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# Introduction to Geography

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# Earth

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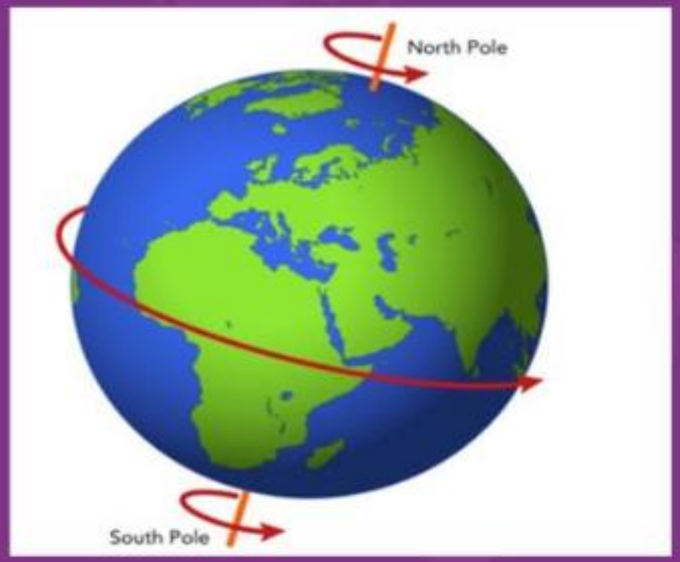
# Earth as a rotating planet

## Rotation

- The Earth spins on its axis from West to East (counter-clockwise).
- It takes the Earth 23 hours, 56 minutes, and 4.09 seconds to complete one full turn.



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# Speed of Rotation of Earth

- The speed of rotation at any point upon the equator is at the rate of approximately 1,038 miles per hour, decreasing to zero at the poles.

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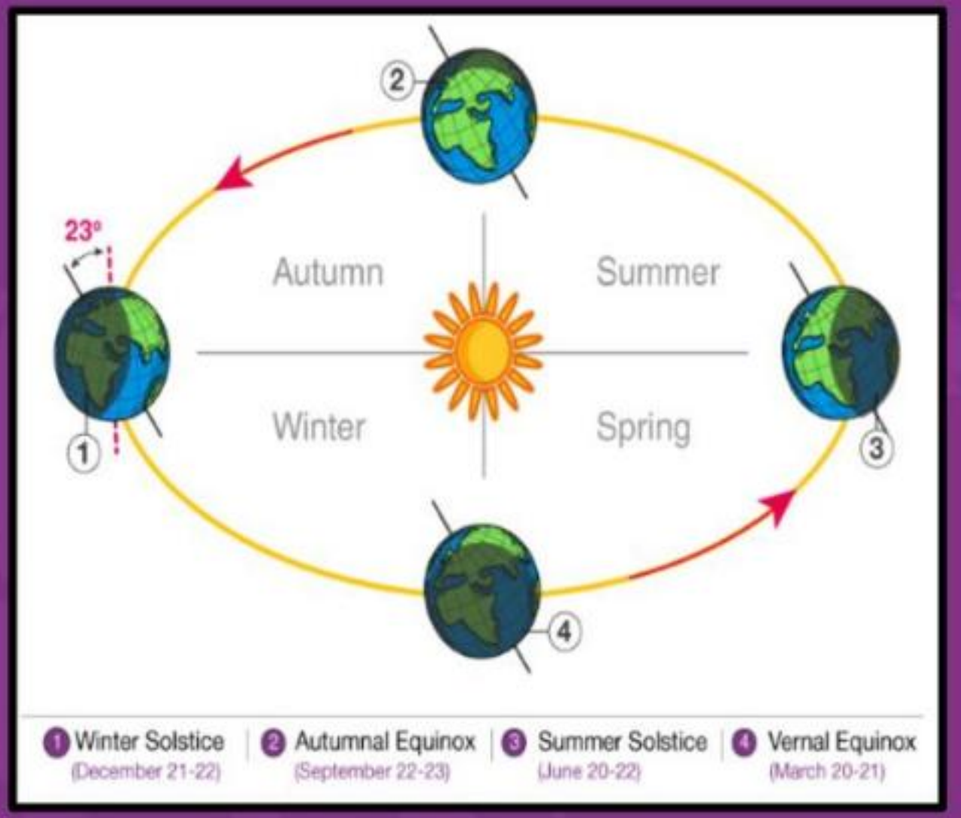
## Revolution

- While the Earth is spinning on its axis, it is revolving around the Sun in a counter-clockwise direction.
- It takes the Earth one full year to complete one full revolution around the Sun.
- The mean distance of the Earth from the Sun is about 93 million miles and the distance varies by 3 million miles, forming a slightly oval path.



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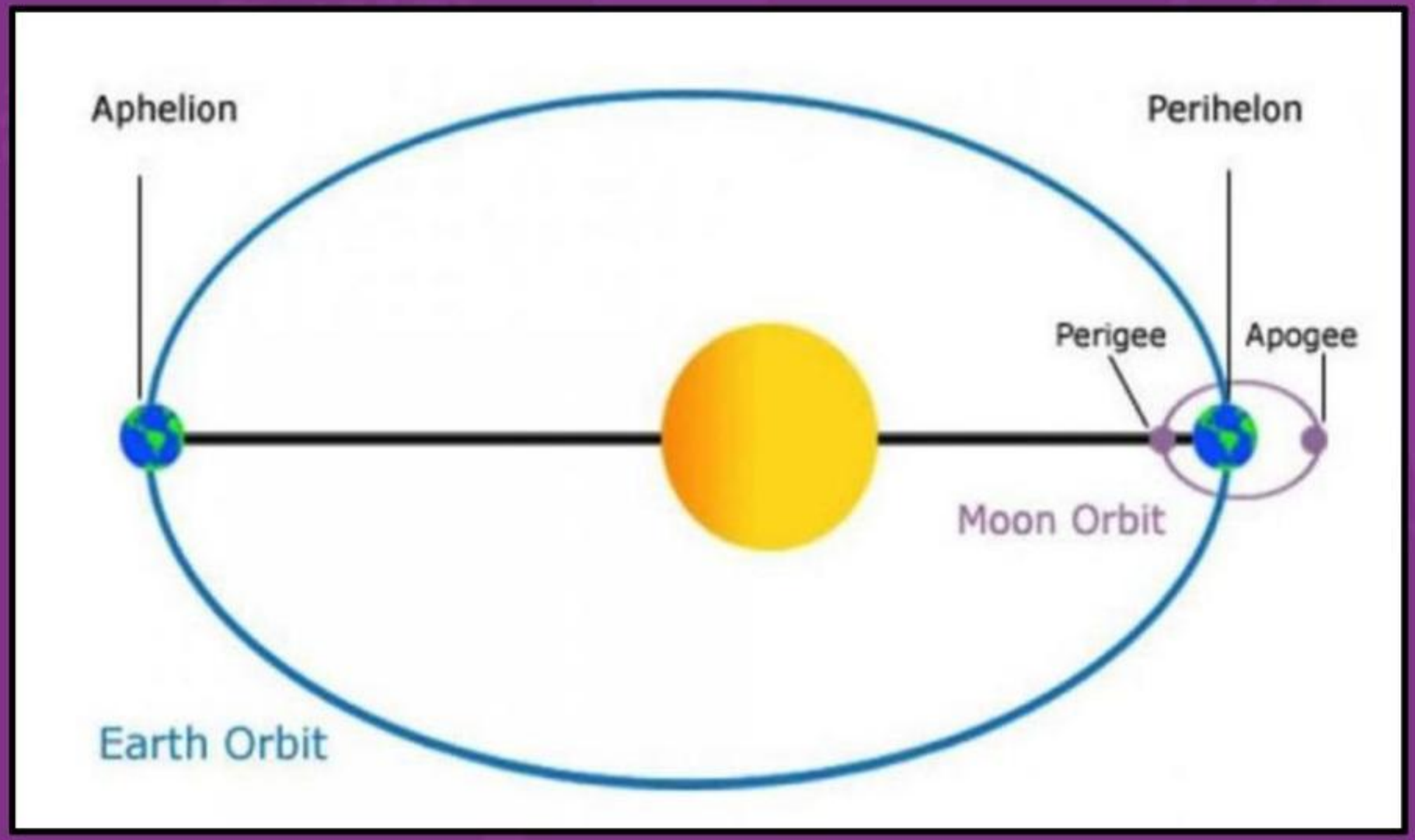
# Aphelion and Perihelion



Earth is at its maximum distance from the sun at aphelion, and at its minimum distance at perihelion.

The point in the moon's orbit where it is farthest from the earth is called apogee, while it's closest approach is known as perigee.

