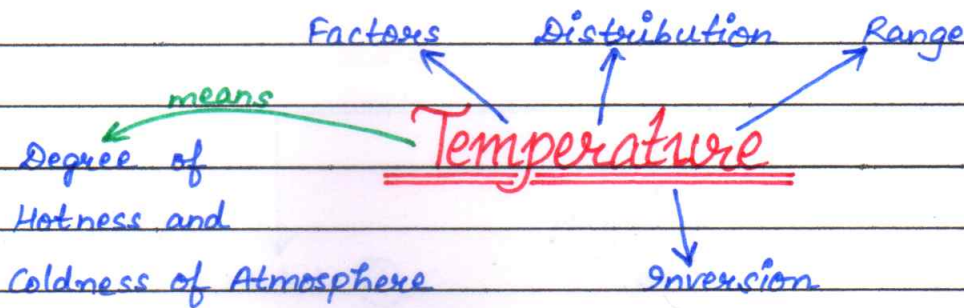
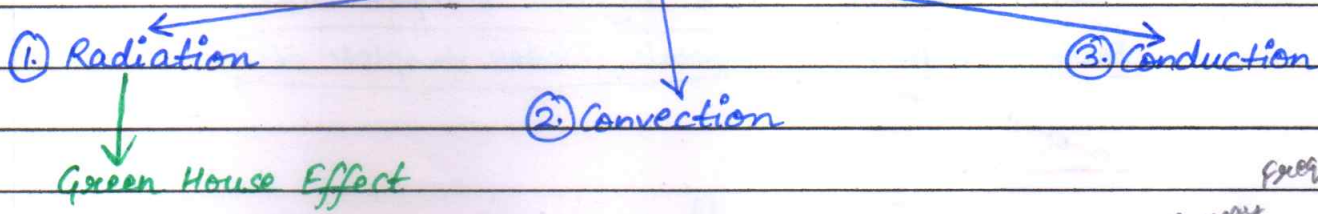


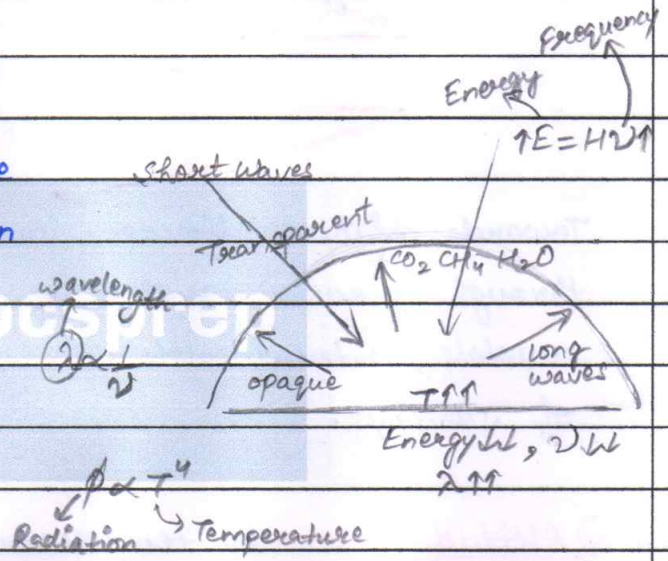
Class → 4



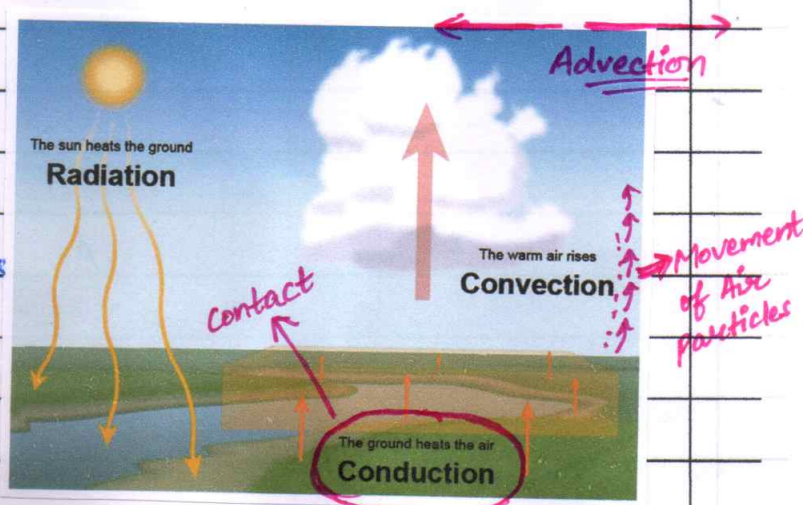
Process of Heat transfer in the Atmosphere



