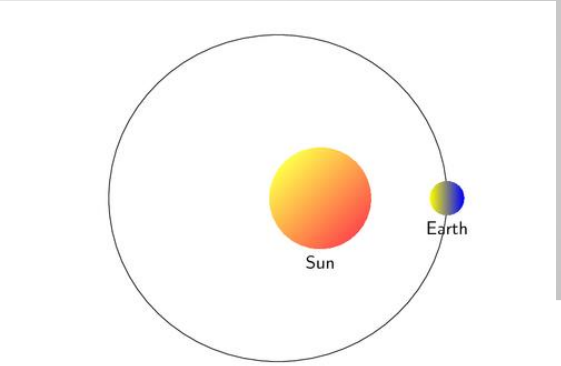
2. The Seasons

Introduction

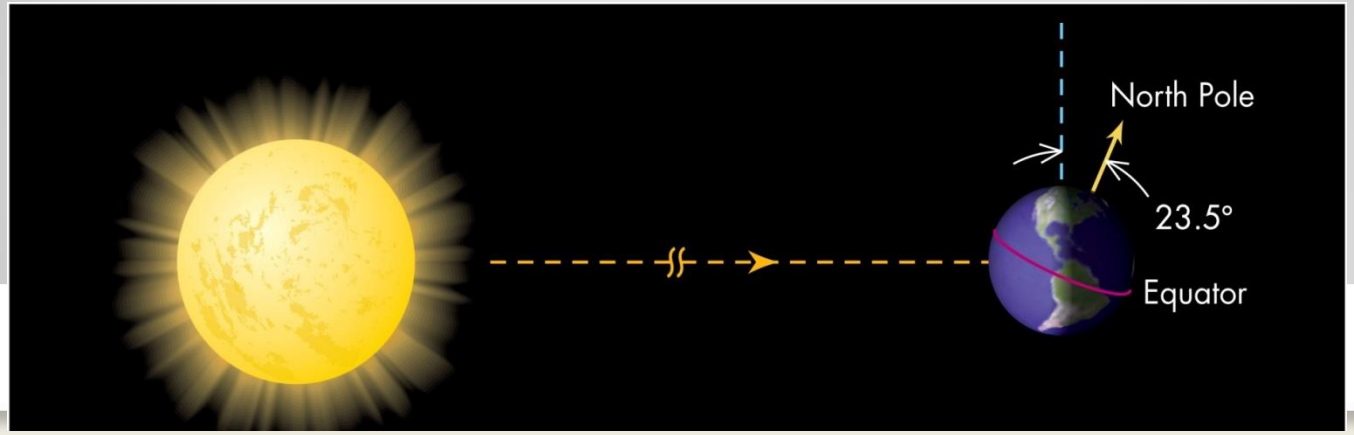
- The Earth's orbit (_____) around the Sun is _____and a bit off center
- There is a time where it is closer to the _____than other times of the year
- *Common misconception*: the _____are directly related to Earth's _____around the Sun
  - That summer occurs when the planet is closest to the Sun and _____occurs when it is farthest a



2. The Seasons

Introduction

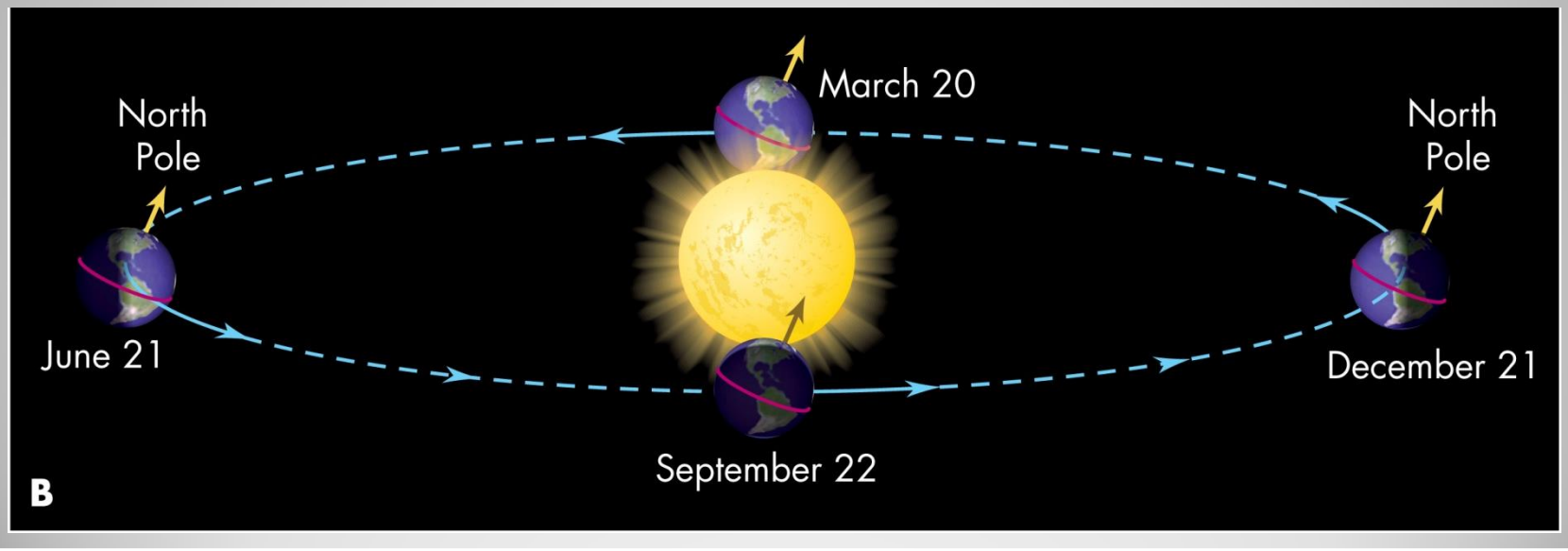
- The _____is true (in the northern hemisphere)
- Our summer season is when we are _____from the Sun and our winter season is when we are closest to the Sun
- Reason? = axis tilt of _____
- Rotation Axis – an _____line through the center of a body about which that body rotates (spins)
- Earth's rotation axis goes through each of the _____



