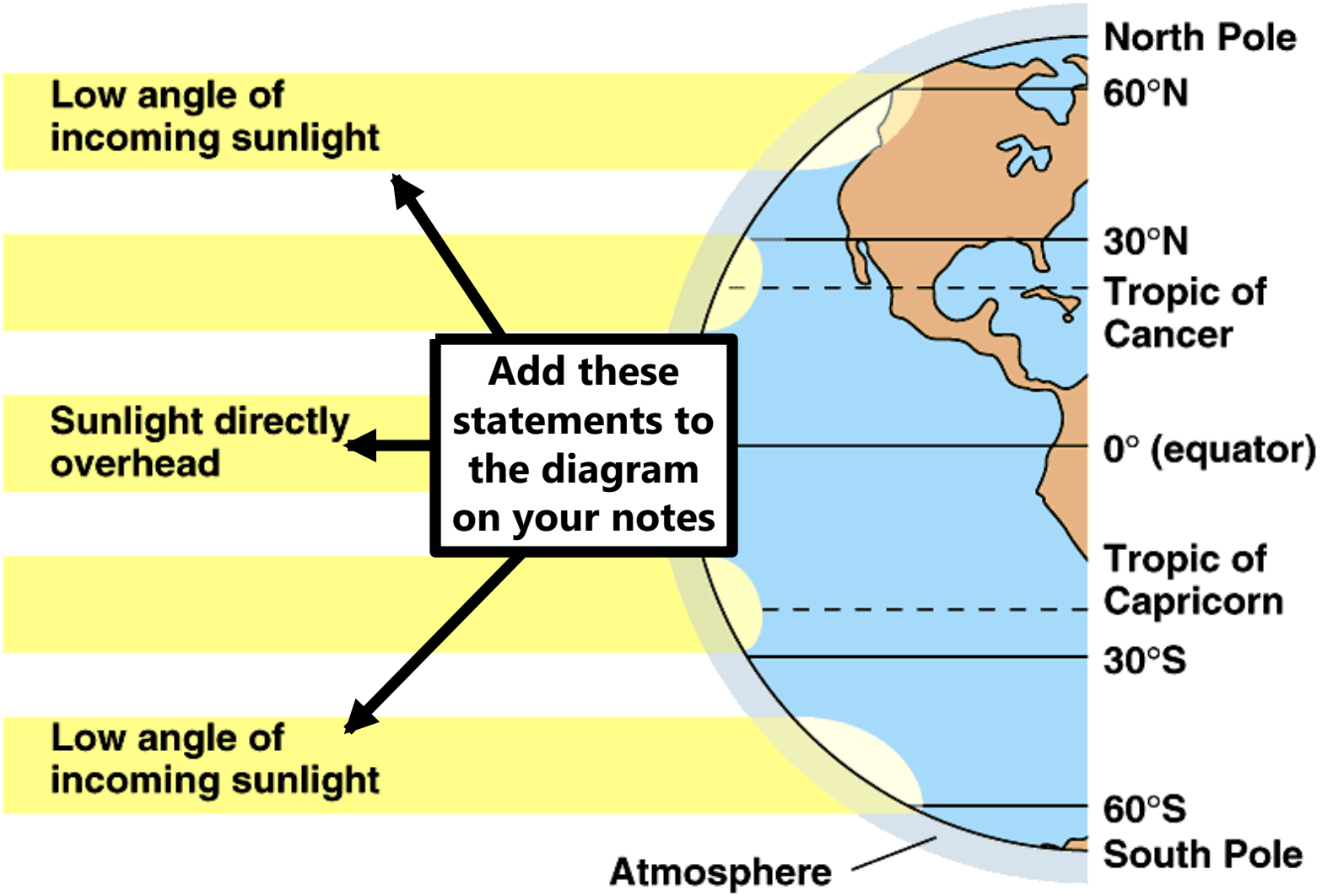

# The Earth's axis is tilted 23.5°


Not to scale
23°
orbit
23°
Earth's axis points in a constant direction as Earth orbits the Sun. Earth is tilted 23° from its orbit.
Use your thumb to represent the North Pole. Keep it steady as you move your hand in a counterclockwise circle on a tabletop.

# Reasons for the Seasons

The Earth's tilt also causes the Sun's radiation to strike the hemispheres at different angles.


