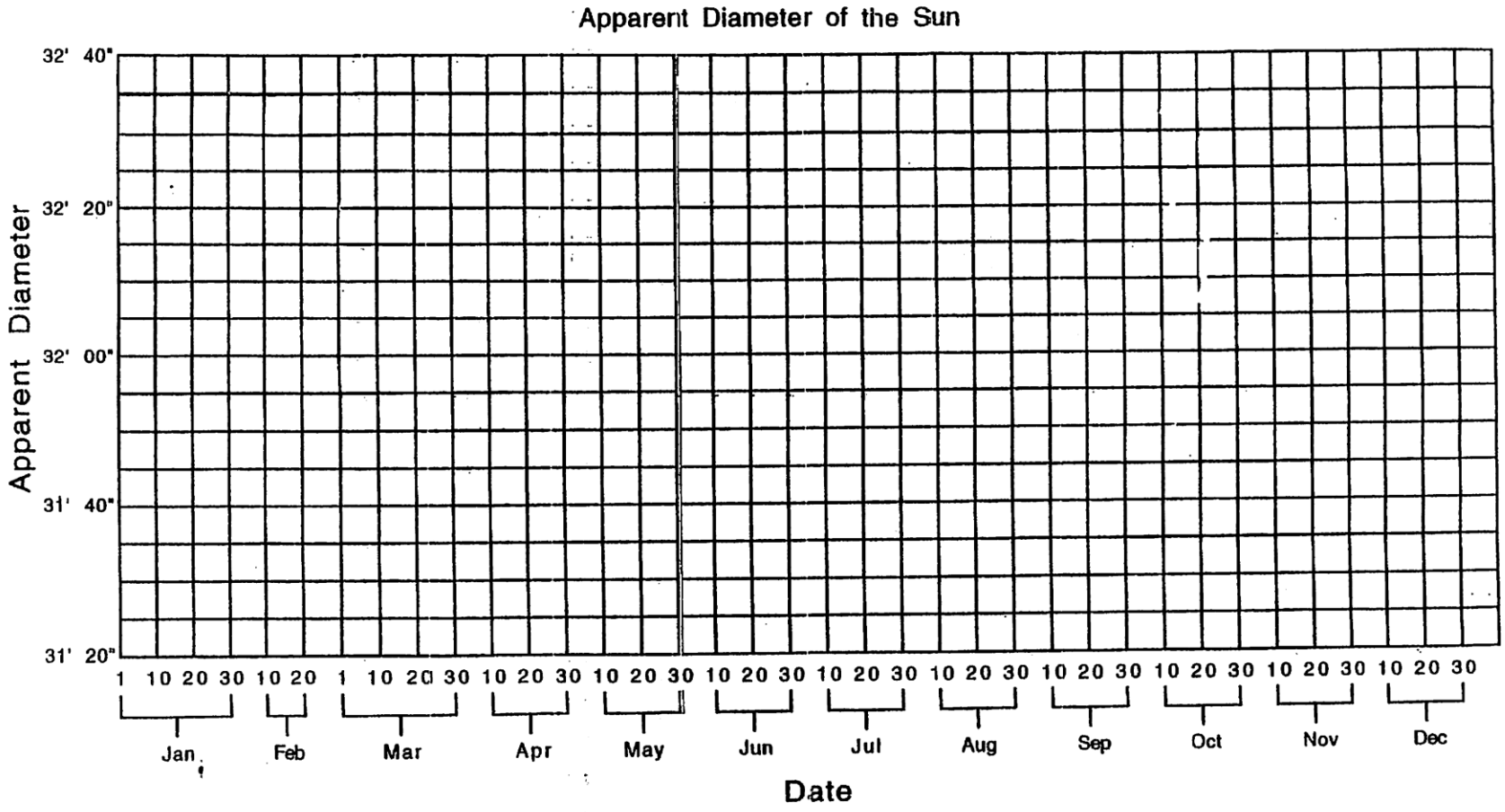
Reasons for the Seasons

- What are the 4 seasons?
- And when do they start?

- Spring/Vernal – March 21st
- Summer – June 21st
- Fall/Autumn – September 21st
- (Or Sept. 22)
- Winter – December 21st


Apparent Diameter of the Sun
32' 40"
32' 20"
32' 00"
31' 40"
31' 20"
Apparent Diameter
1 10 20 30 10 20 1 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date

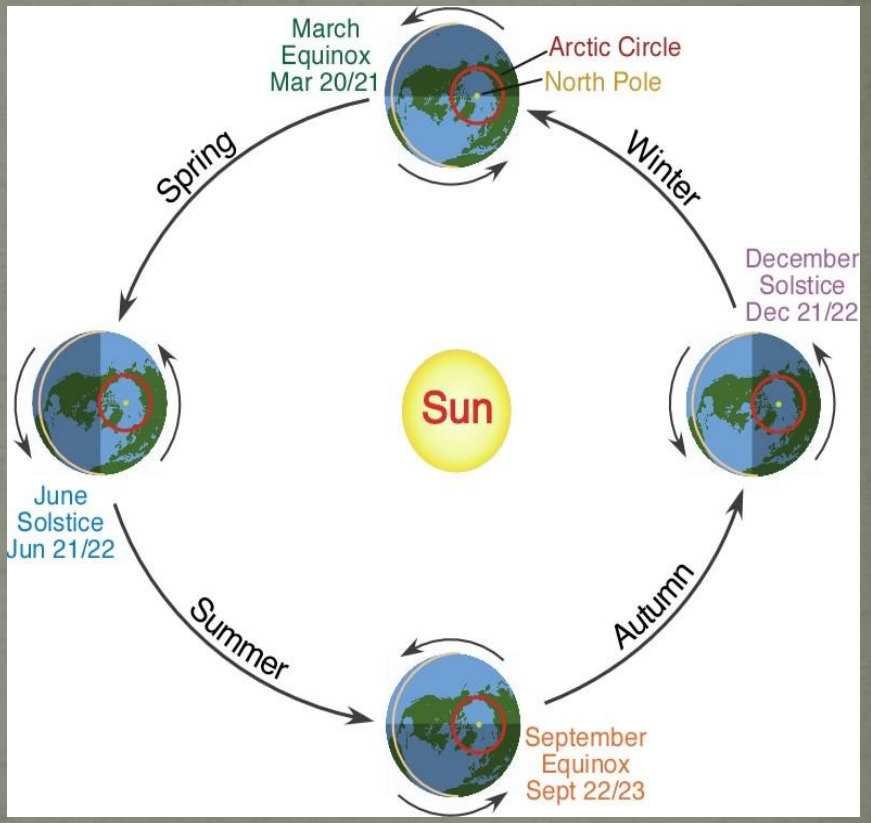
Distance and the seasons

- Does distance affect the seasons?

  Apparent diameter of the Sun is largest in the winter.