2. The Seasons

Introduction

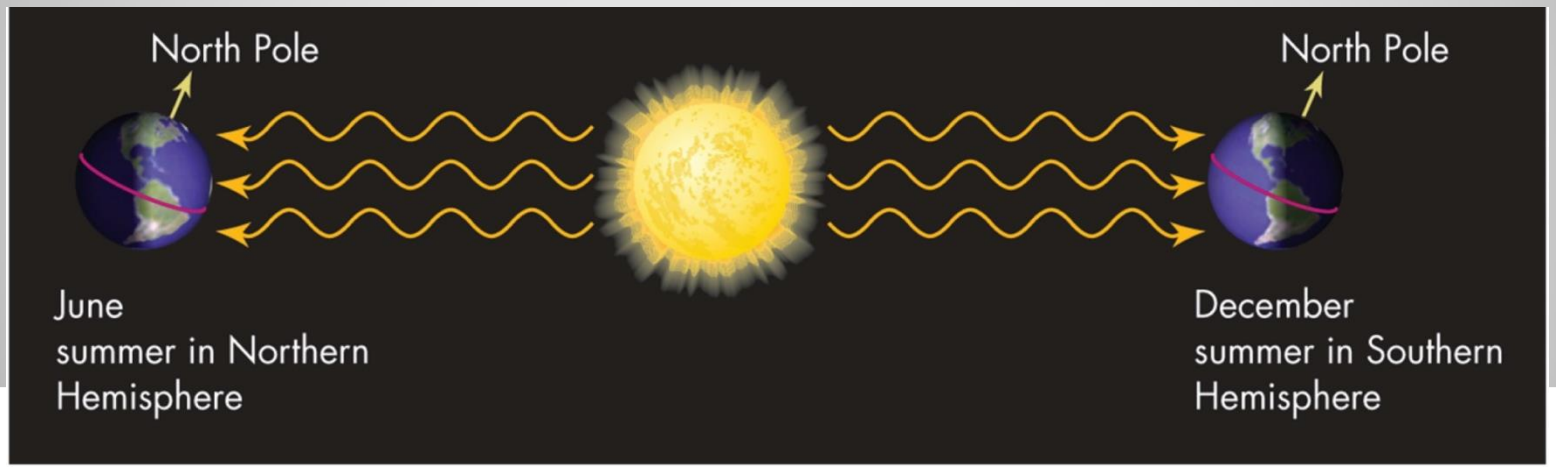
- The axis is _____perpendicular to the orbit around the Sun
  - Meaning that the _____of the rotation axis will never change as it moves around the Sun