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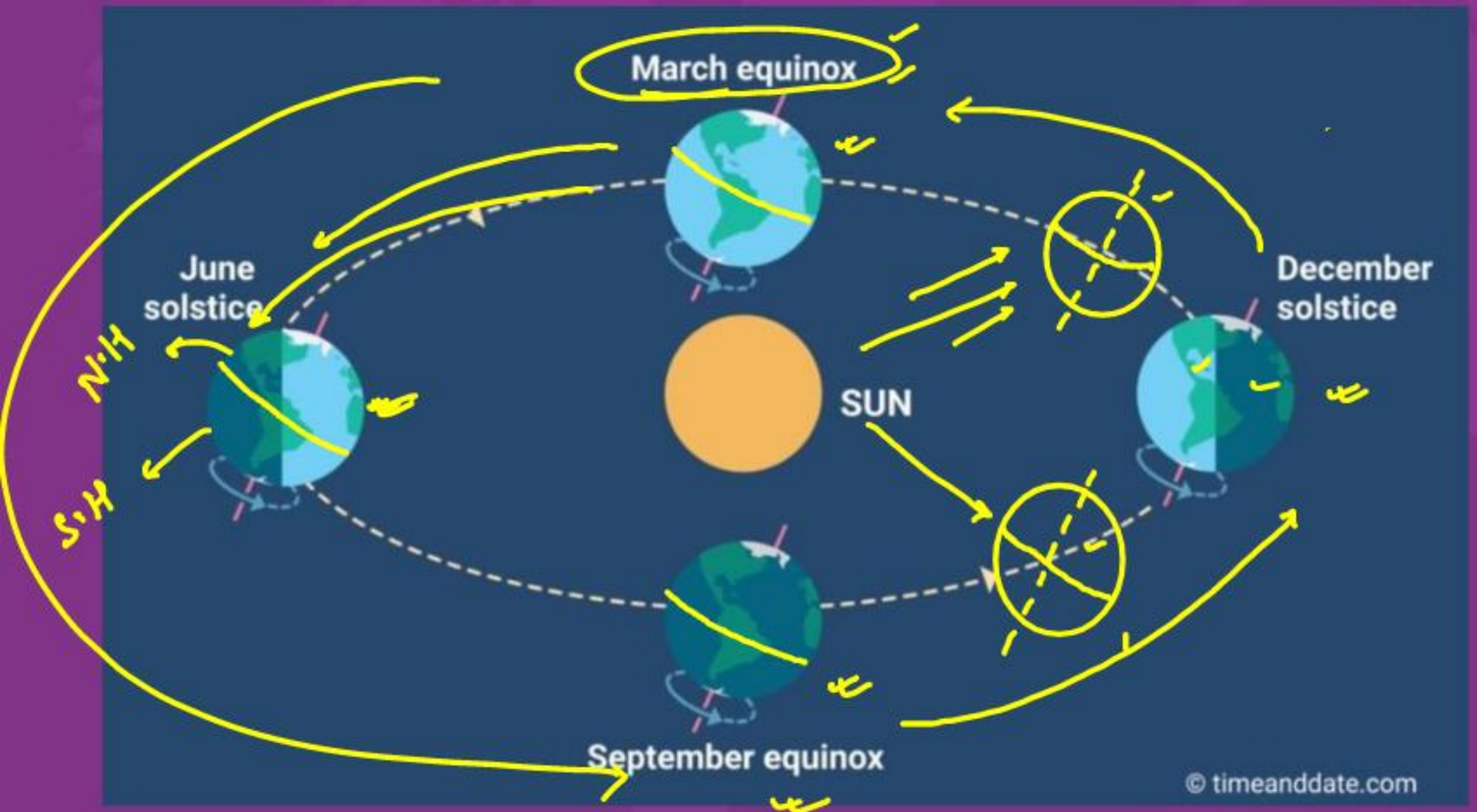
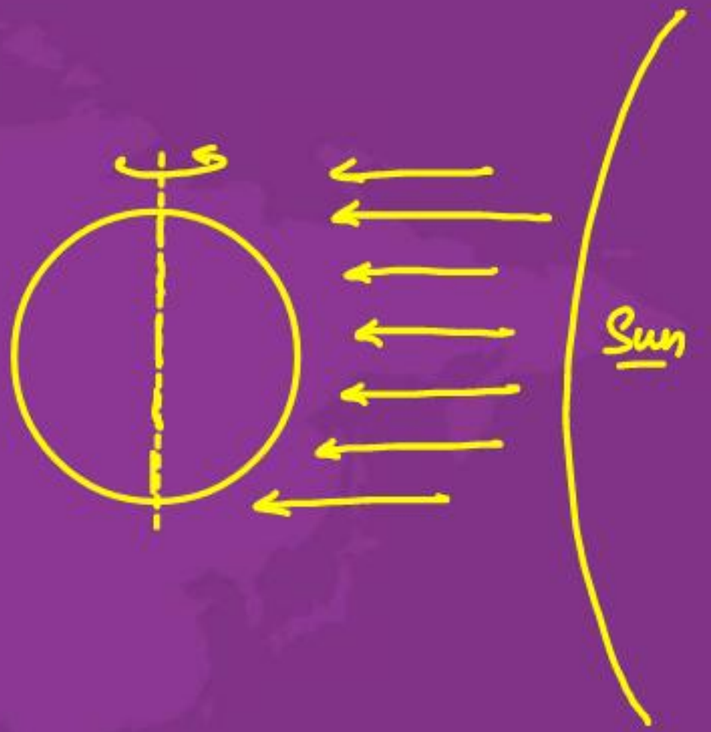
# Seasons on Earth



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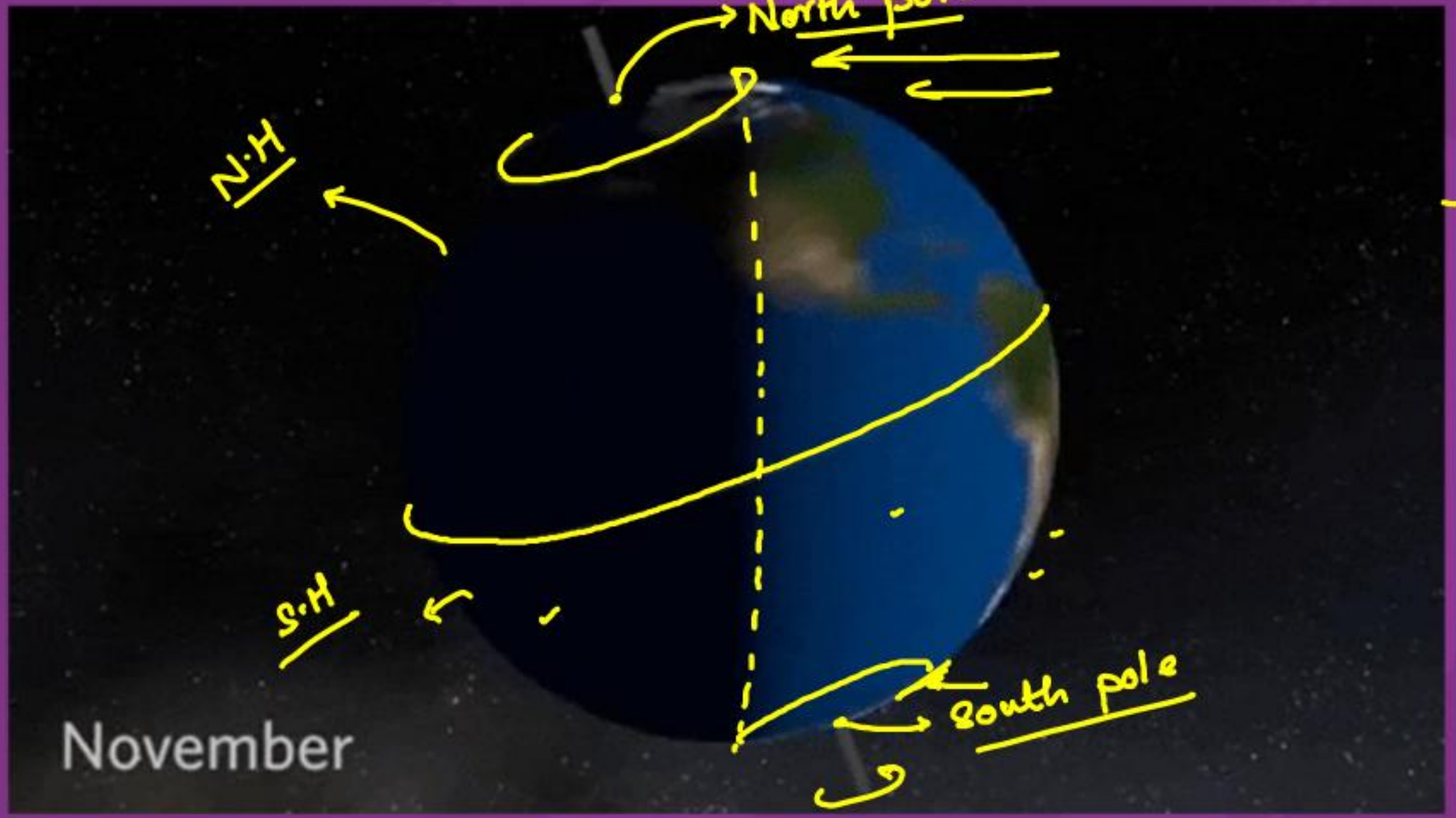
(Oct - feb)




**N.H**

→ Shorter days & longer nights

→ Winter season

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**S.H**

→ Longer days & shorter nights

→ Summer season.

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Oct – February

N·H ⟶ Winter ; S·H ⟶ Summer

Polar region ⟶ Arctic Circle & North pole ⟶ Prolonged night for many months.
↳ The sun does not rise above the horizon.

⟶ South Pole & Antarctic Circle. ⟶ Continuous daytime.
↳ The sun does not set below the horizon.

December Solstice / Winter solstice.

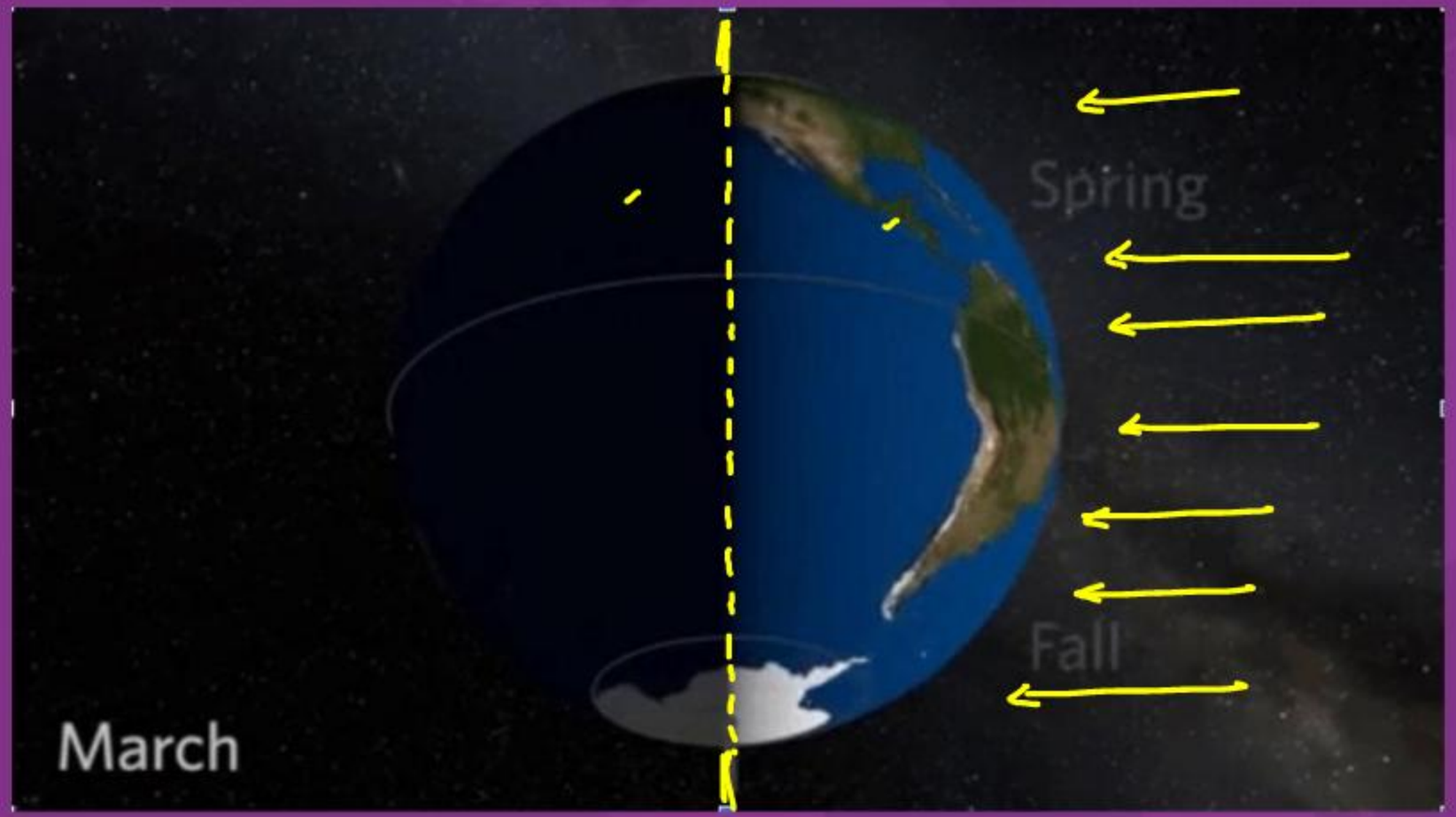
21st Dec ⟶ N·H ⟶ Longest night & shortest day.
S·H ⟶ Longest day & shortest night.