Solar radiation concentrated
over a larger area
Solar radiation concentrated
over a smaller area

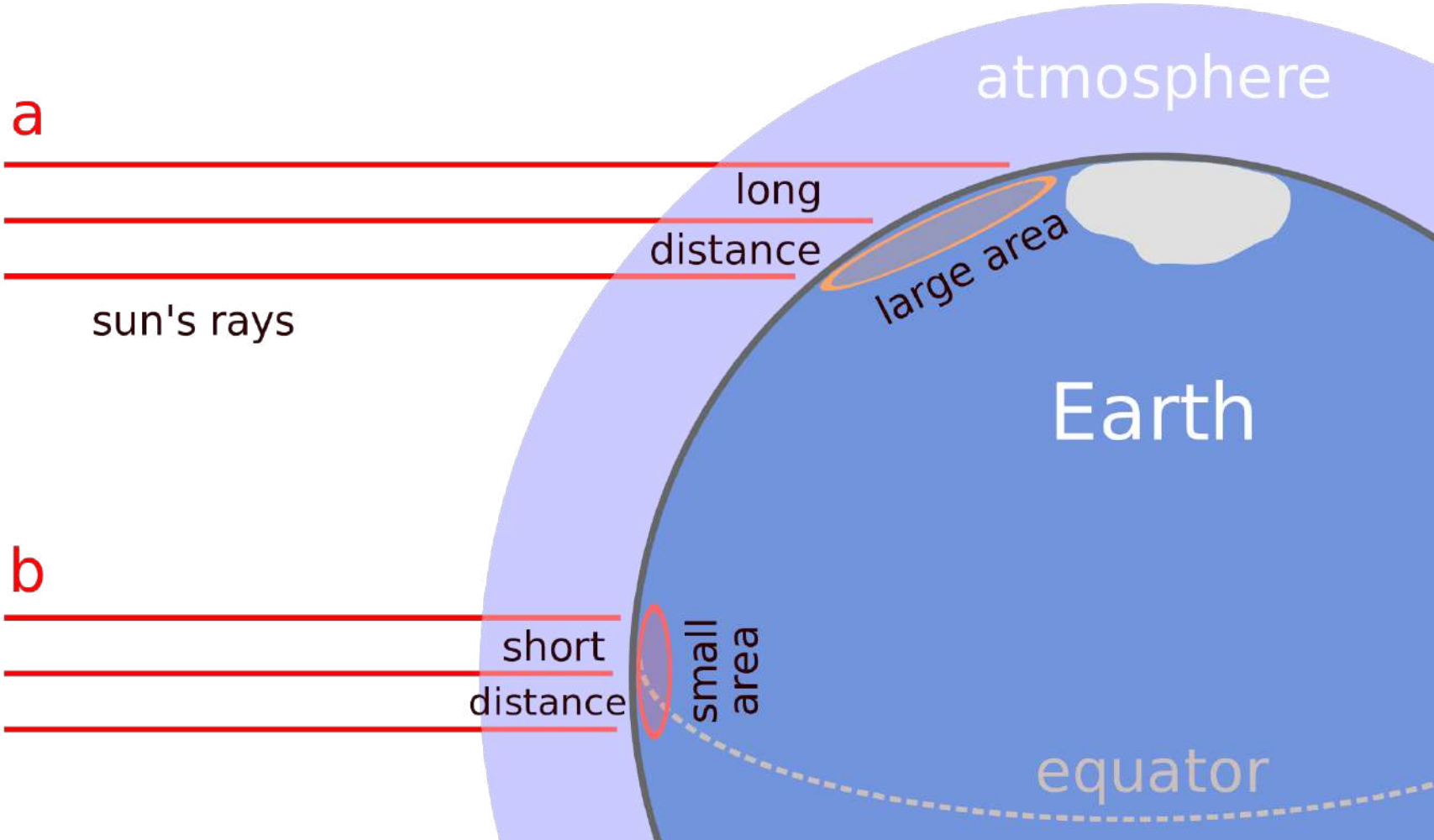



**Areas at a higher angle (closer to 90°) receive more total solar radiation (sun rays) than areas where sunlight strikes at a lower angle.**