2. The Seasons

Introduction

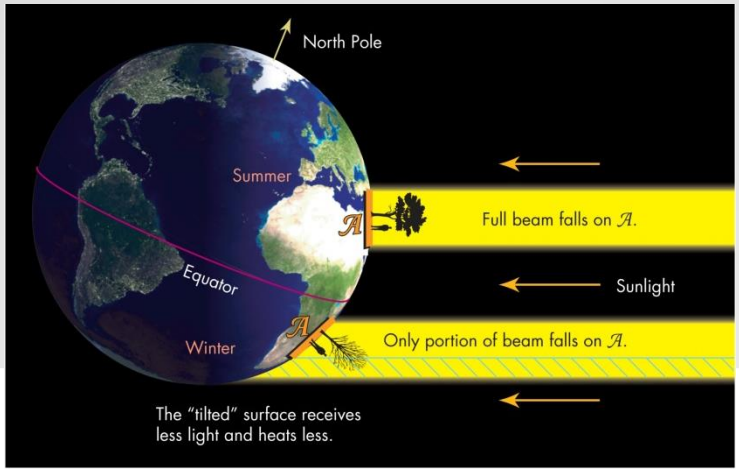
- Because this is _____, sunlight falls more directly on the northern hemisphere in _____ (and months around it) and more directly on the southern hemisphere in _____ (and months around it)
- This causes a variation of _____in each hemisphere at each time of the year



2. The Seasons

Introduction

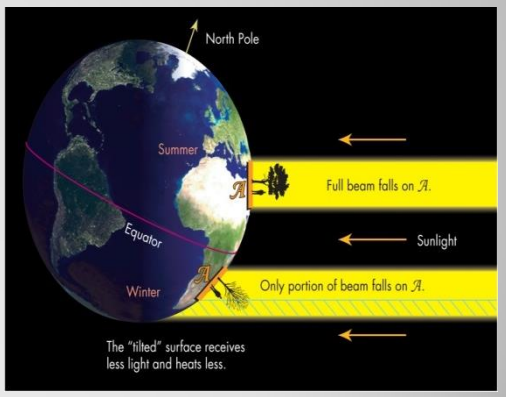
- If the surface of Earth gets sunlight at a direct _____, that will produce the most heat
- If the surface of Earth gets sunlight at anything _____than 90°, then that will produce less heat
- 90° of sunlight = _____season
- >90° of sunlight = _____season