March
September

## Conditions of Equinox

↳ Both in northern & southern Hemisphere; equal amount of solar rays :-

→ Equal duration of day & night



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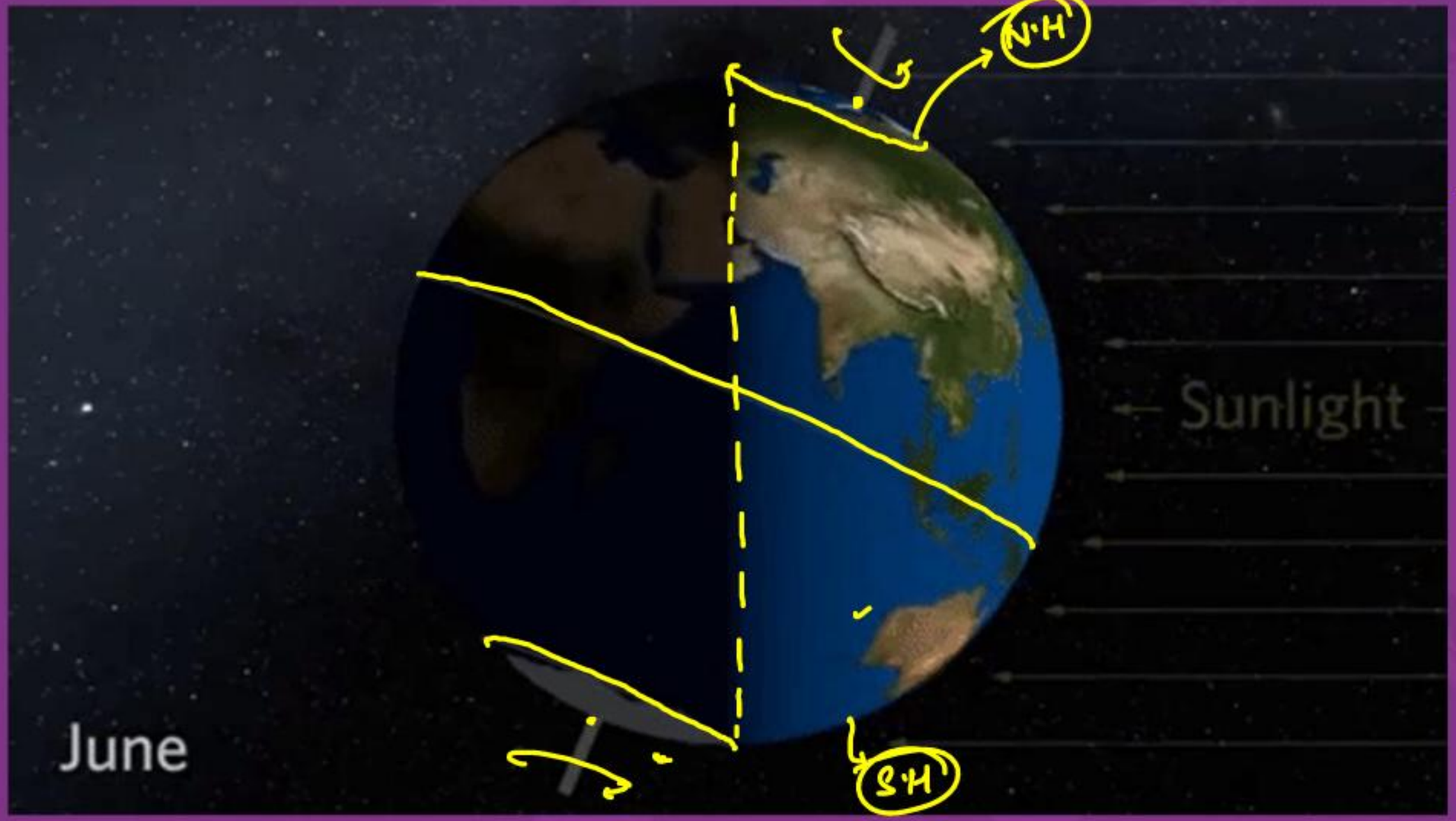
April - Aug ∝




**N·H**

→ Longer days & shorter nights
→ Summer.

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**S·H**

→ Shorter days & longer nights.
↳ winter

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(April - Aug)

Arctic & North Pole → Constant daytime → Sun does not set below the horizon.

Antarctic Circle & South Pole → Constant night.

June Solstice / Summer solstice

21st June. → N.H → Longest day & Shortest Night.

S.H → Shortest day & longest night.

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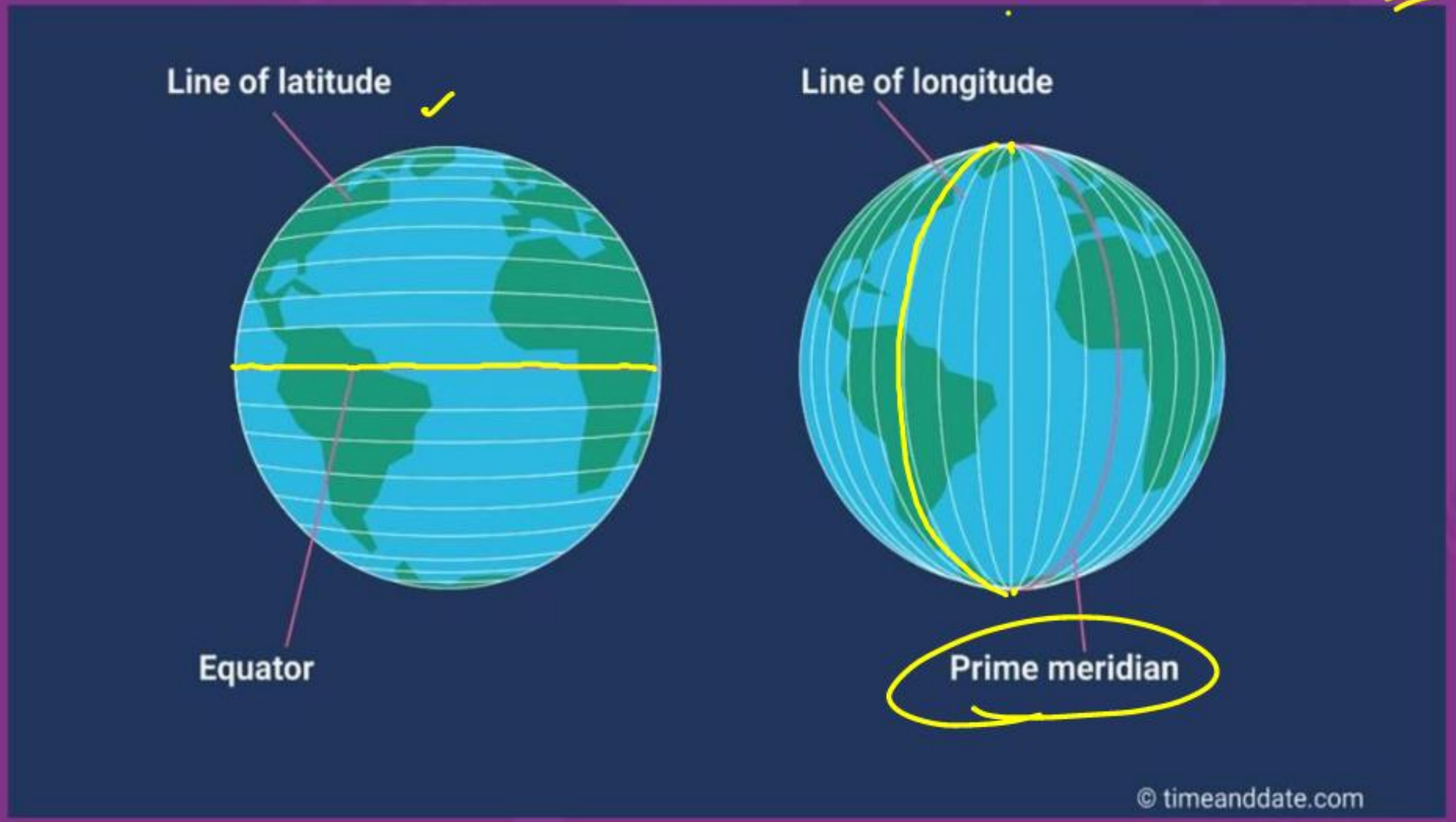
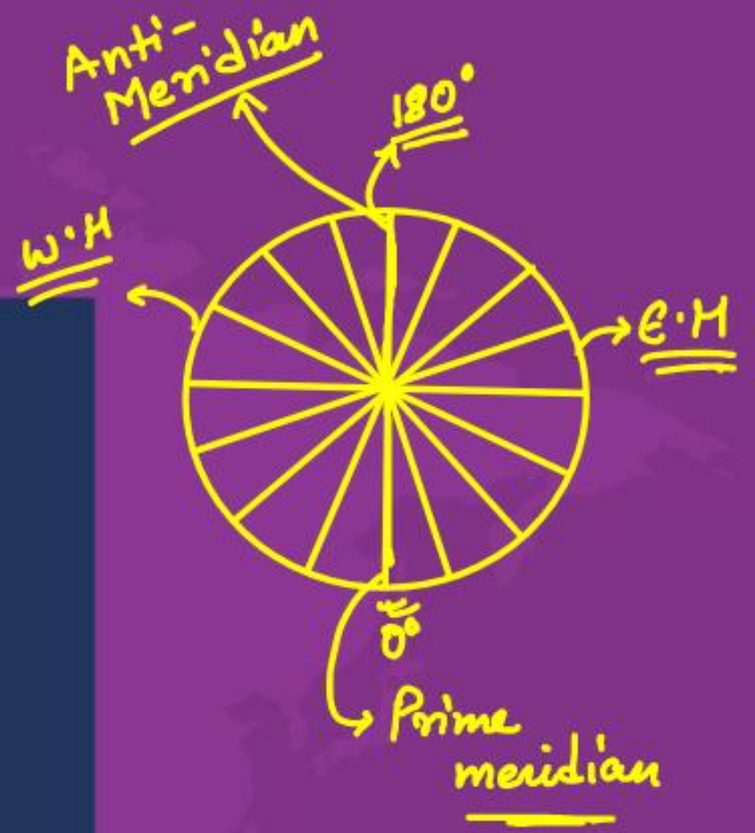
# Longitudes and Latitudes