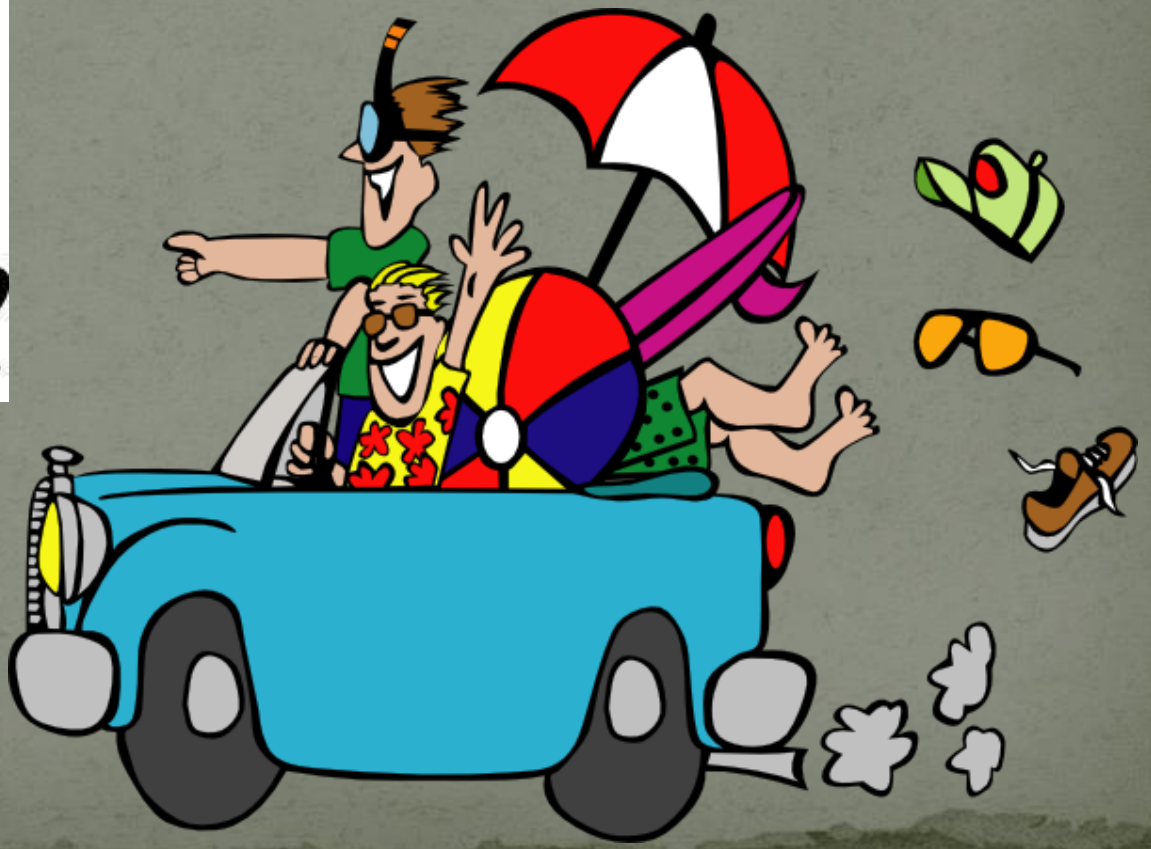
- We are closer to the Sun in the winter.

- Distance does not create the seasons.



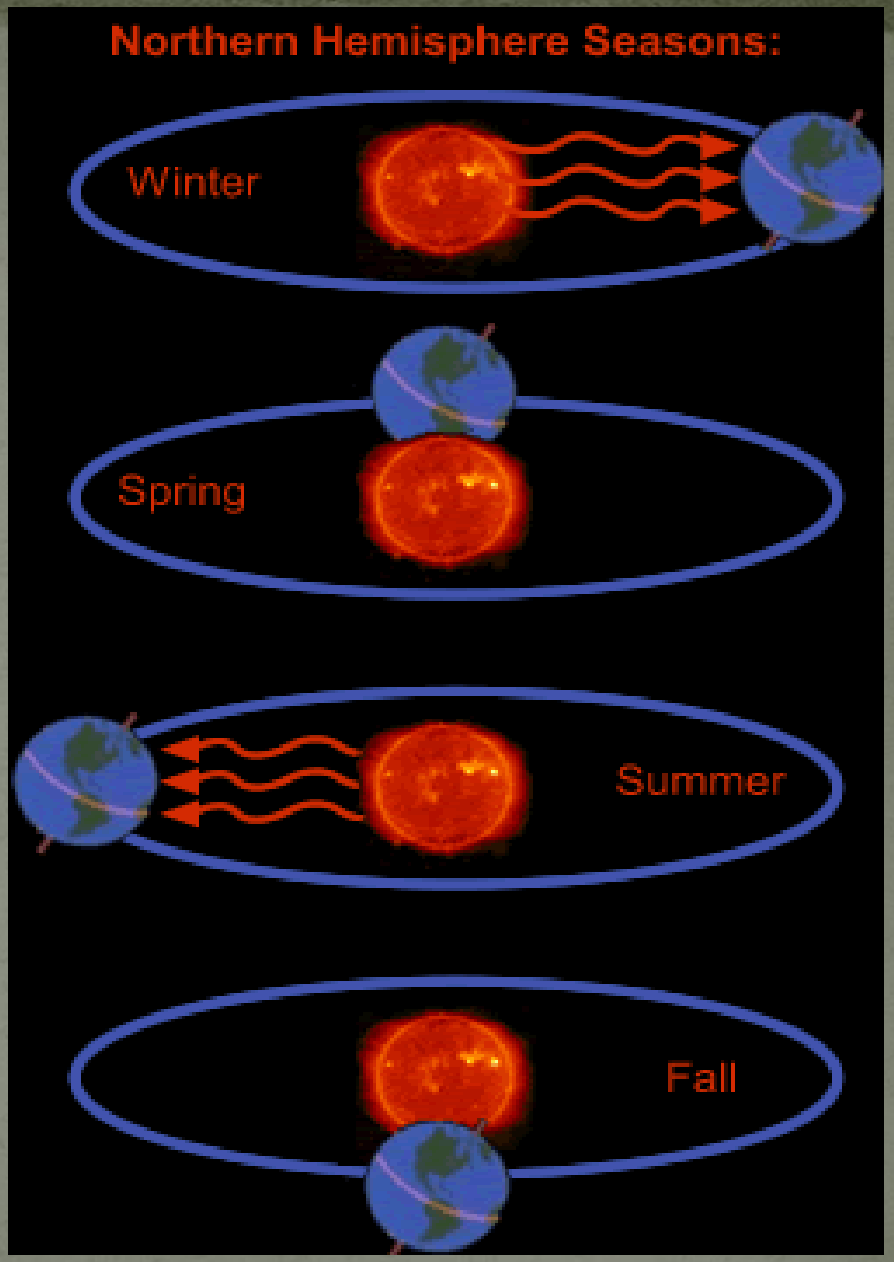
Why do we have seasons?

- We have 4 seasons due to 1 “TRIP” around the Sun



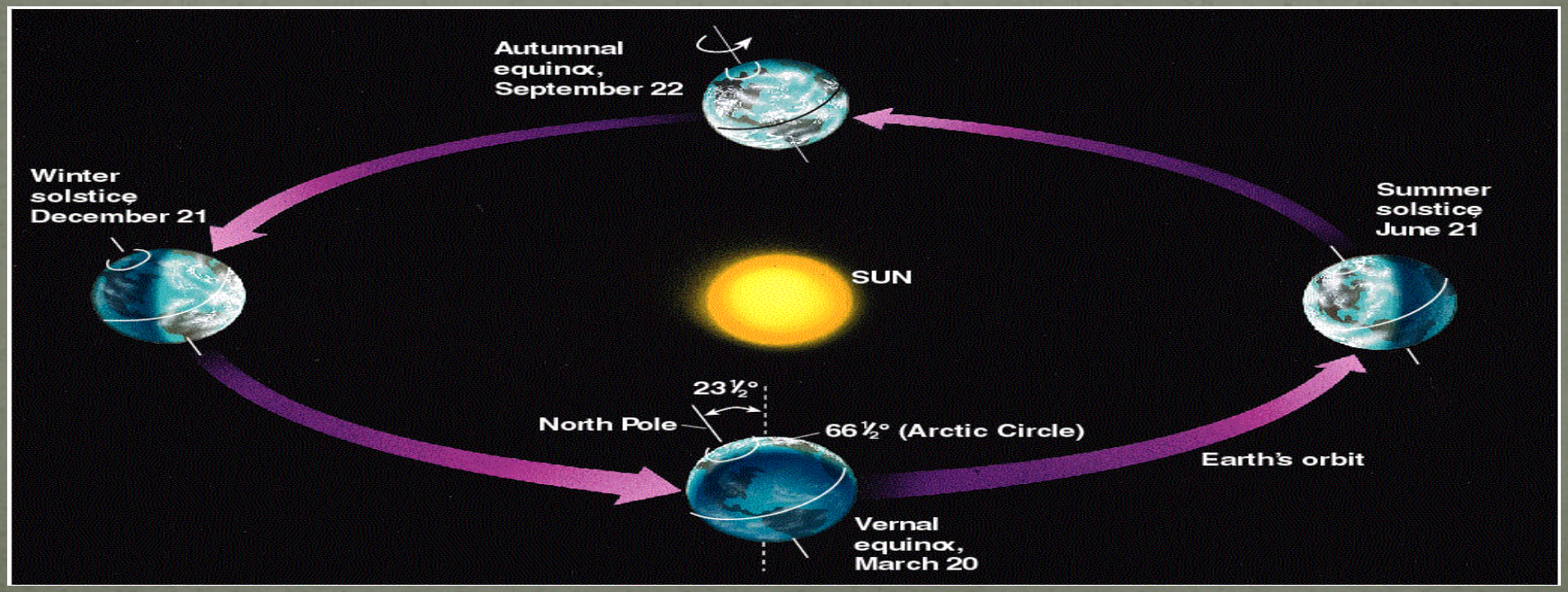
TRIP

- T –
- Tilt – The Earth is on a 23.5 degree tilt.
- This makes 1 Hemisphere face the sun and 1 face away.
- Gives more light and heat.
- The seasons are opposite in the Southern Hemisphere.