2. The Seasons

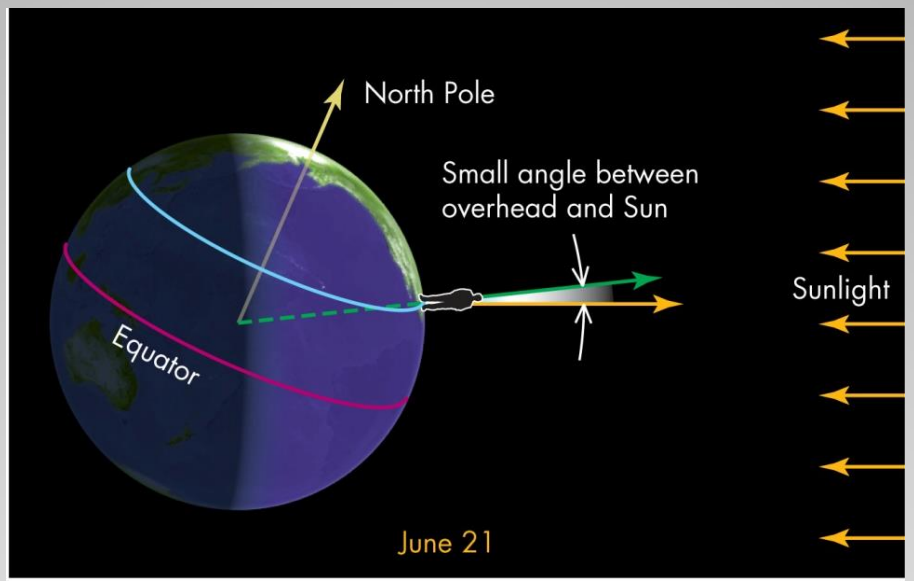
Introduction

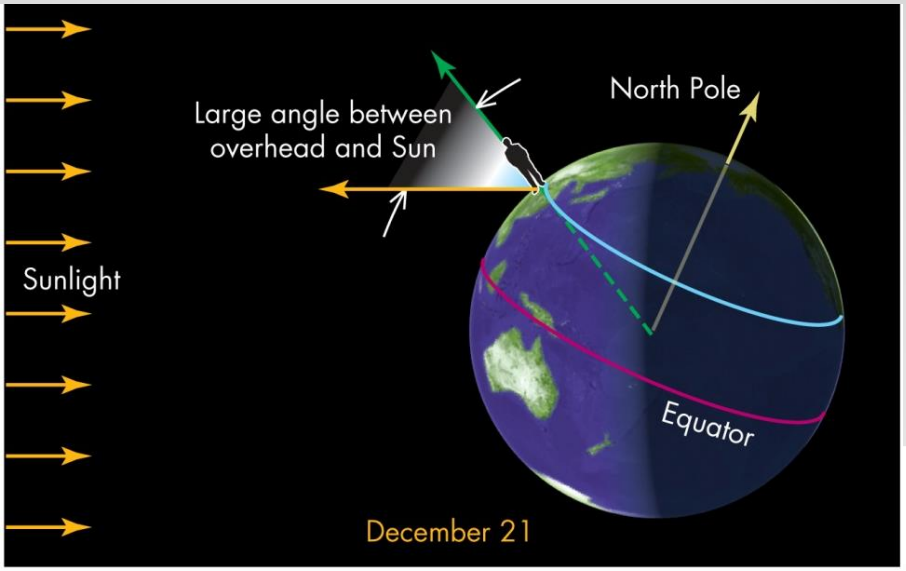
- Northern Hemisphere:
  - June – _____(90° of sunlight)
  - September – _____(> 90° of sunlight)
  - December – _____(>> 90° of sunlight)
  - March – _____(> 90° of sunlight)
- Southern Hemisphere: _____of the north
- Equator:
  - June – _____(> 90° of sunlight)
  - September – _____! (90° of sunlight)
  - December – _____(> 90° of sunlight)
  - March – _____! (90° of sunlight)



2. The Seasons

Introduction

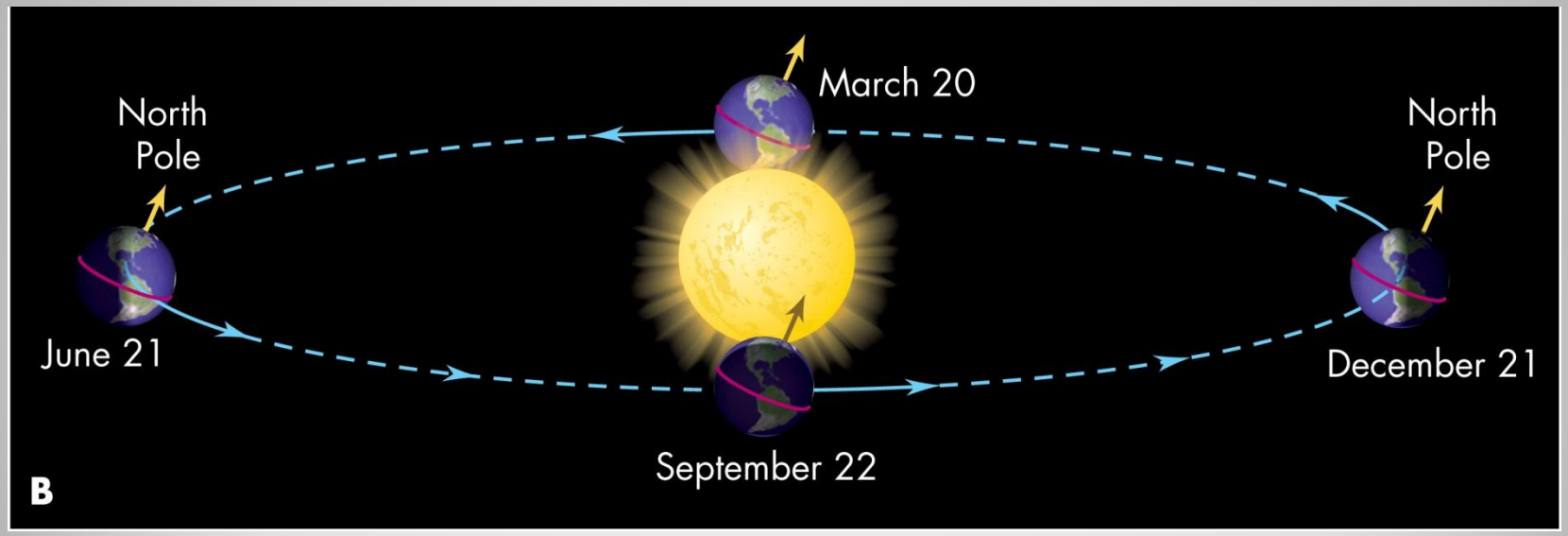




2. The Seasons

Introduction

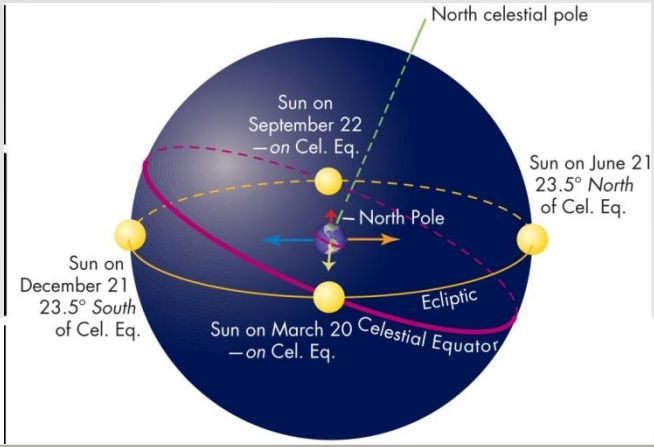
- Irony: at Earth's _____ point from the Sun, it's summer in the northern hemisphere, at the closest it's winter
- The seasons are _____ caused by Earth's rotation axis