↳ 1.) Radiation! — Radiation is the main process of heat transfer in the atmosphere. The heat is transferred in the form of electromagnetic waves or rays. Atmosphere gain heat through Green House effect.

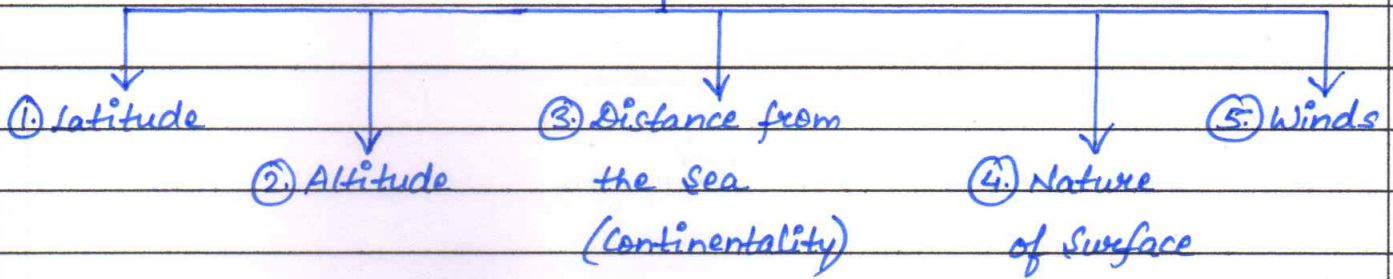


↳ 2.) Convection! — Convection means the transfer of heat including, involving the movement of the air particles or particles of the medium.

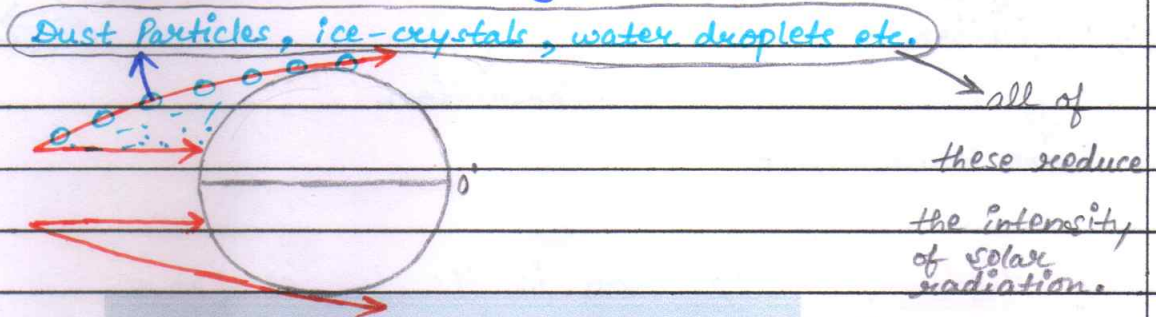


↳ 3.) Conduction! — Conduction means the transfer of heat through a material by Direct Contact. Least effect on atmosphere is observed by the process of conduction.