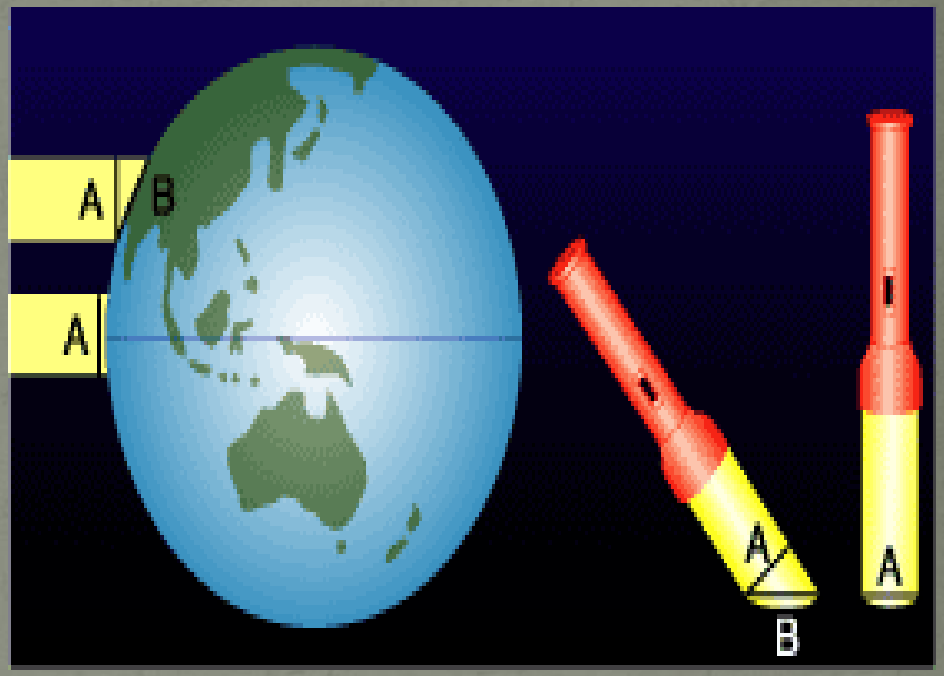
TRIP

- R –
- Revolution.
- As the Earth Orbits the Sun it changes which Hemisphere faces the Sun.



TRIP

- I –
- Insolation is the angle the sun strikes the Earth.
- Incoming
- Solar
- Radiation
- The more direct the rays the stronger they are.
- (Angle of Incidence)



What type of energy does the sun give us?

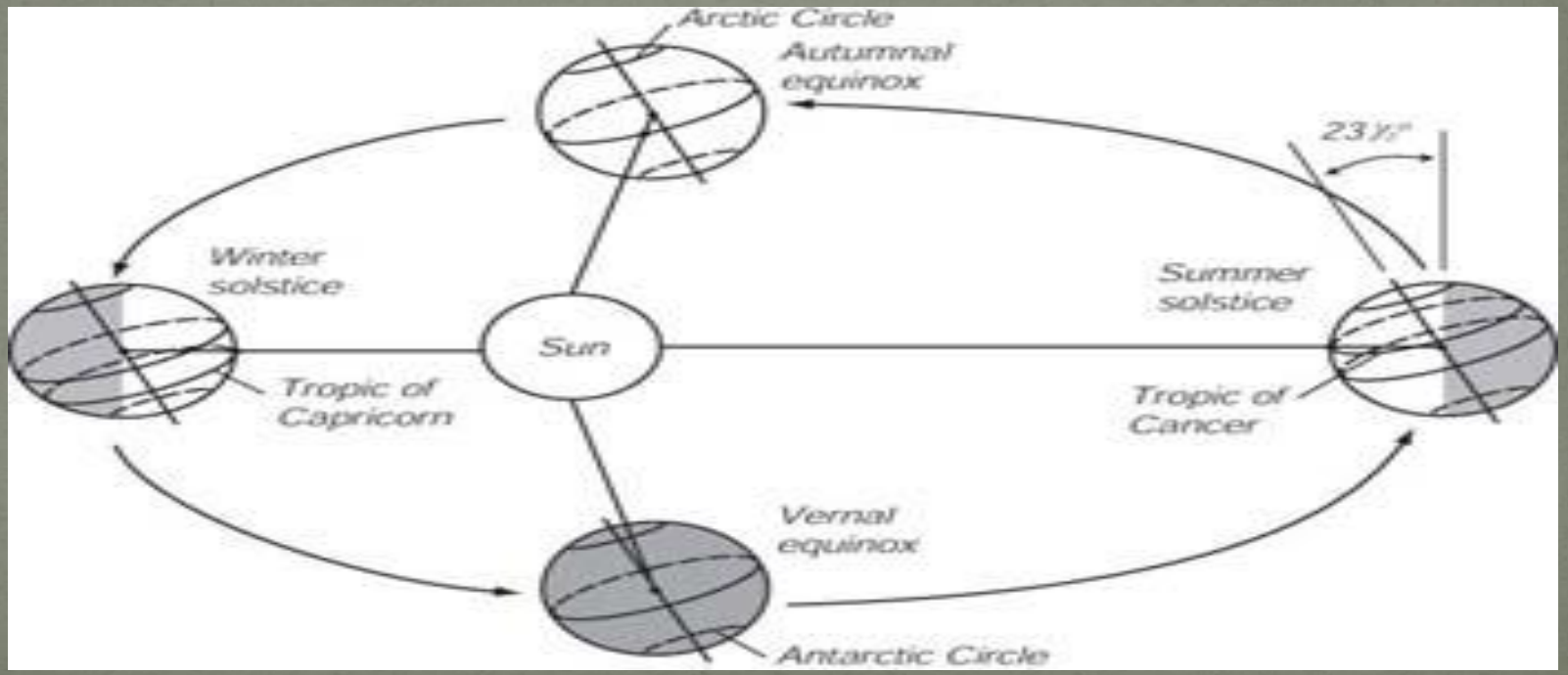
Sun gives Ultra Violet Radiation. High energy (Sunglasses or Ultra Violent)

What type of energy does the Earth reradiate?

The Earth gives back off Infrared Radiation. Lower energy (infrared glasses)

TRIP

- P –
- Parallel – The axis of the Earth remains parallel to itself through out the orbit keeping it cyclic.