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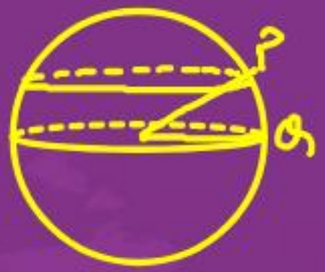
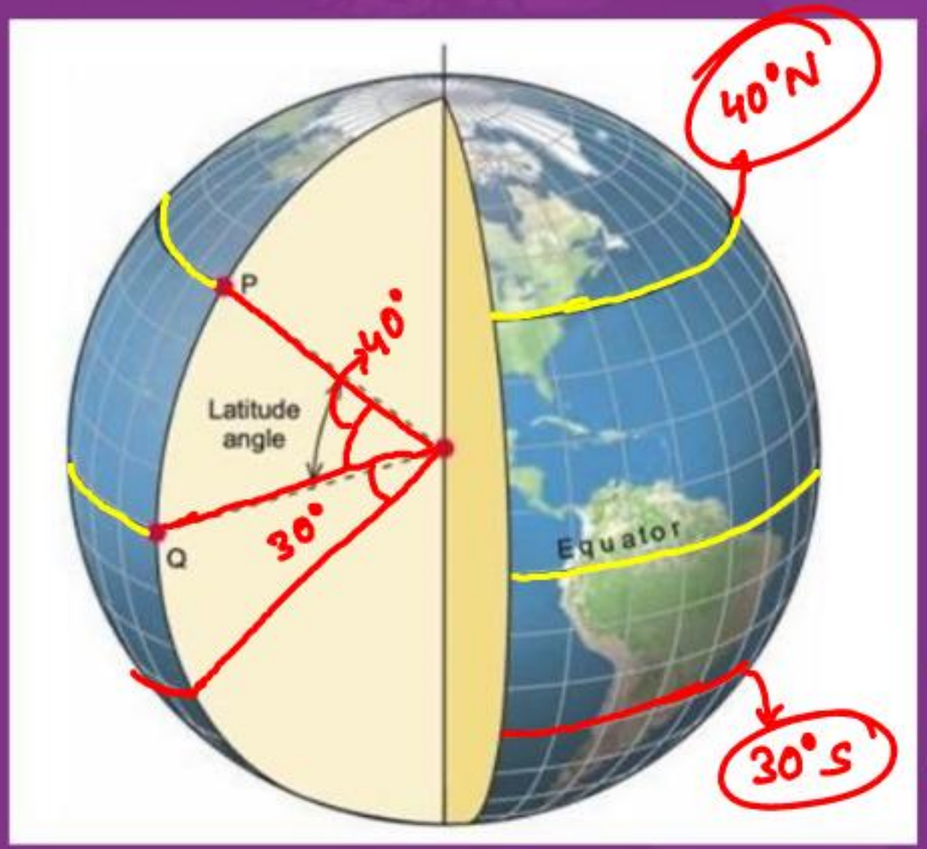
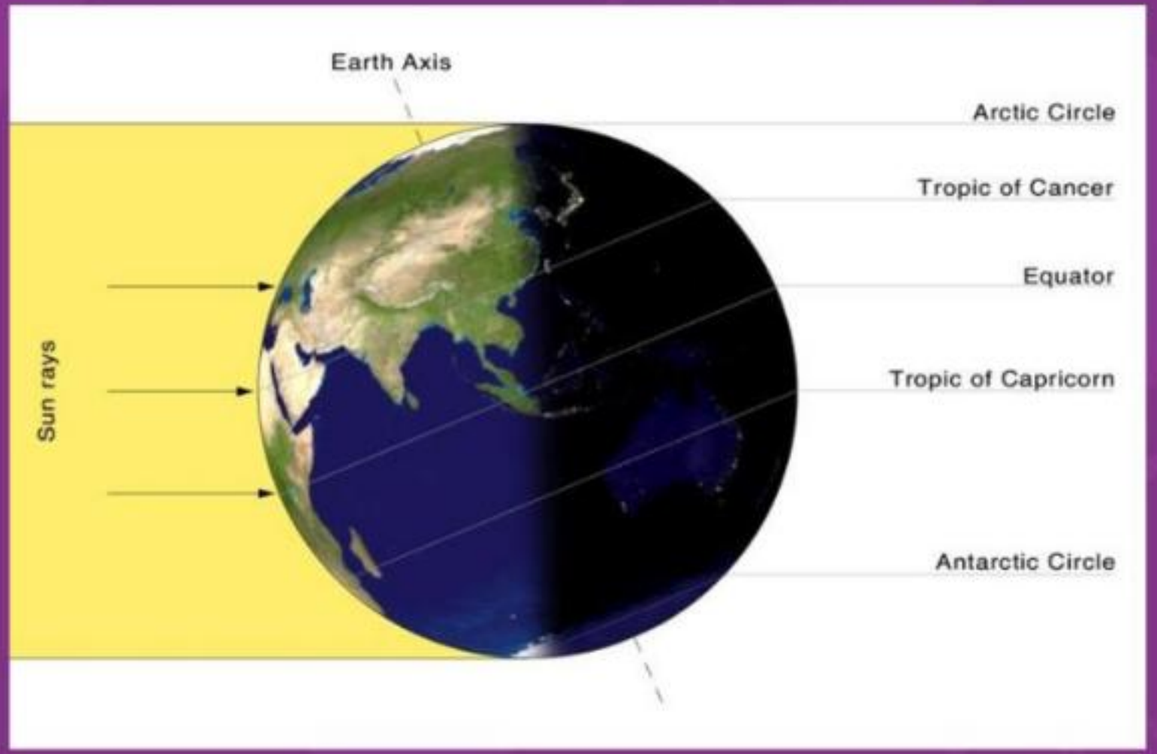
# Latitudes





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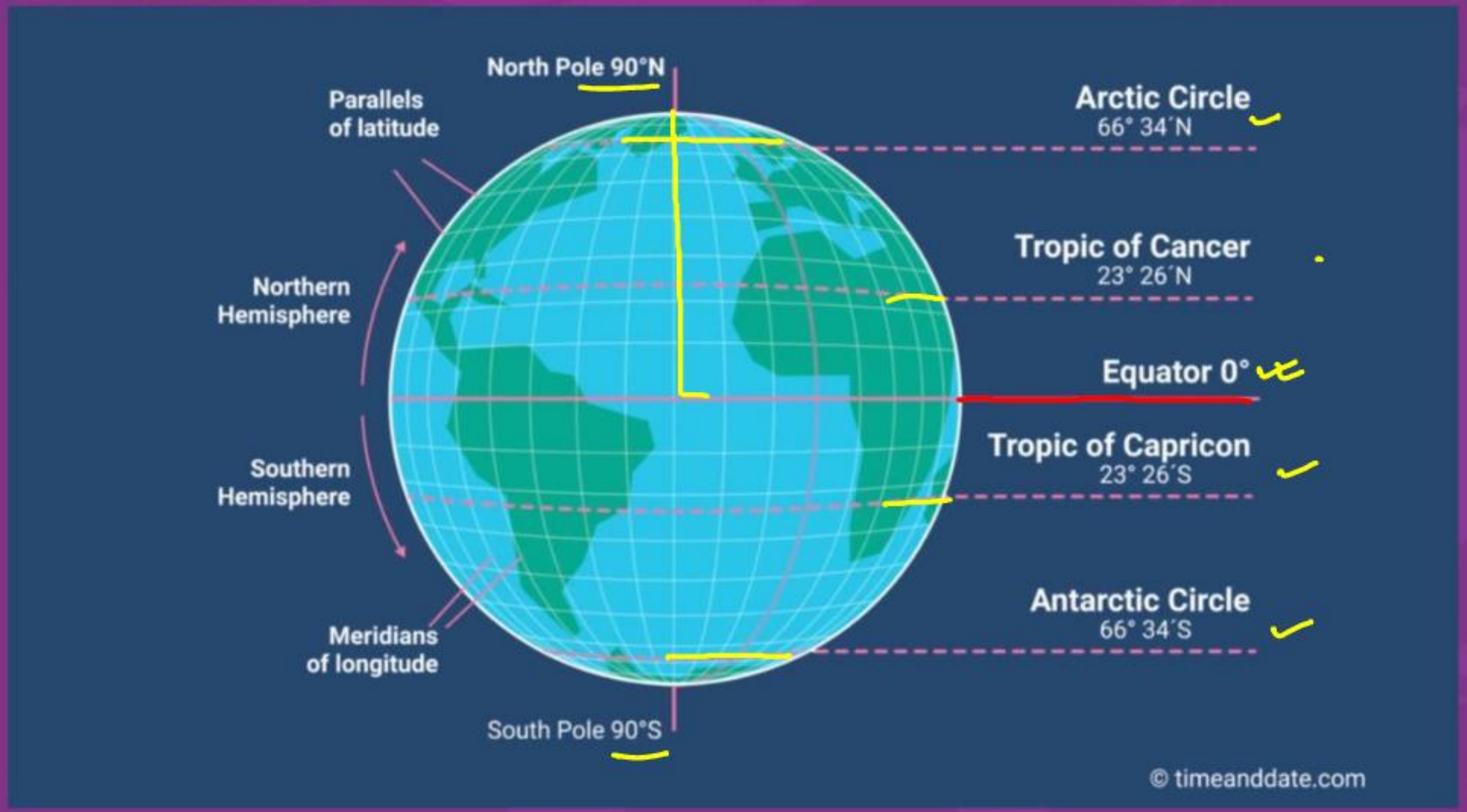

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Latitudes are imaginary circles parallel to the Equator. On a map where north is up, latitudes run laterally (left to right). They are named after the angle created by a line connecting the latitude and the center of the Earth, and the line connecting the Equator and the center of the Earth.