# Activity demonstrating angle of sunlight on Earth's surface

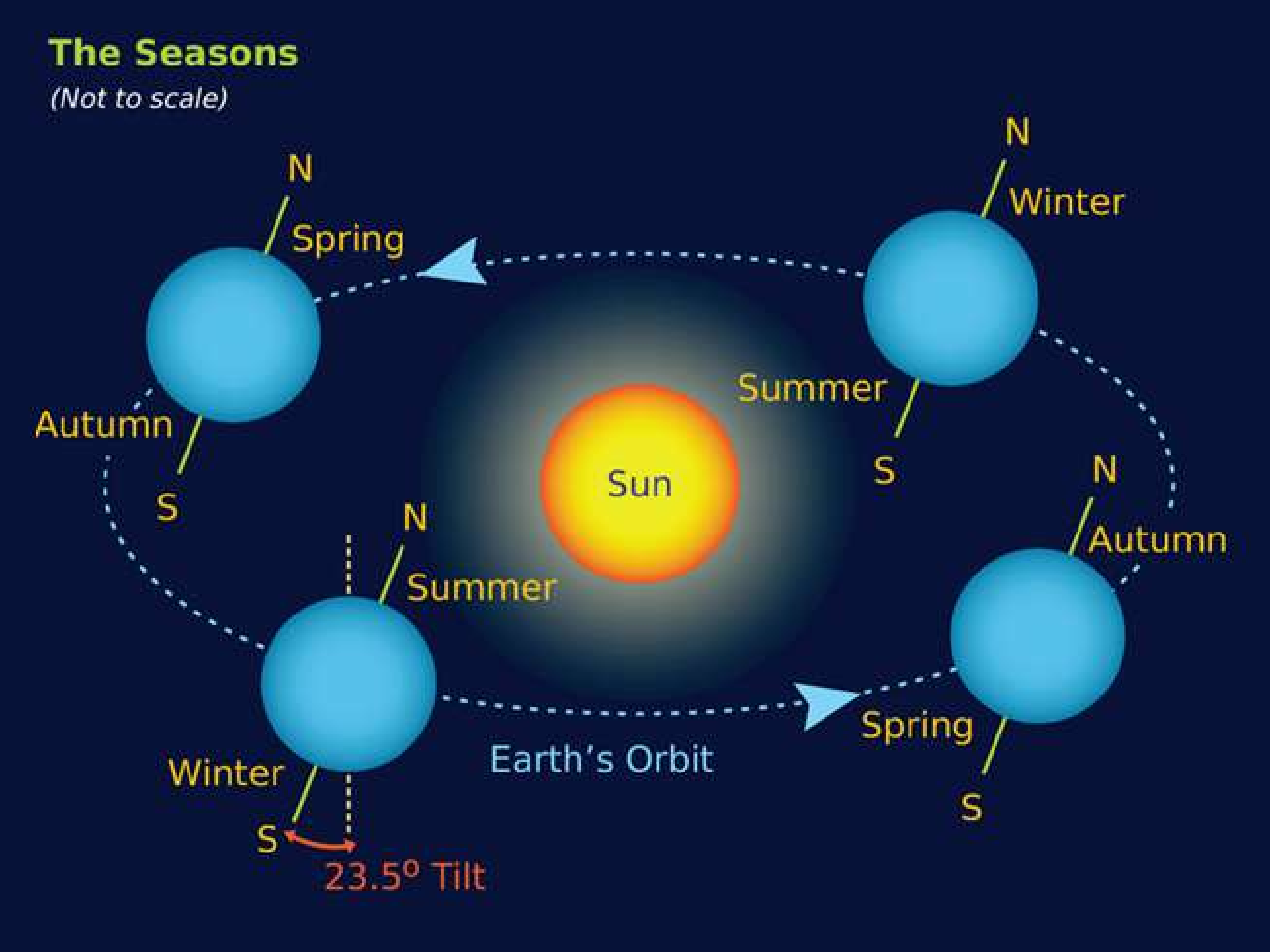
http://www.atmosedu.com/meteor/Animations/43_Angle%20of%20Sun/43.html

# Which area (a or b) experiences greater solar radiation? Why?



# Reasons for the Seasons

- Summer occurs in the hemisphere tilted toward the Sun, when its radiation (sunlight) strikes Earth at a higher angle
- The number of daylight hours is greater for the hemisphere experiencing Summer
- The hemisphere receiving less radiation (sunlight) experiences Winter.