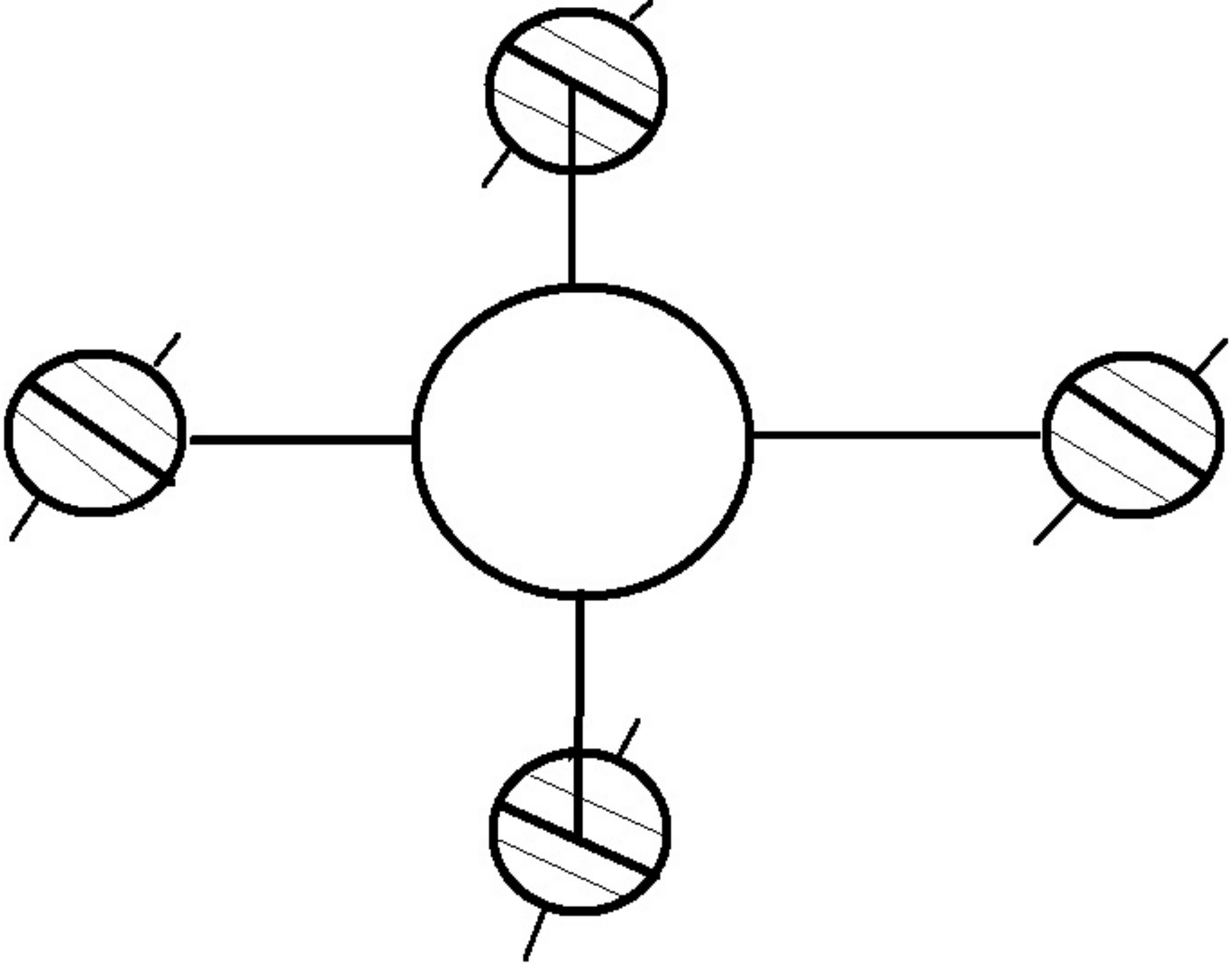


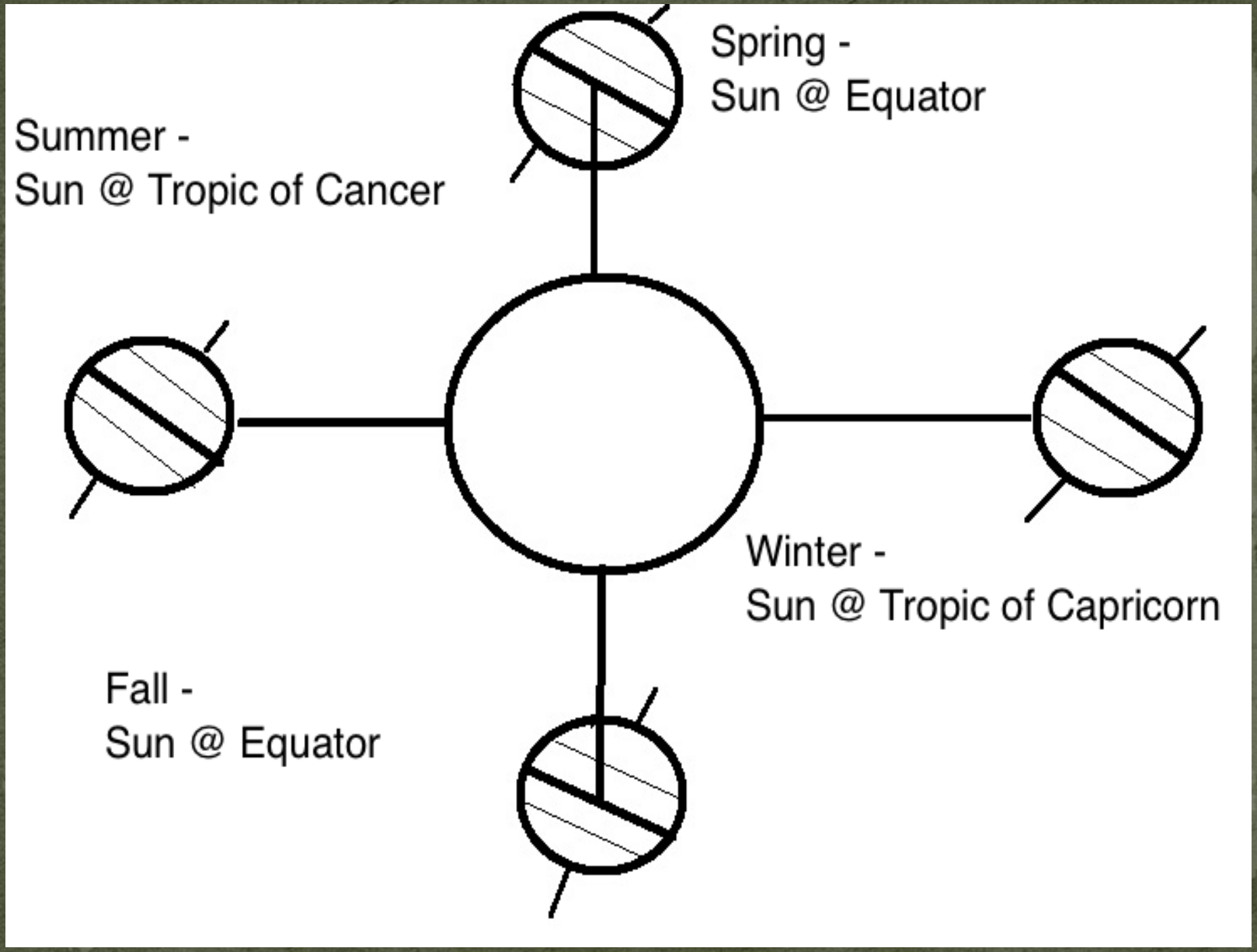
Seasons Lab (G)

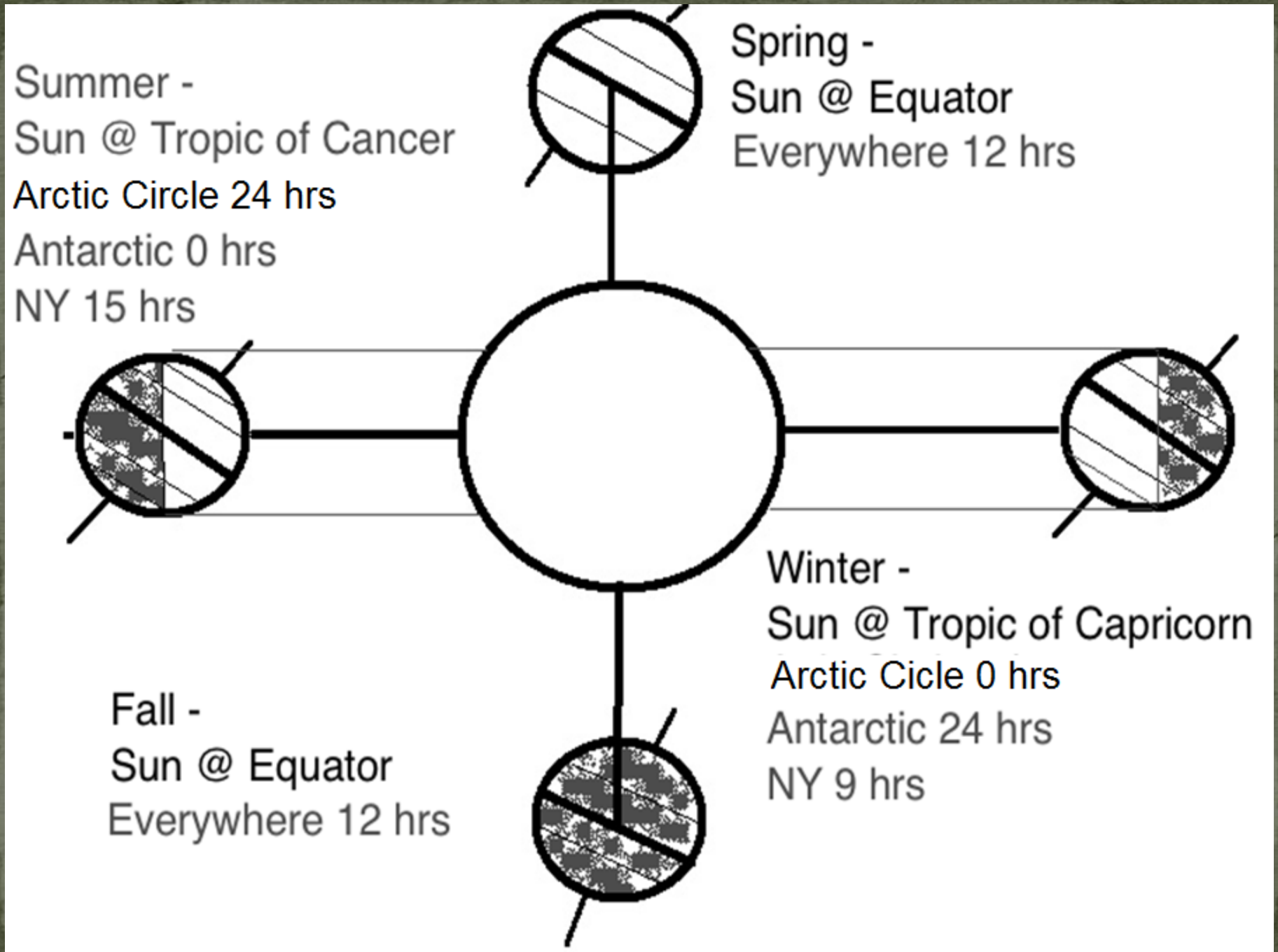
- When is Earth Closest to the Sun?
- When is Earth Furthest?
- Difference between Actual and Apparent Diameter?
- Why does our Apparent Diameter change during orbit?
- Does Distance create the seasons? (give evidence)
- What 4 things do create seasons? (explain)
- Why does Santa wear a swim trunk in Australia?