Factors affecting Temperature

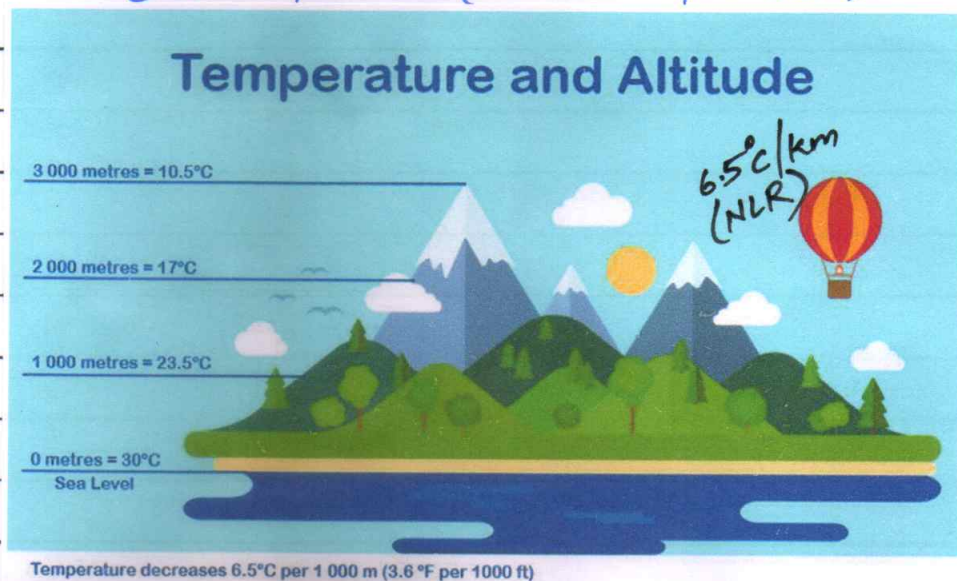


→ 1.) Latitude! — Higher latitudes have lesser temperature whereas lower latitudes have higher temperature.



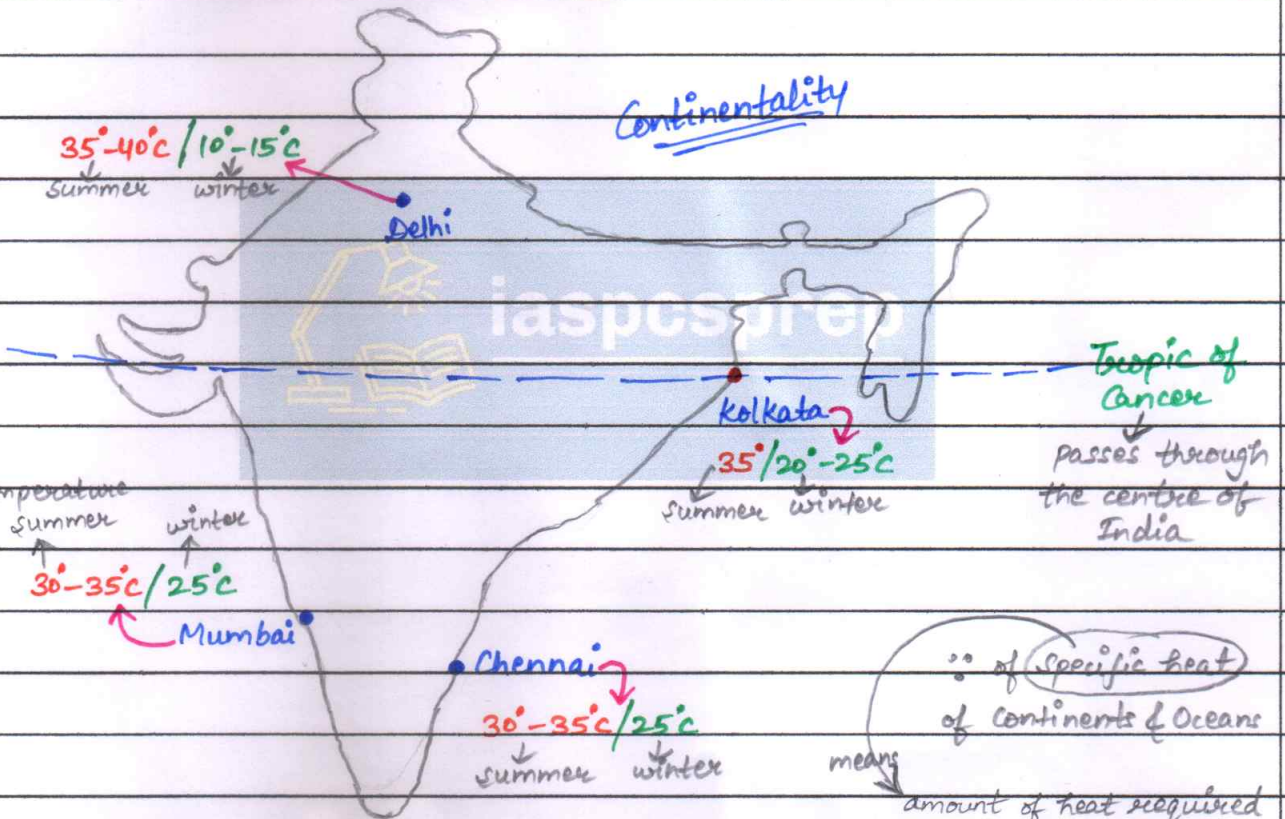
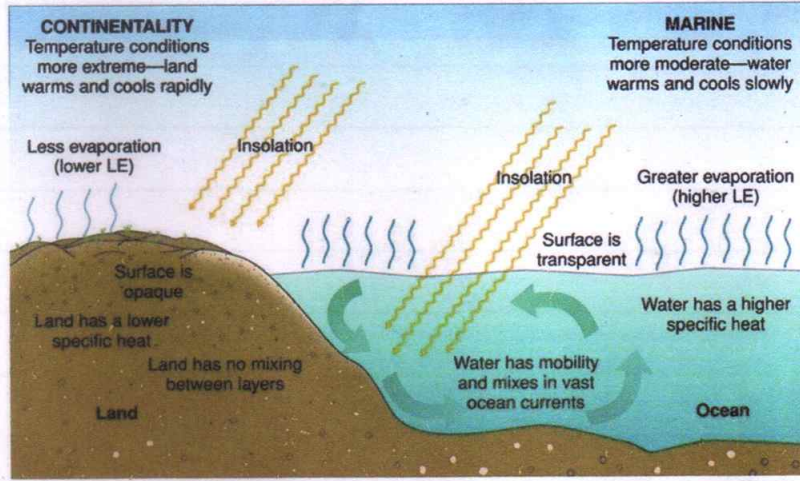
Towards higher latitudes, sunrays are more slanting, thus pass through greater portion of atmosphere. Dust particles, ice-crystals, water droplets suspended in air reduces the intensity of sunrays.