2. The Seasons

Solstices, Equinoxes, and Ecliptic's Tilt

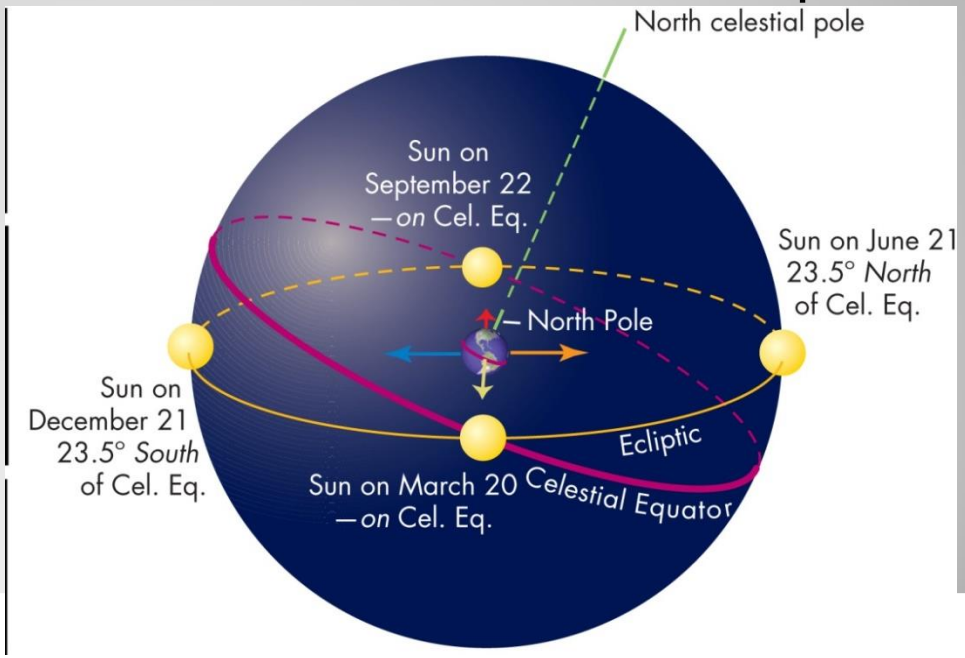
- Back to Earth…
  - Remember that from our prospective, every way we travel seems _____ in the sky
  - The Sun's path is included in that, too!
- The rotation axis is also responsible for the Sun's _____ in our view of the sky throughout the day
- It is _____ in respect to the celestial equator