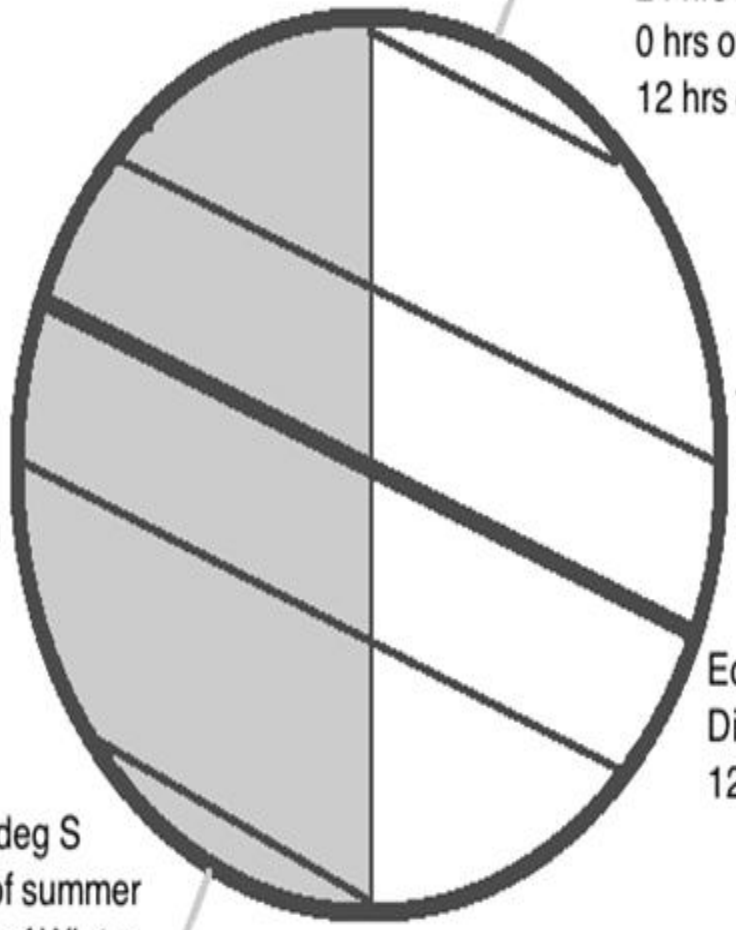
C

- http://www.youtube.com/watch?v=iMEfYLvxioc




Spring -
Sun @ Equator
Summer -
Sun @ Tropic of Cancer
Winter -
Sun @ Tropic of Capricorn
Fall -
Sun @ Equator


Summer -
Sun @ Tropic of Cancer
Arctic Circle 24 hrs
Antarctic 0 hrs
NY 15 hrs
Spring -
Sun @ Equator
Everywhere 12 hrs
Winter -
Sun @ Tropic of Capricorn
Arctic Cicle 0 hrs
Antarctic 24 hrs
NY 9 hrs
Fall -
Sun @ Equator
Everywhere 12 hrs



Arctic Circle 66.5 deg N
24 hrs of Sun 1st day of summer
0 hrs of Sun 1st day of Winter
12 hrs on an Equinox

Tropic of Capricorn - 23.5 deg S
Direct rays Winter Solstice
Southern most latitude for the Sun

Tropic of Cancer - 23.5 deg N
Direct rays Summer Solstice
Northern most latitude for the Sun

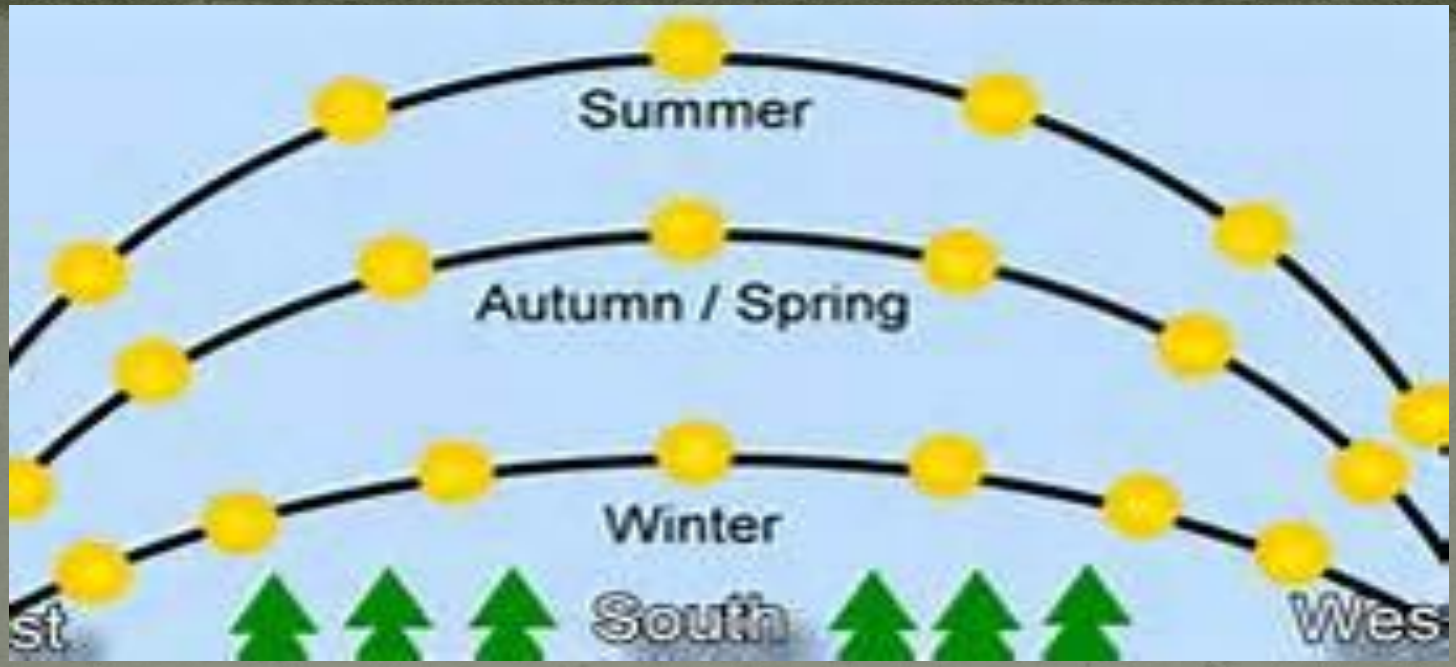
Equator - 0 deg
Direct rays Fall / Spring Equinox
12 hrs of Sun year round