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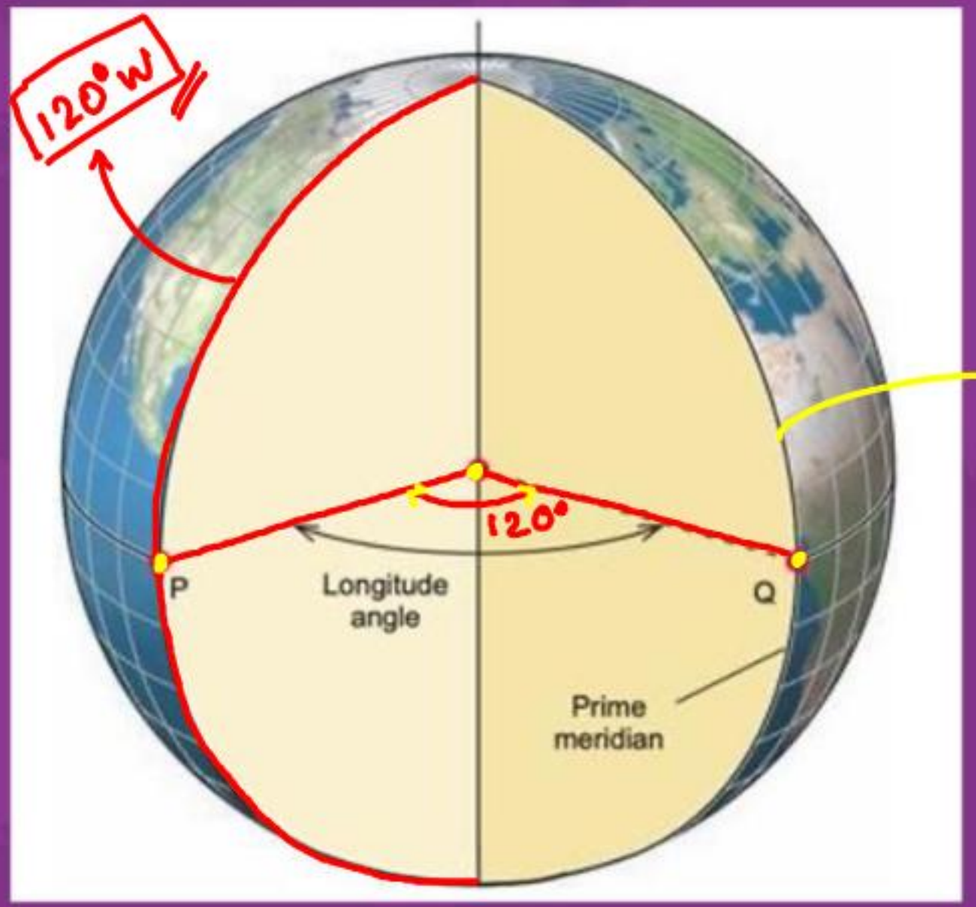
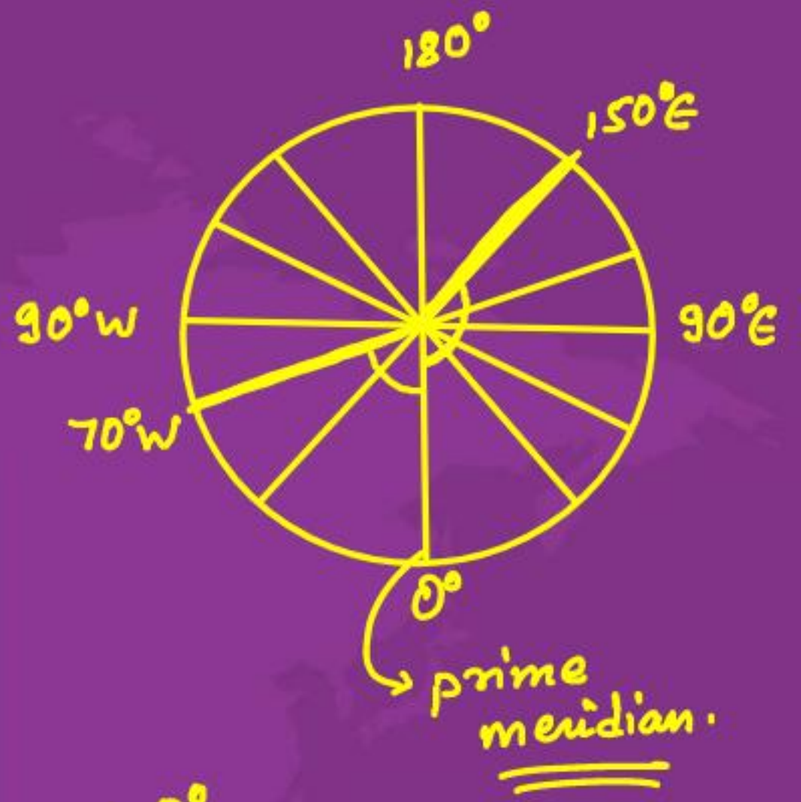
# Longitudes

- Prime Meridian
- Anti Meridian




0°

7am

Longitudes are geographical positioning markers that run from the geographical North Pole to the geographical South Pole, intersecting the Equator. They meet at both Poles and specify the east-west position of a location.

The Prime Meridian is set as 0° longitude and it divides the Earth into the Eastern and the Western Hemispheres. All the other longitudes are measured and named after the angle they make with respect to the center of the Earth from the intersection of the Meridian and the Equator.

IST → GMT + 5½ hrs

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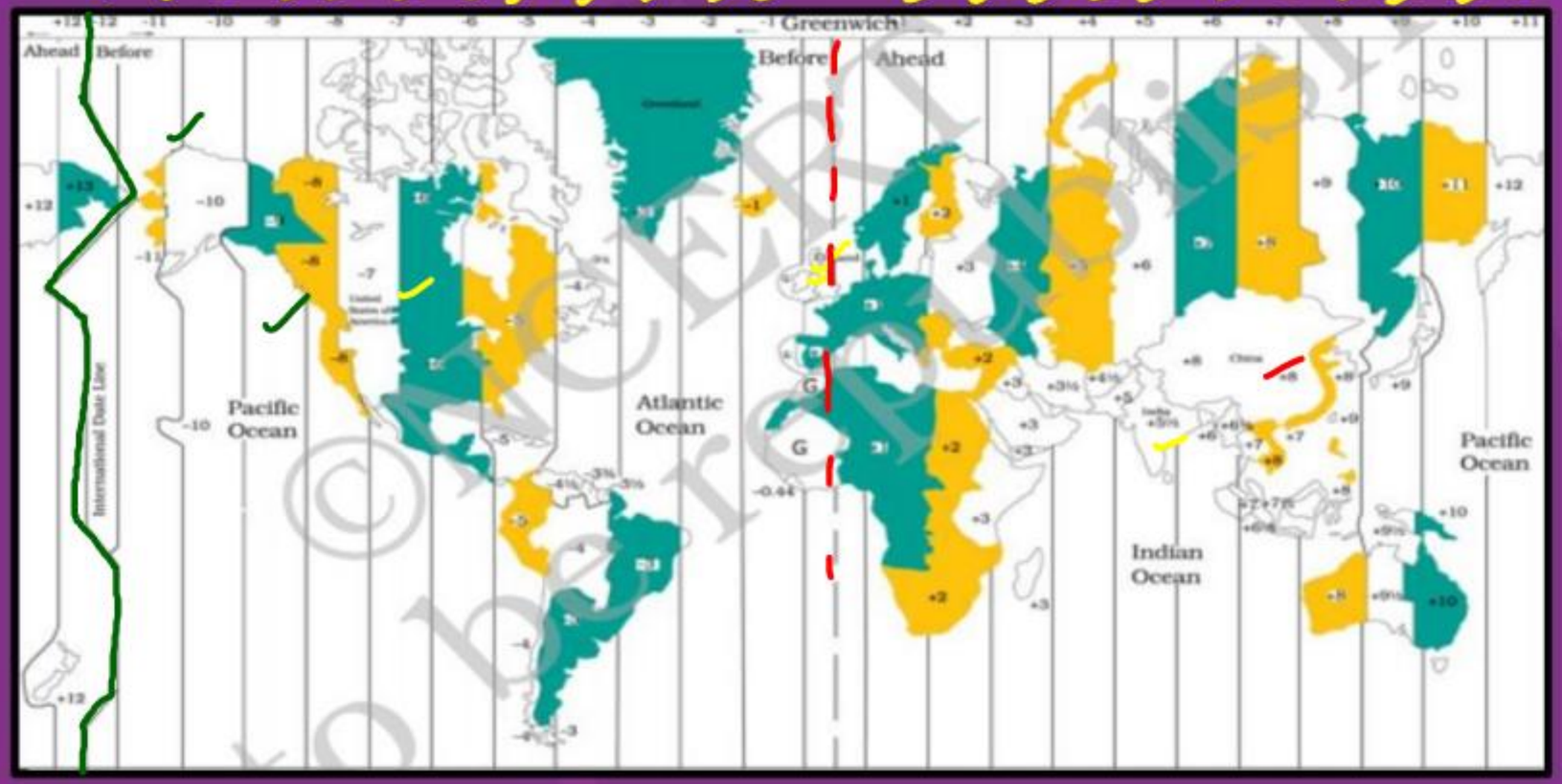
# International Date Line (IDL)

- The International Date Line (IDL) is an imaginary line on Earth's surface defining the boundary between one day and the next.