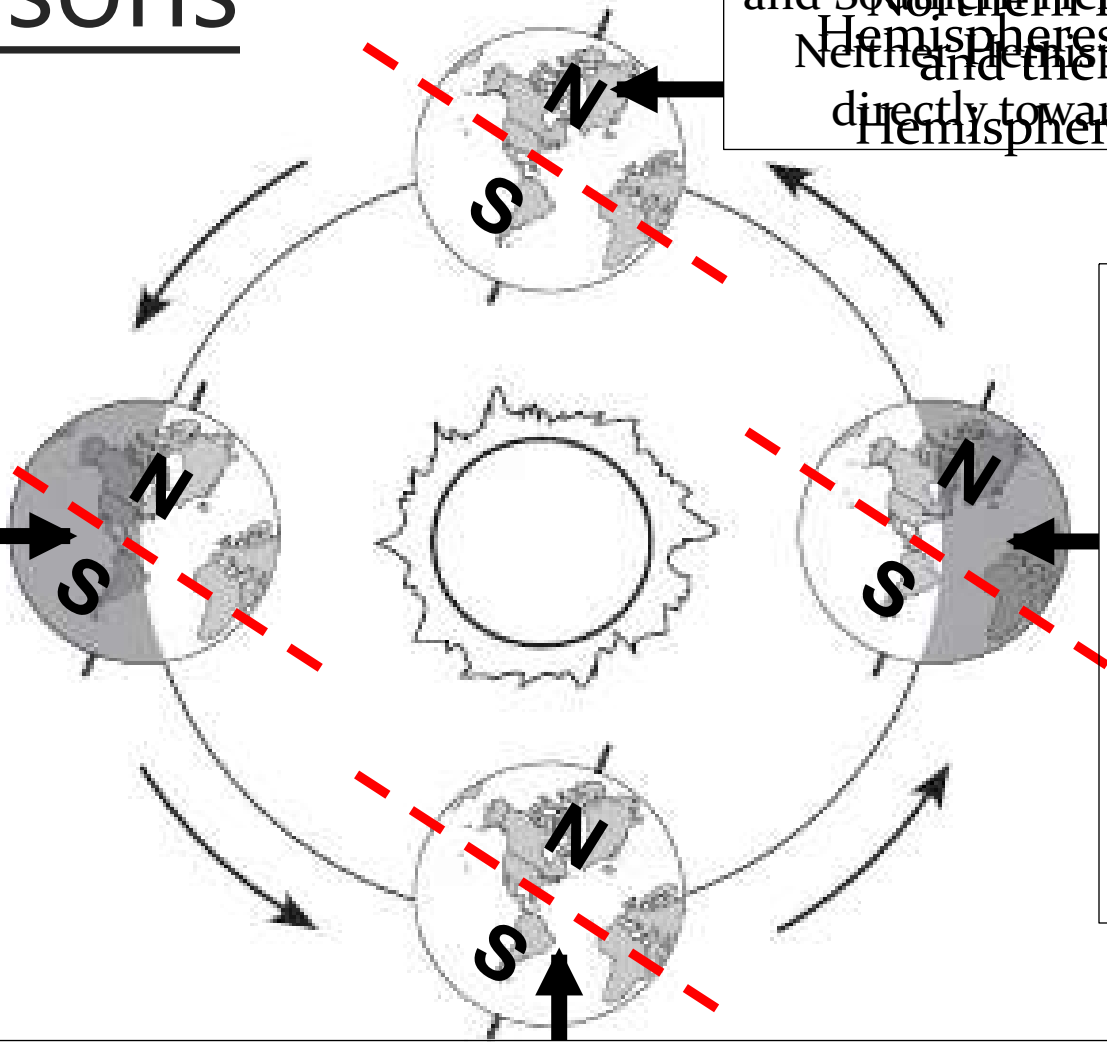

The Seasons
(Not to scale)
N
Spring
N
Winter
Autumn
S
Summer
S
Sun
N
Summer
N
Autumn
Winter
S
Spring
S
Earth's Orbit
23.5° Tilt

# Identifying the Seasons

Step 1: Draw imaginary lines to separate the Northern/Southern Hemispheres.

Step 2: Identify the Northern/Southern Hemispheres (not exact).

Step 3: For each position of the Earth, identify the season for each Hemisphere and WHY.




Northern Hemisphere is Summer and Southern Hemisphere is Winter because the Northern Hemisphere is tilted towards the Sun.

Northern Hemisphere is Winter and Southern Hemisphere is Summer because the Southern Hemisphere is tilted towards the Sun.

Northern Hemisphere is Fall and Southern Hemisphere is Spring. Neither Hemisphere is tilted directly towards the Sun.

# Think, Pair, Share

# What would happen if the Earth was not tilted?

# If the Earth was not tilted…

There would no longer be seasons as we know them. The temperature and precipitation pattern would not vary much. It would still be warm at the equator and cold at the poles.

Across the Earth it would be like it is in the middle of fall or spring but it would last all year every year. Areas today that have wet, dry, warm and cold seasons would have a fairly constant weather all year whether it be wet, dry, warm and/or cold.

http://theweatherprediction.com/habyhints2/471/

# Animations

- Astronomy: Journey to the Cosmic Frontier Seasons Interactive

- Astronomy Education at the University of Nebraska-Lincoln [similar to the previous animation]

# Study Jams: Seasons

# Seasons Summarizer

**Seasons Summarizer** Name _____ Date _____ Period ___

1. What causes seasons?

2. How does the tilt of the Earth affect the distribution of sunlight?

3. If the Northern Hemisphere is turned away from the sun, which season does it experience? Why?

4. Draw a diagram below showing the placement of the Earth and the Sun when the Southern Hemisphere is experiencing summer.