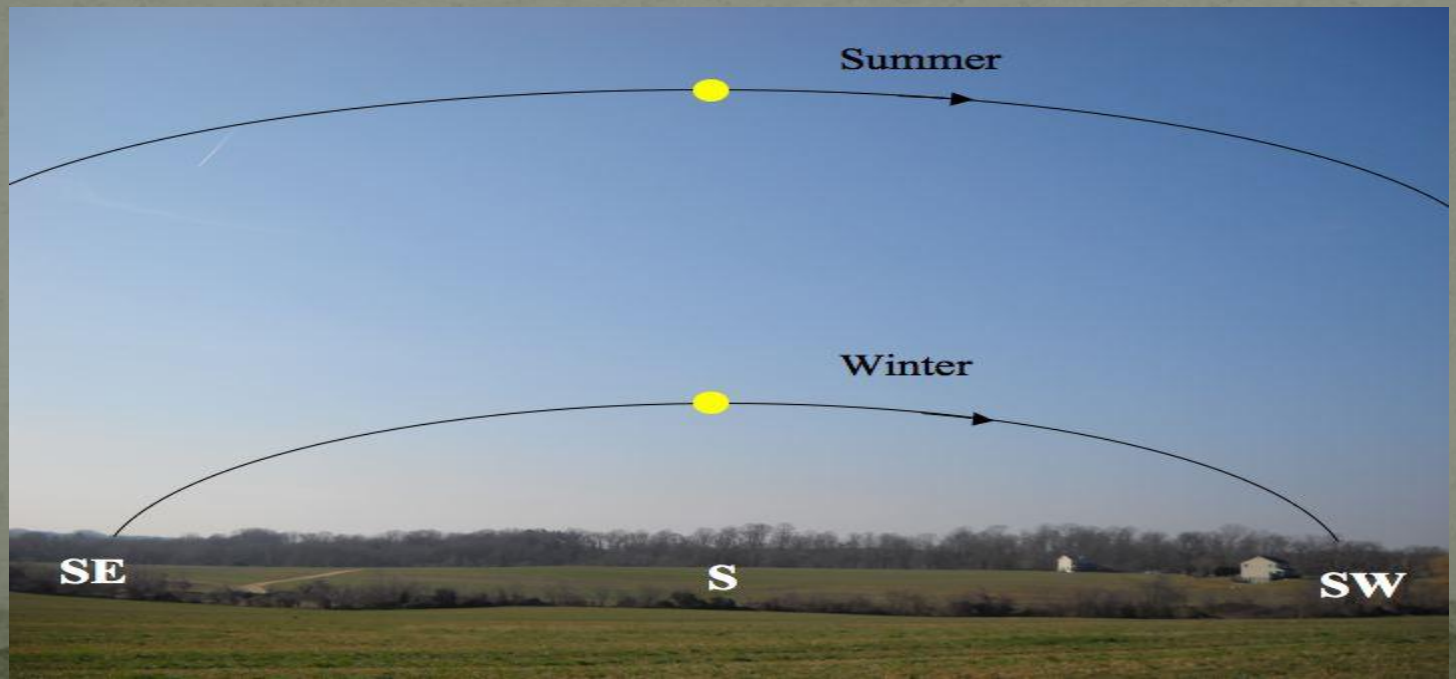
Antartic Circle - 66.5 deg S
0 hrs of Sun 1st day of summer
24 hrs of Sun 1st day of Winter
12 hrs on an Equinox

Important terms

- Equinox –
- Means Equal Night.
- Everywhere has 12 hours of day, 12 hours of night.
- The sun is directly over the equator.
- Sun rises & sets exactly E→W
- Spring (Vernal)
- Fall (Autumnal)

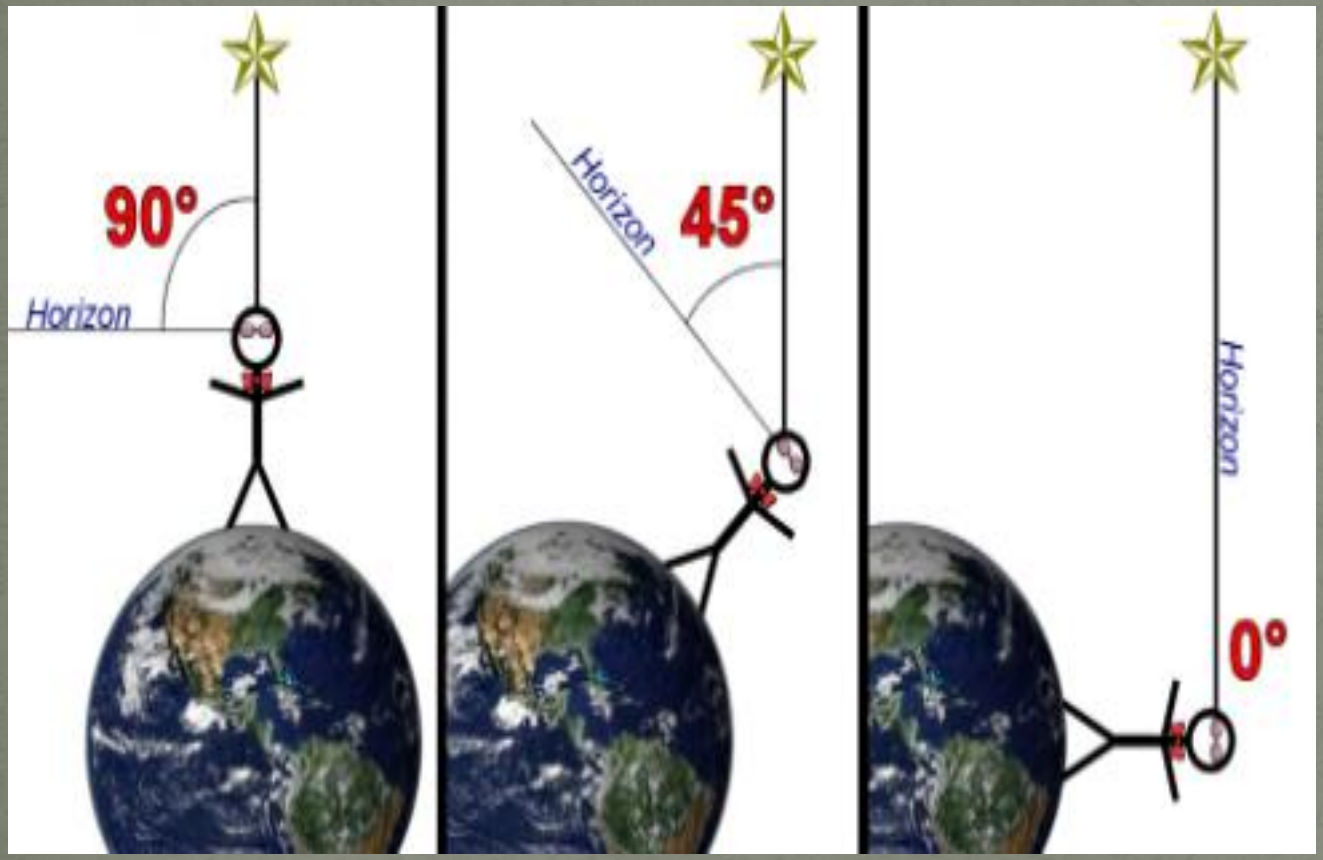
- Solstice –
- Means Sun stands still.
- Either farthest North / South until the Sun stops and heads back the other direction.
- Rises/sets farthest North/South
- The sun will also get higher or lower in the sky each day.
- The circles have 0 or 24 hours of sun.
- Longest / Shortest Day
- The sun is over a Tropic.
- Winter / Summer


Summer
Autumn / Spring
Winter
South


Summer
Winter
SE
S
SW

(R)_

How to find the noon day Sun.