2. The Seasons

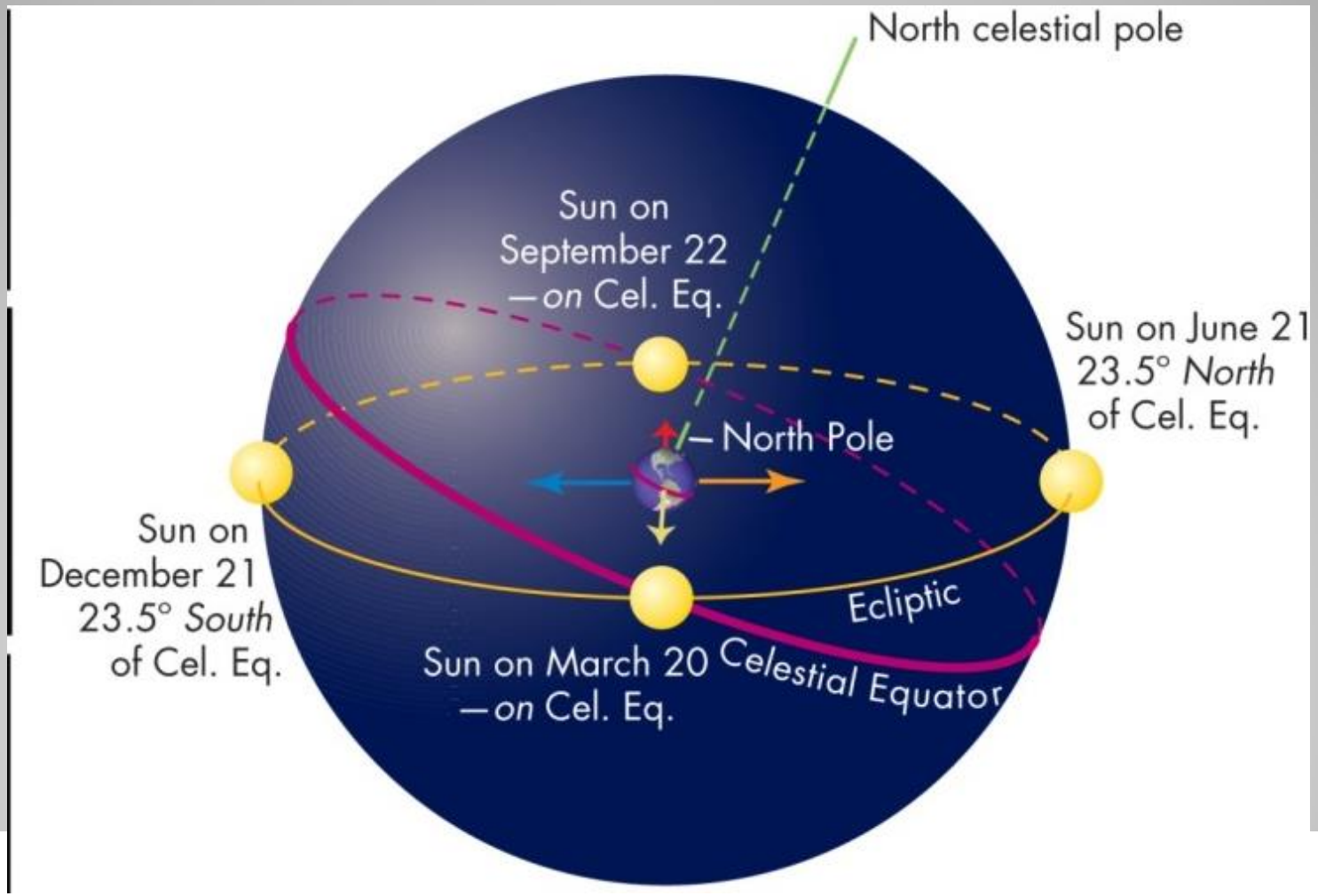
Solstices, Equinoxes, and Ecliptic's Tilt

- _____ 20th and _____ 22nd: The Sun directly hits the equator
  - This means the Sun would follow the celestial equator exactly
- In one _____, the Sun will cross the celestial equator in the sky twice