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# International Date Line (IDL)


- The Dateline Is Not Straight why?
  - The dateline runs from the North Pole to the South Pole and marks the divide between the Western and Eastern Hemisphere.
  - It is not straight but zigzags to avoid political and country borders and to not cut some countries in half.

West to East → Gain a day → Subtract a day.

East to West → Lose a day → Add a day

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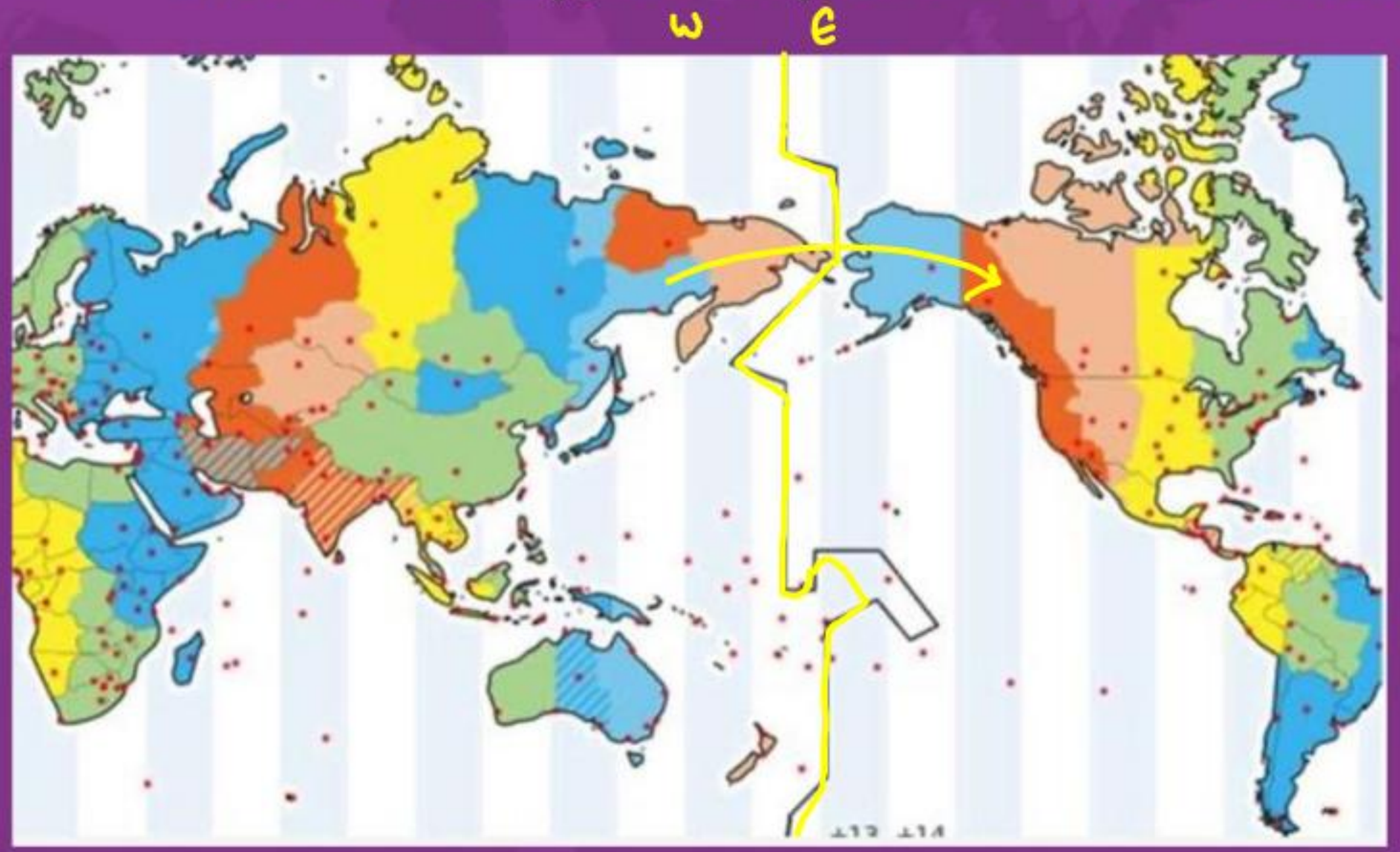
# What Happens When You Cross the Dateline?

- When you cross the International Date Line from west to east, you subtract a day, and if you cross the line from east to west, you add a day.



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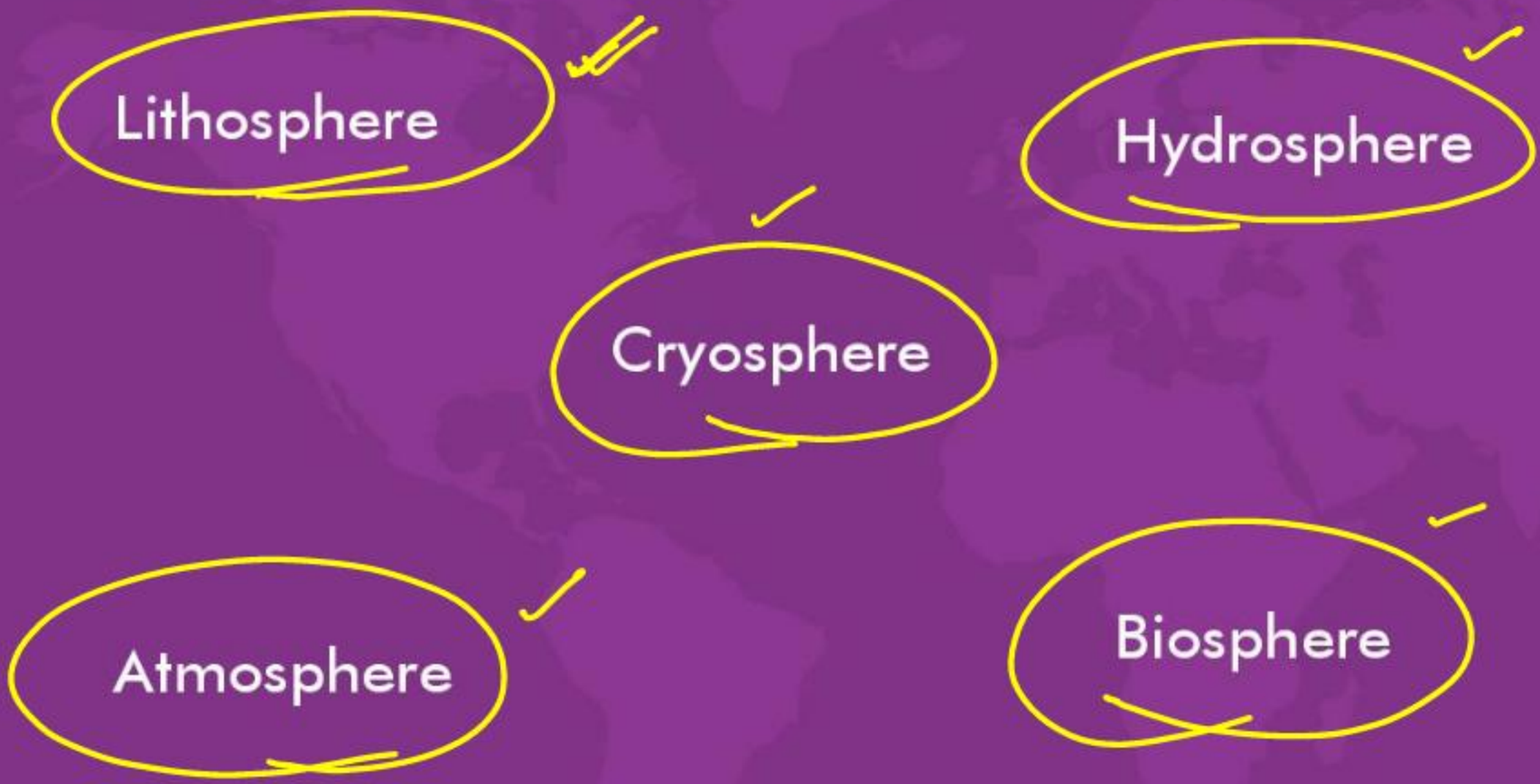
# Systems of Earth



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# Basic Geomorphology in Everyday Life

Mountain → Greater height
Conical distinct peak

Glaciers
↳ Moving mass of ice

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plateau → Flat tableland like structure.

Hills → Lesser height
Rounded tops

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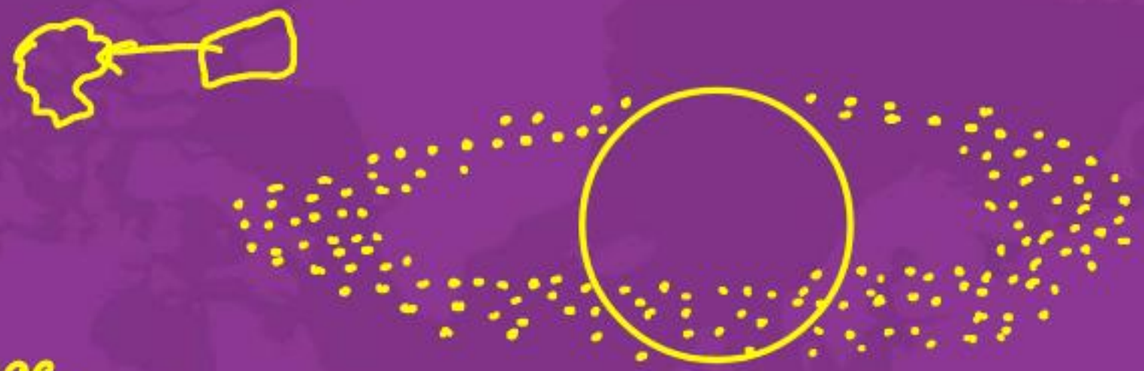
# Formation of Earth → Accretion Theory



→ ← G ∝ mass

Creation of large Planetesimals.