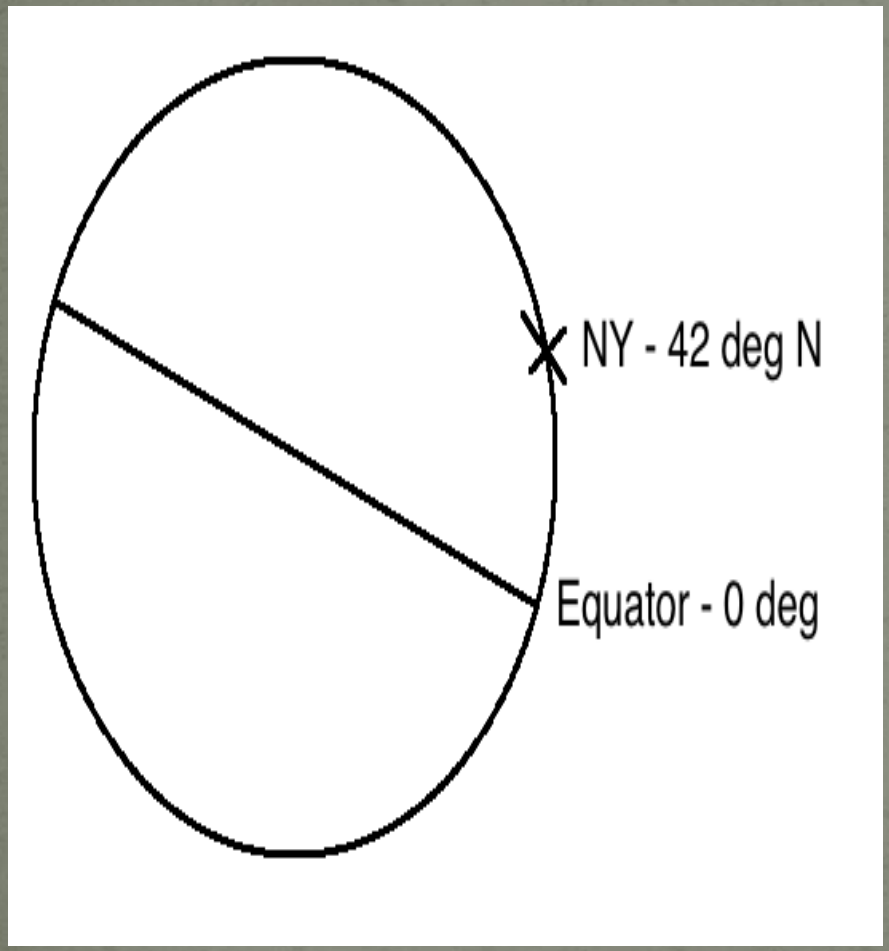


At the North Pole Polaris is 90 deg above you. Every deg you walk away Polaris drops 1 degree in the sky.

Finding the noon day sun. (R)

- The sun acts just like Polaris.
- If we know where the sun is directly over head we know where it is at 90 degrees.
- For every degree we walk away from that location it drops 1 degree in the sky.

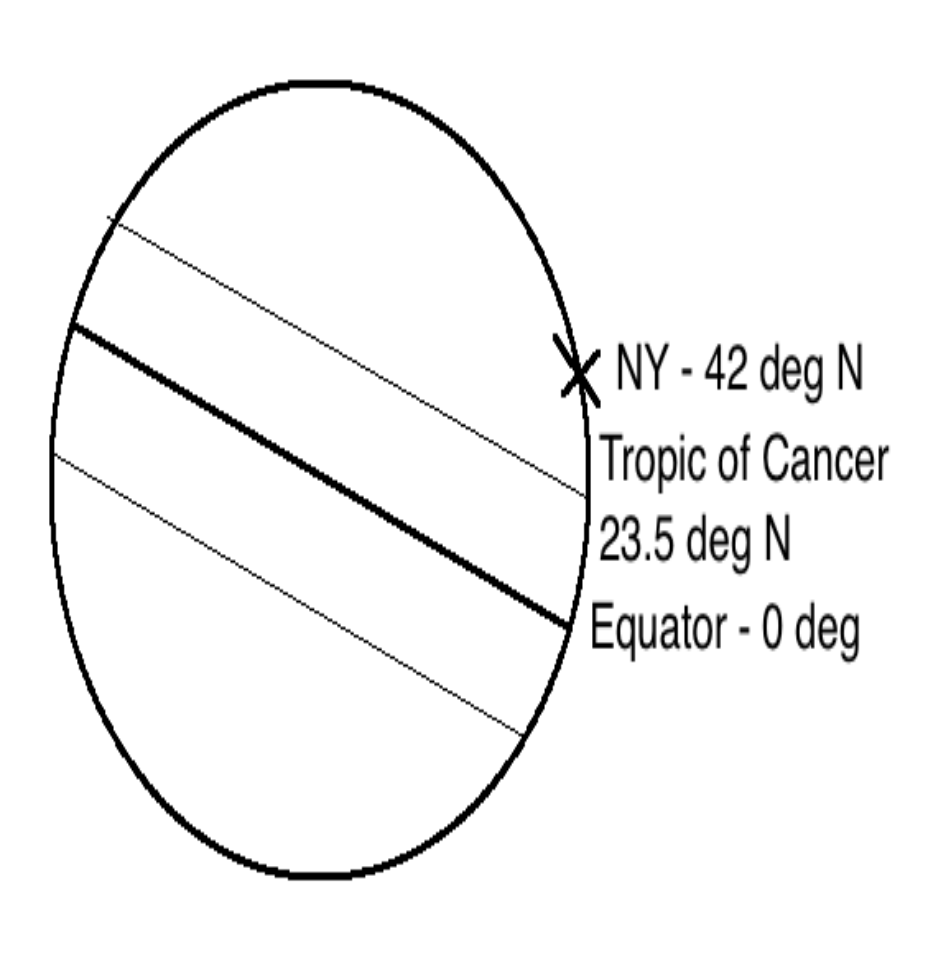
Equinox (R)



- Spring / Fall Equinox
- The sun @ Equator 0 deg
- NY is 42 degrees

- If we were at the equator the sun would be 90 degrees in the sky.
- We are 42 deg away
- 90 – 42 =?
- 90 – 42 = 48
- The sun is 48 degrees in the sky

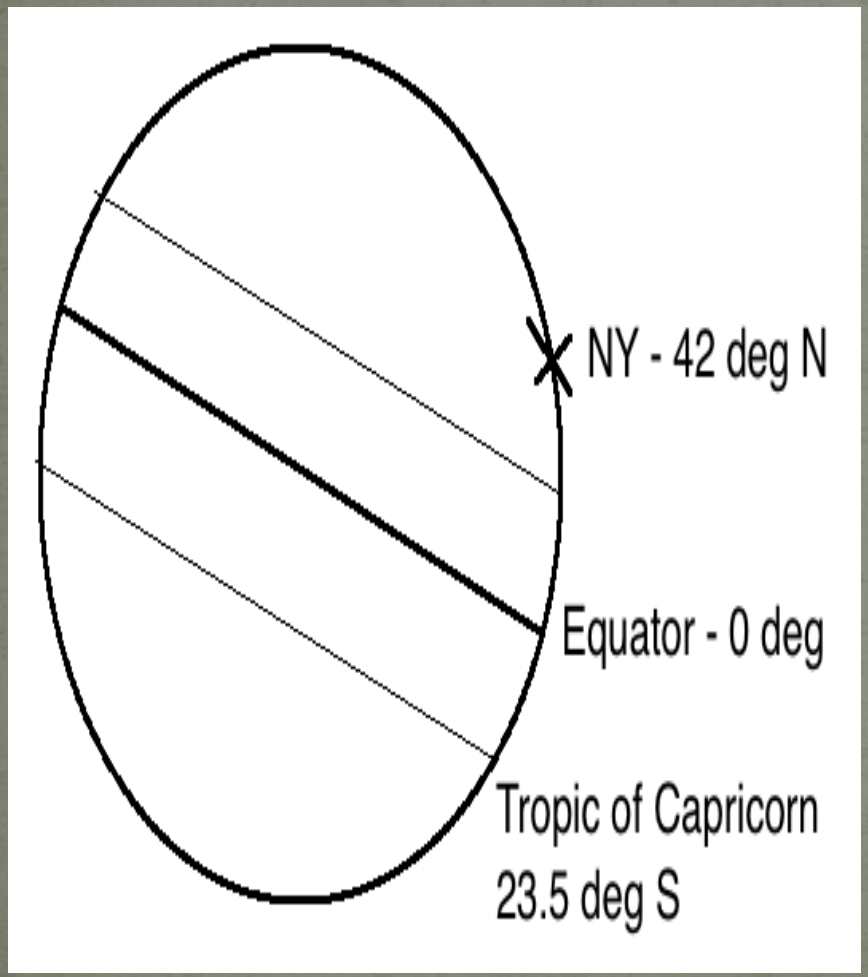
Summer Solstice (R)



- Summer Solstice
- The sun @ T. of Cancer 23.5 deg N
- NY is 42 degrees

- T. of Cancer has 90 degree sun.
- We are ? Away
- 42-23.5 = 18.5 deg away
- 90 – 18.5 =?
- The sun is 71.5 degrees

Winter Solstice (R)