2. The Seasons

Solstices, Equinoxes, and Ecliptic's Tilt



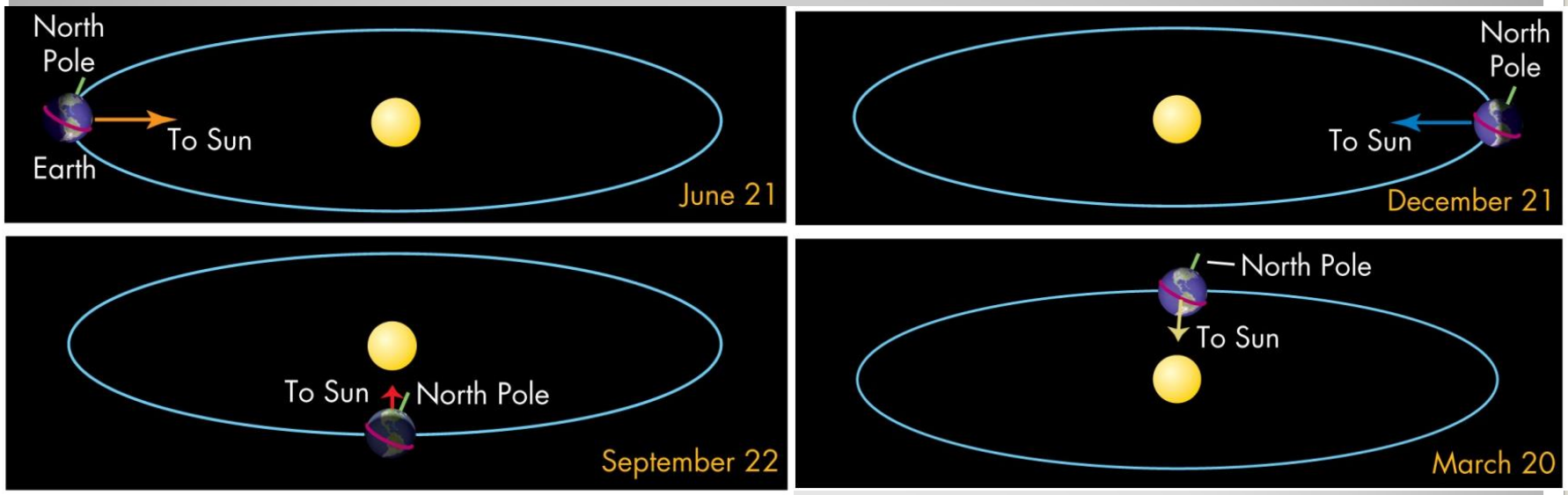
2. The Seasons

Solstices, Equinoxes, and Ecliptic's Tilt

- Equinox – the time of year when the Sun appears to cross the celestial _____
  - The number of daylight and nighttime _____ are even
- Two of them:
  - Vernal Equinox – the start of _____(March 20th)
  - Autumnal Equinox – the start of _____(September 22nd)
- Solstice – the time of year when the Sun is at its greatest distance _____ and greatest distance _____ on the Earth
- Two of them:
  - Winter Solstice – the start of _____(December 21st)
  - Summer Solstice – the start of _____(June 21st)

2. The Seasons

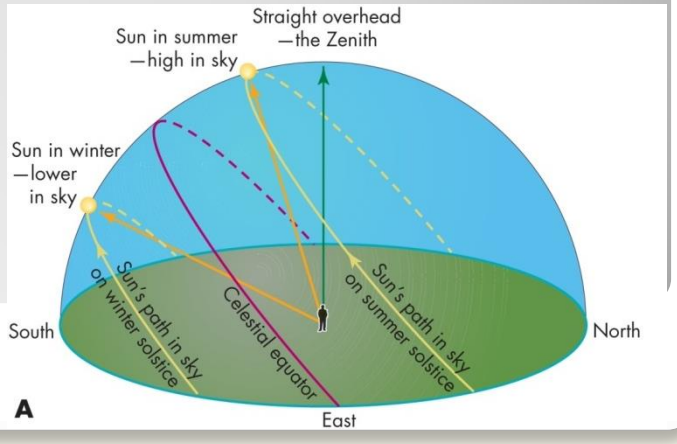
Solstices, Equinoxes, and Ecliptic's Tilt



2. The Seasons

Tracking the Sun's Changing Position

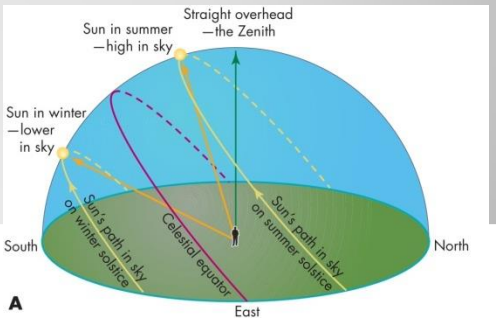
- With the visual of the sky being _____ of reality, the pathway and _____ change, but they can be timed and tracked
- The Sun will be _____ in the sky at noon on a summer day than it would be at noon on a winter day due to its distance from the celestial equator
  - This is just like the light _____ on the planet



2. The Seasons

Tracking the Sun's Changing Position

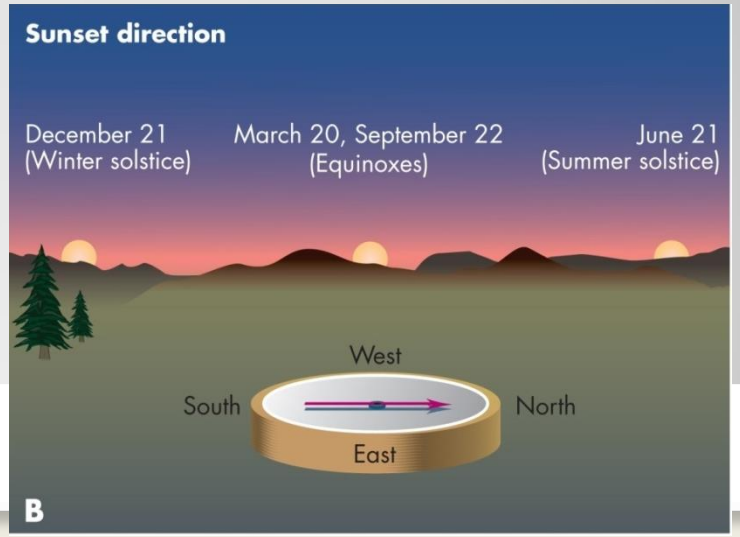
- On _____ 21st at 40° latitude: the noon Sun is about 73.5° above the horizon, about 16.5° from the Zenith
- On _____ 21st at 40° latitude: the noon Sun is about 26.5° above the horizon
- This causes the direction in which the Sun _____ and sets to change!
  - It won't always be true _____ and _____ directions for the rising and setting (that will adjust with the changing position)