→ 2.) Altitude! — By temperature decreases with increase in elevation @ 6.5°C per km (Normal lapse rate).



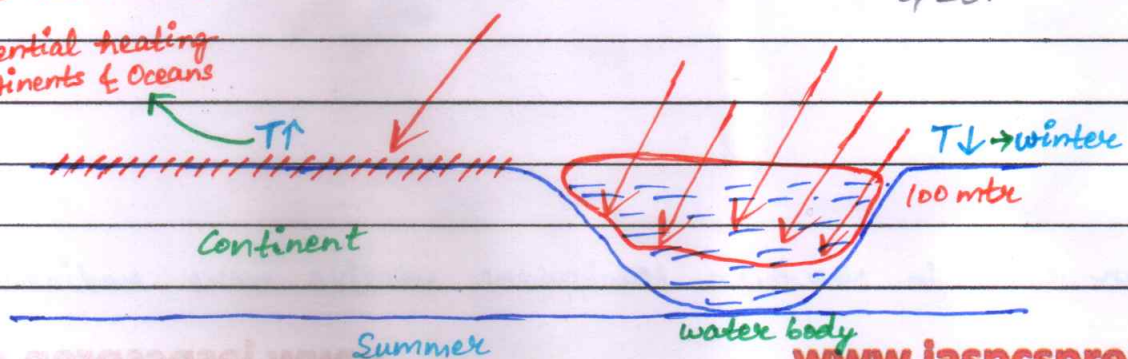
→ 3) Distance from the sea (continentality)! —

Water buffers temperature extremes because it heats up and cools down more slowly than land.