Building blocks of planets.

Collisions → Rise in temp. → Materials joining together → Increase in mass of the particles → Increased gravity → More collisions → Rise in temp.

→ planetesimals collided to form Earth

(Molten state)

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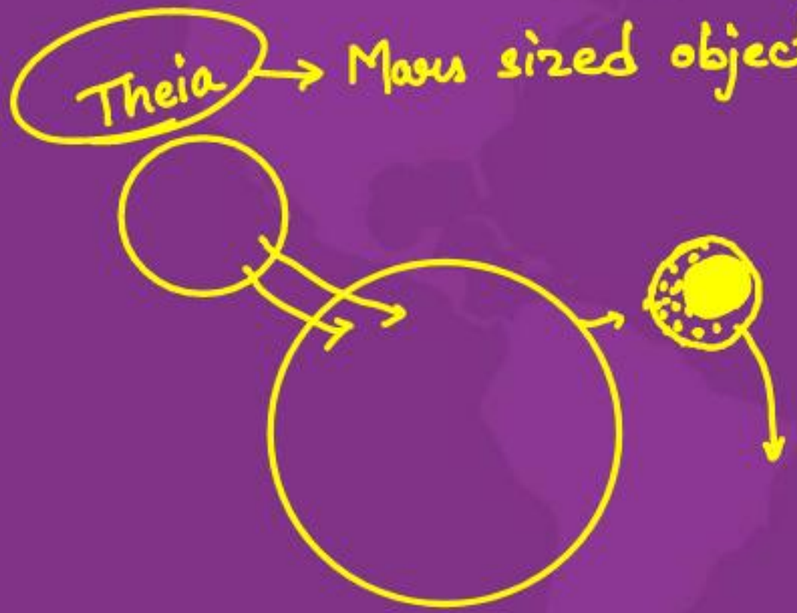
molten earth

→ (Iron & Nickel)

↳ Heaviest elements settled down at the bottom & layers started to develop

→ [Giant Impact Hypothesis]

Theia → Mars sized object colliding with liquid/molten earth



↳ Large mass separated but was held by earth's gravitation & became the Moon.

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On 21st June, the Sun (2019)


(a) does not set below the horizon at the Arctic Circle

(b) does not set below the horizon at Antarctic Circle

(c) shines vertically overhead at noon on the Equator

(d) shines vertically overhead at the Tropic of Capricorn

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# Thank You!

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Mains
- Basics of Rocks
- Theories
  - Continental Drift
  - Seafloor Spreading
  - Plate Tectonics

Prelims
- Interior structure of Earth
- Discontinuities
- Basics of Rocks
- Basics of Plate Tectonics

# Earth and its Interior
# Rocks
# Plate Movements

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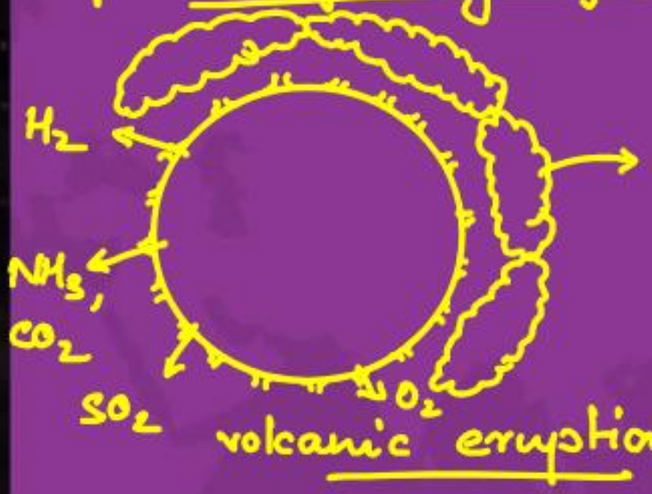
# Formation of the Earth

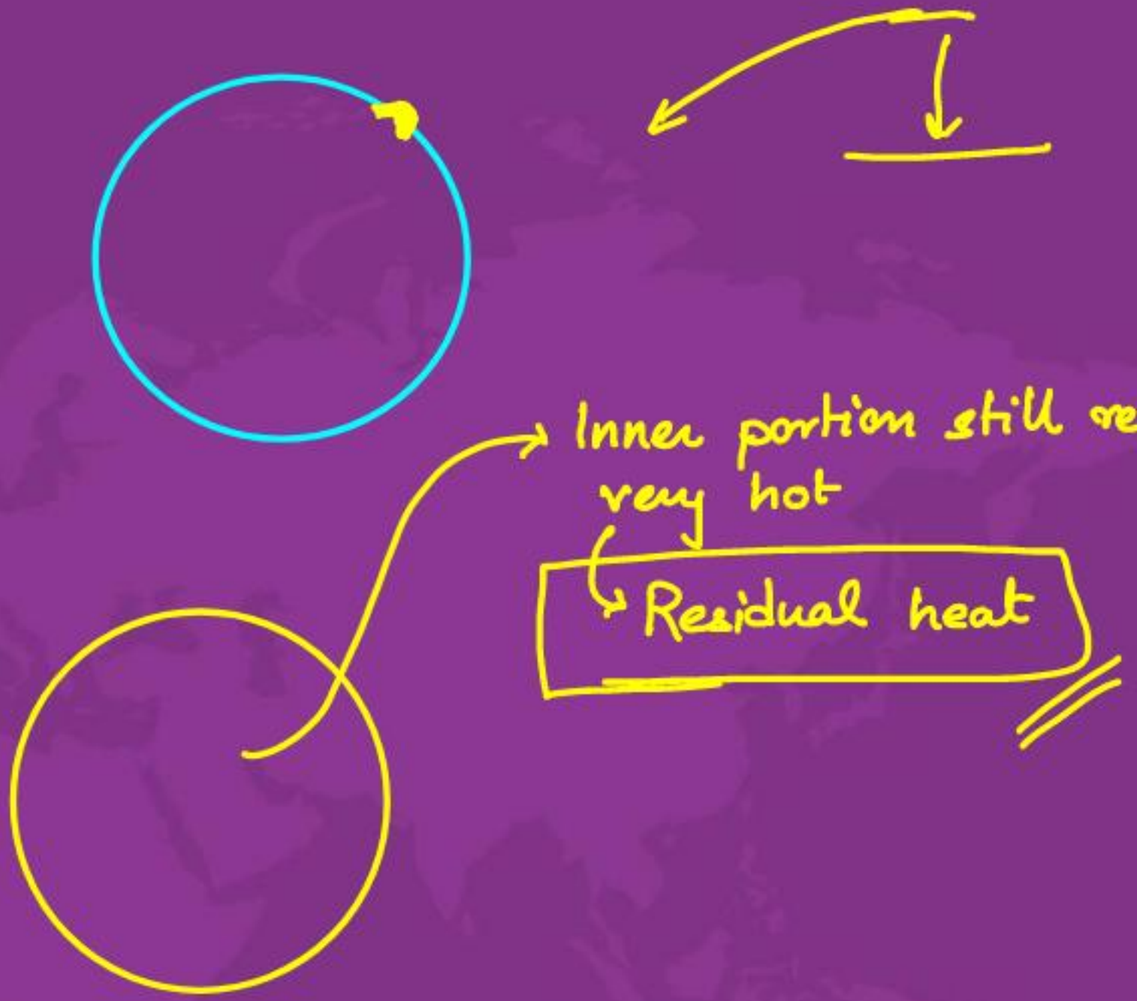
$Fe_2O_3$ / $Fe_3O_4$ / $Al_2O_3$ $SiO_2$

Outer portion started solidifying, with lot of gases trapped in the interior.

phase of degassification (exit of gases)




(phase of continuous & torrential rains) → (continued to rain for 7,000 – 10,000 years)


Inner portion still remains very hot
Residual heat

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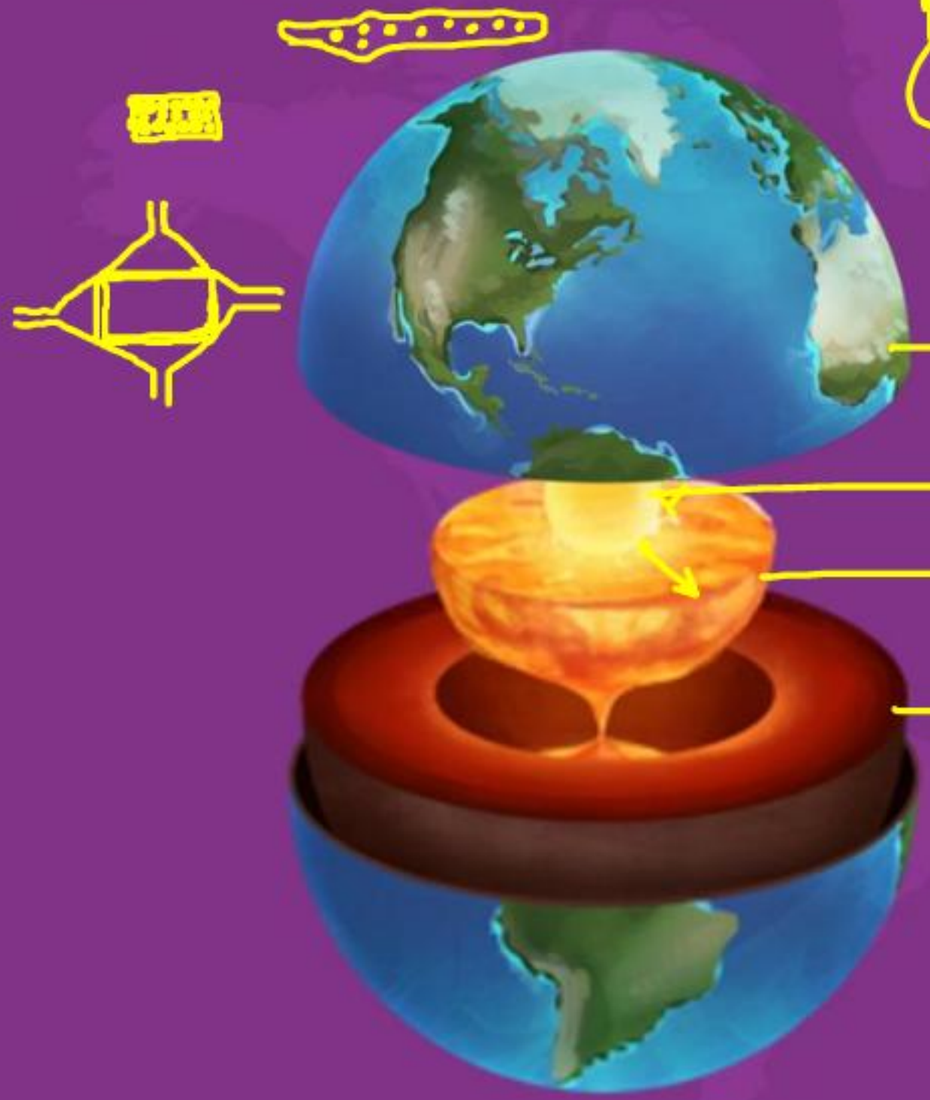
# Interior of Earth



→ Sources of information
- → Direct sources
  - → Volcanic eruptions
  - → Mining & digging
- → Indirect sources.
  - → Seismic waves [Energy waves generated during Earthquakes]
  - → Asteroids & Meteors
  - → Magnetic & Gravitational anomalies of planet earth

**Geothermal Gradient**

→ Rise in temp. as we move into the depth.