2. The Seasons

Tracking the Sun's Changing Position

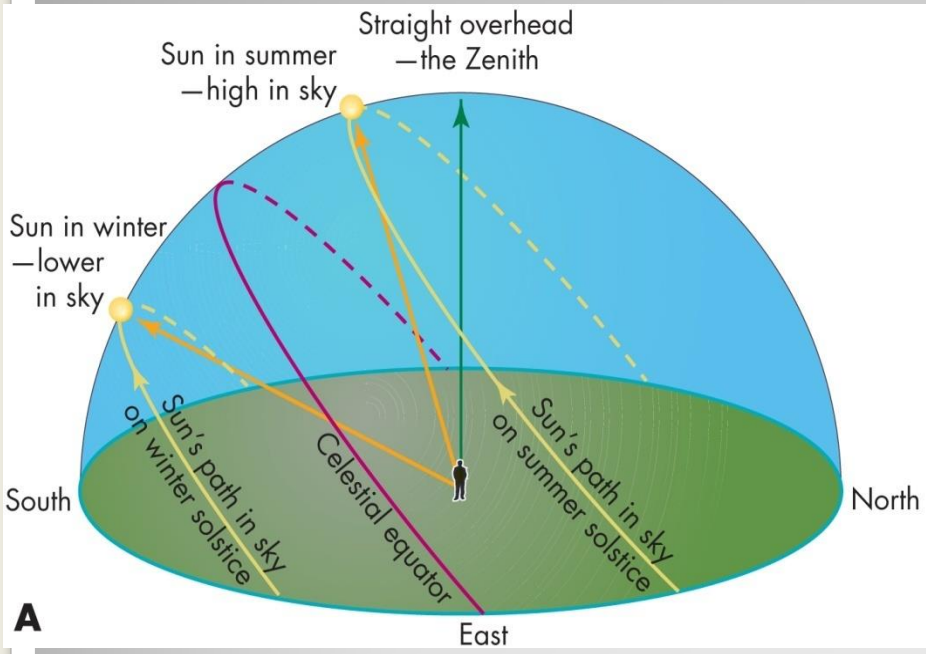
- On _____ 21st at 40° latitude: the Sun will rise in the northeastern direction and set in the northwestern direction
- On _____ 21st at 40° latitude: the Sun will rise in the southeastern direction and set in the northwestern direction
- Only during the equinoxes will it rise and set in exactly the east and west directions (that's where the celestial _____ sits)

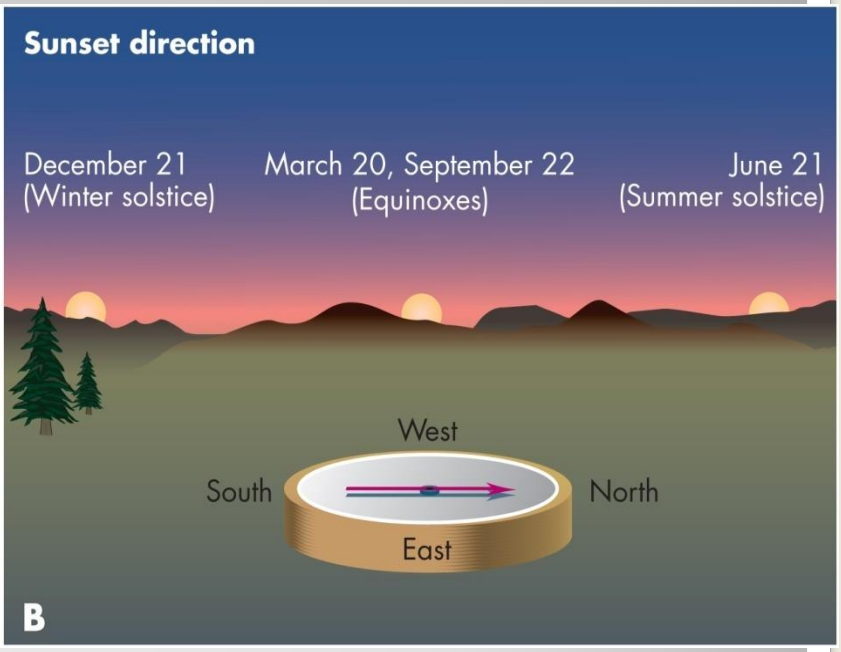


2. The Seasons

Tracking the Sun's Changing Position

- Let's compare side-by-side





2. The Seasons

Tracking the Sun's Changing Position

- Tracking the Sun is very _____ dependent!
  - Just like everything else…
- Many _____ and other buildings were constructed to help track the Sun, Moon, and other bodies as they traveled the sky throughout the year
- Prime example: _____(Amesbury, United Kingdom)