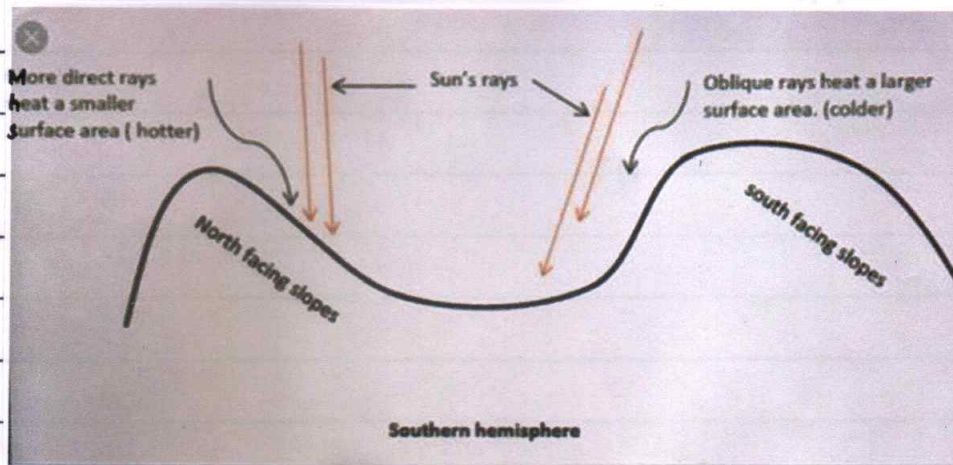
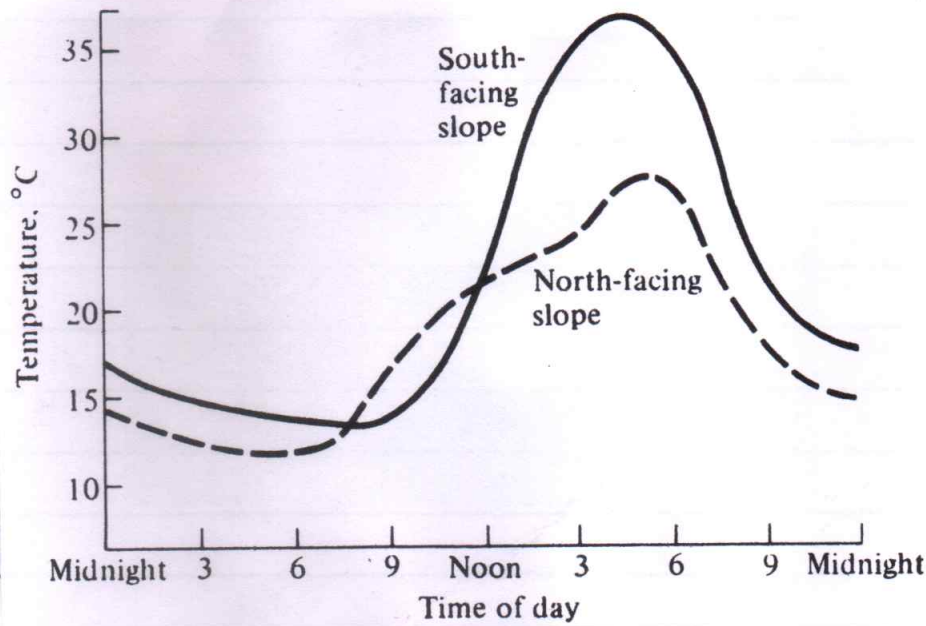
∴ of Specific heat of Continents & Oceans
 means amount of heat required to raise the temperature by 1°C.

Specific heat leads to Differential heating of Continents & Oceans



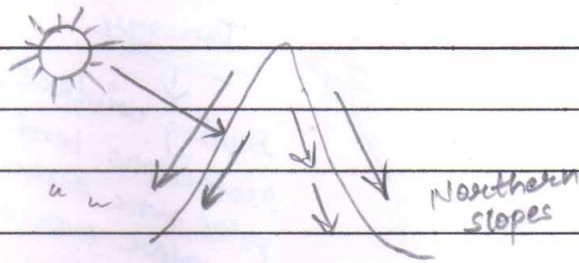
Continentality! — It cause extremities in temperature that is temperature range between summers and winters is much higher. It is because specific heat of continents is lesser than specific heat of oceans or water bodies. It gives rise to differential heating and cooling between continents and oceans. Hence, the moderation effect remains confined to coastal regions only.