→ Crust

→ Inner core (solid) → Due to extreme pressure exerted from all sides; it cannot expand & hence continues in a solid state despite the very high temp.

→ Outer core (liquid)

→ Mantle (solid)

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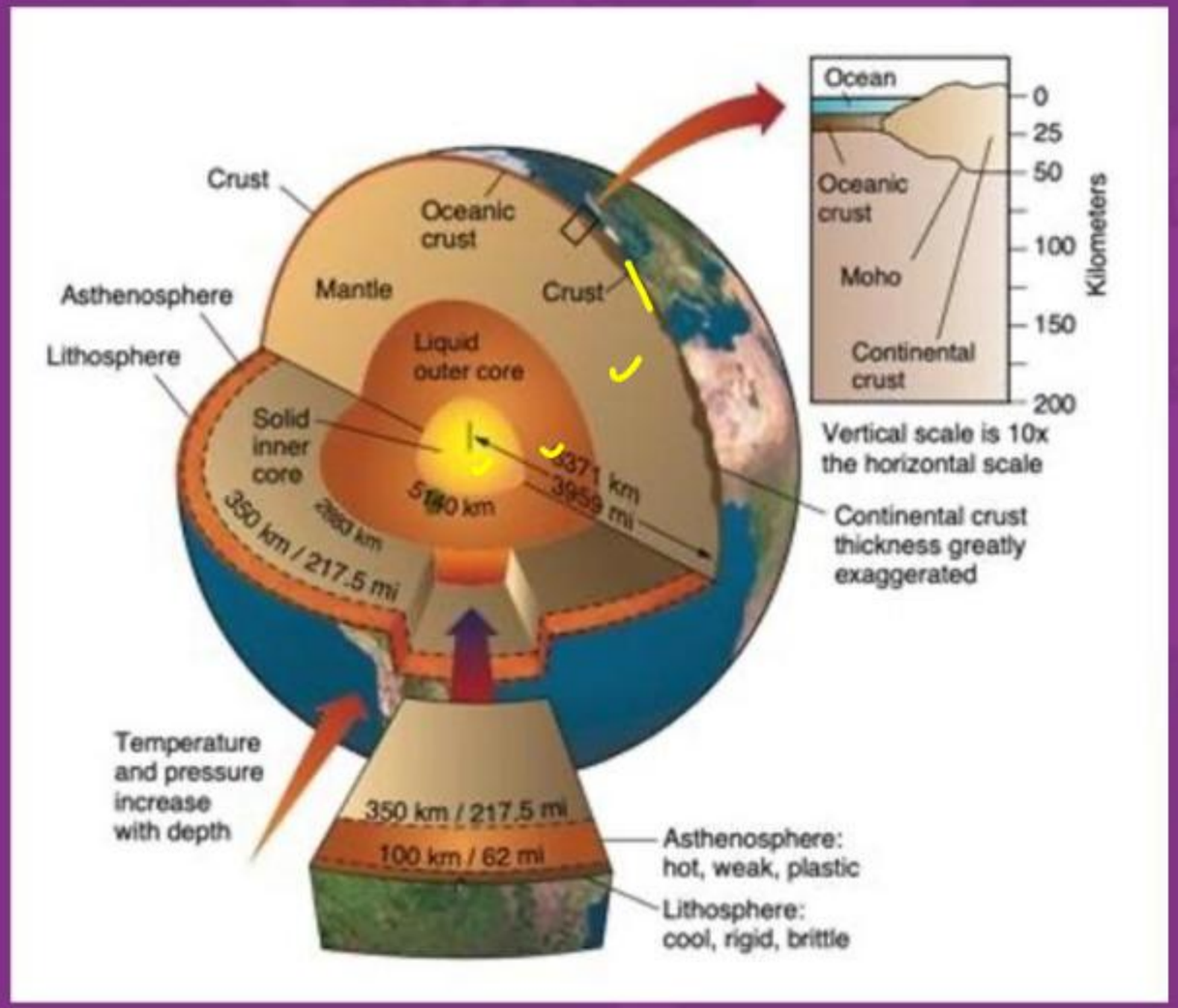
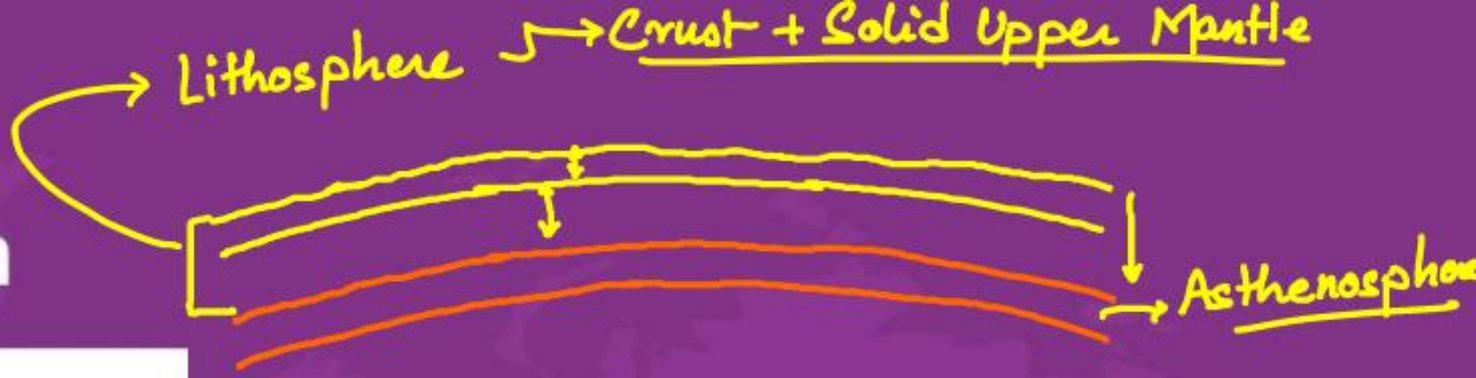
# Structure of the Earth




→ Mantle (solid)

Asthenosphere → semi-solid / semi-molten state.

↳ Materials like Uranium & Pottasoium undergo thermo-nuclear reaction & produces heat.

↳ partially melts ——als. around creating Asthenosphere

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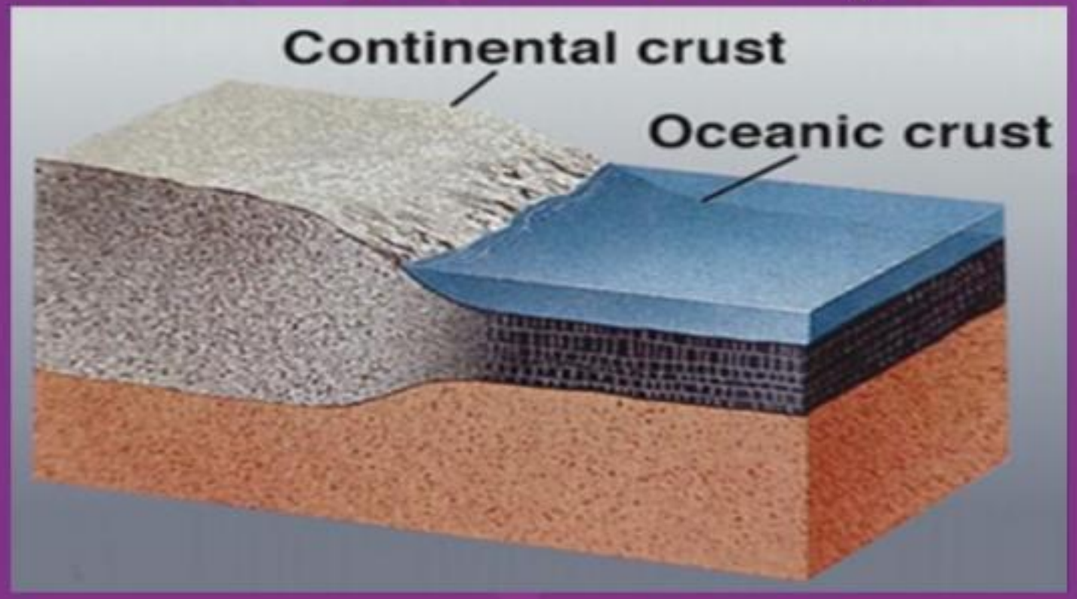
# The Crust

- It is the outermost solid part of the earth. It is brittle in nature.
- The thickness of the crust varies under the oceanic and continental areas. Oceanic crust is thinner as compared to the continental crust.
- The mean thickness of oceanic crust is 5 km whereas that of the continental is around 30 km.

- The **continental crust is thicker** in the areas of major mountain systems. It is as much as 70 km thick in the Himalayan region.
- The **continental crust**, composed chiefly of **Granite** has a **density of 2.7 g/cm$^3$.**
- The type of rock found in the **oceanic crust is basalt**. The mean **density** of material in oceanic crust is **3 g/cm$^3$.**



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# The Mantle

- The portion of the interior beyond the crust is called the mantle.
- The mantle represents about 68 % of Earth's mass.
- It has a density around (3.4 g/cm$^3$) higher than the crust portion.