- Winter Solstice
- The sun @ T. of Capricorn 23.5 deg S
- NY is 42 deg N

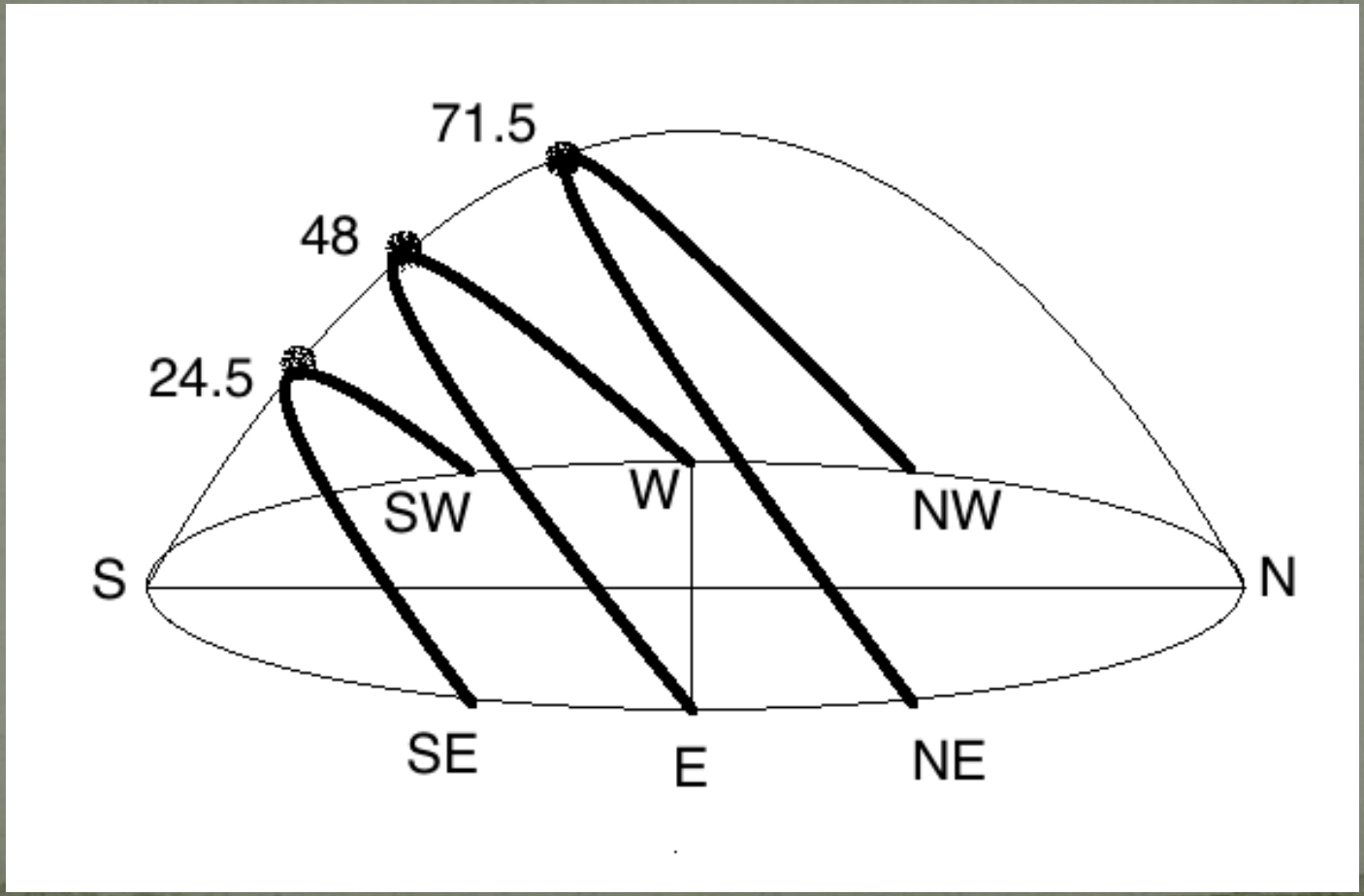
- T. of Capricorn has 90 degree sun.
- We are ? Away
- 42 + 23.5 = 65.5 away
- 90 – 65.5 = ?
- The sun is 24.5 degrees
- Or (90-42=48-23.5=24.5)

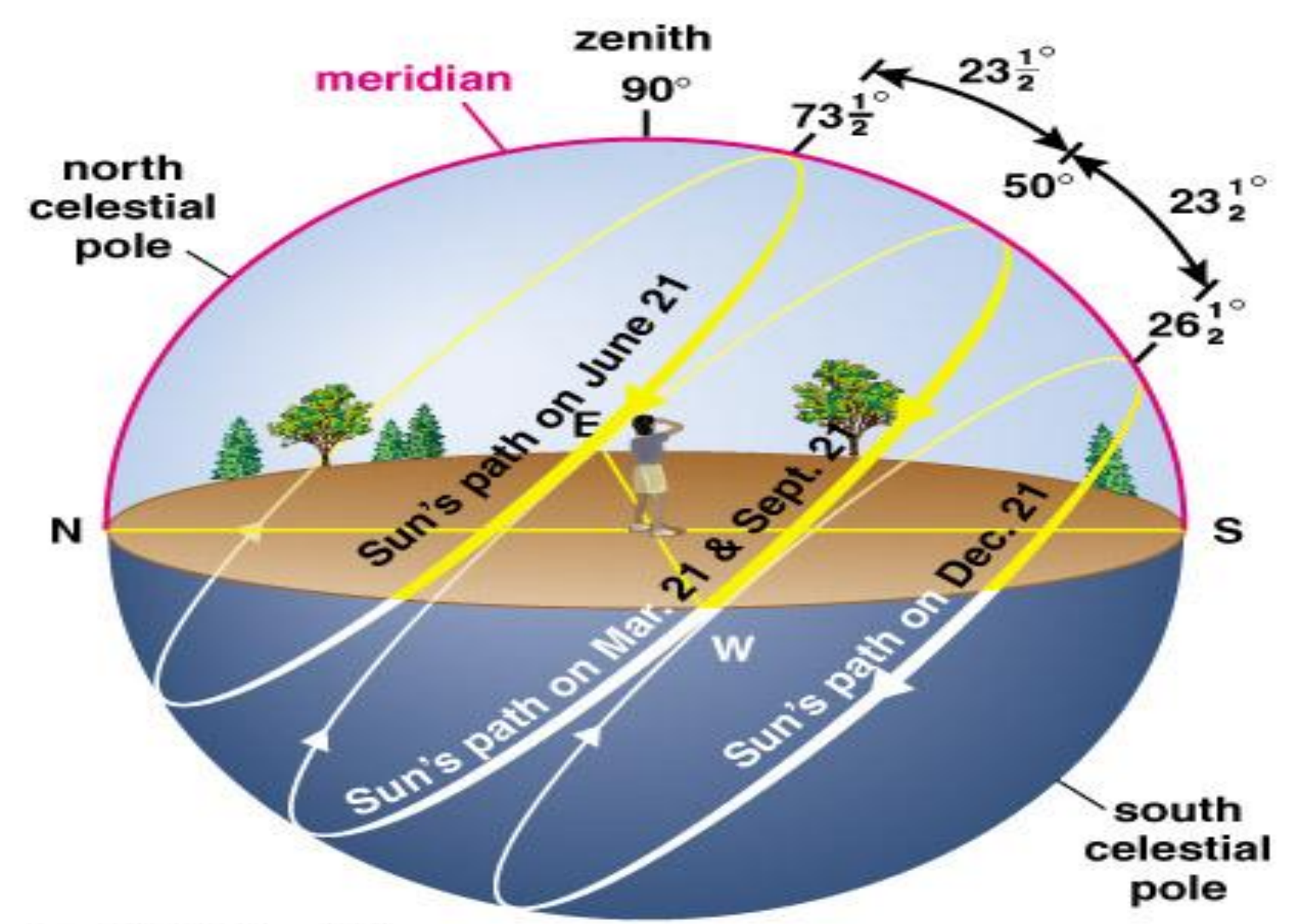
Where does the sun rise and set??? (R)

Equinox – The Sun rises and sets E → W

Summer – The sun is in the North NE → NW

Winter – The sun is in the South SE → SW





Seasons Conclusion (R)

- 1)EXPLAIN the 4 reasons for the seasons
- 2) Explain the importance of EACH of the 5 key latitudes
- 3) EXPLAIN all about Equinoxes
- 4) EXPLAIN all about Solstices
- 5) How to find the angle of the noon day sun.