↳ 4) Nature of surface! — Slope / Nature of slope



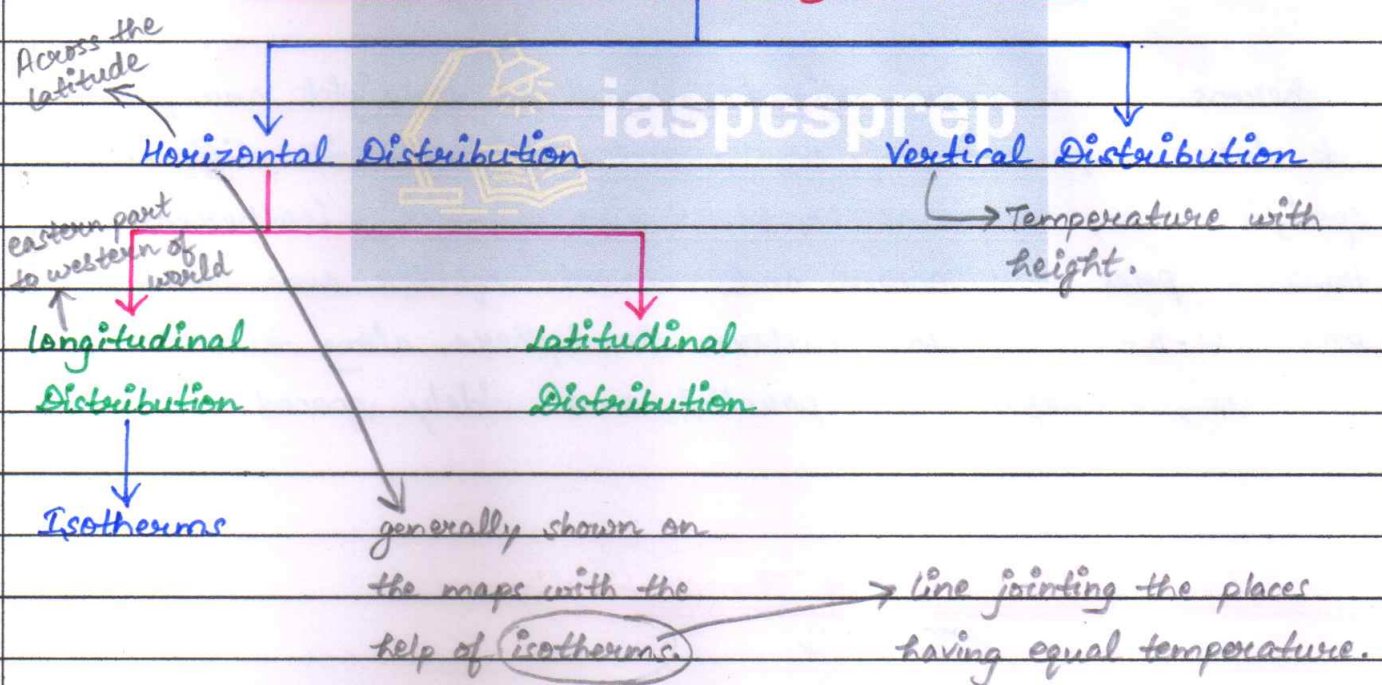
Southern slopes in Northern Hemisphere receive more radiation

than Northern slopes. In Southern hemisphere, northern slopes receive more radiation than southern slopes.

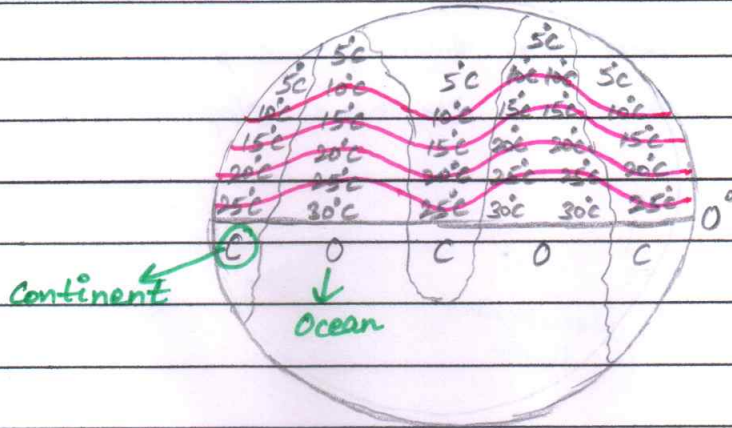


↳ 5.) Winds : — The winds act as regulators of temperature. Warm winds will increase the temperature and cold winds will reduce the temperature.

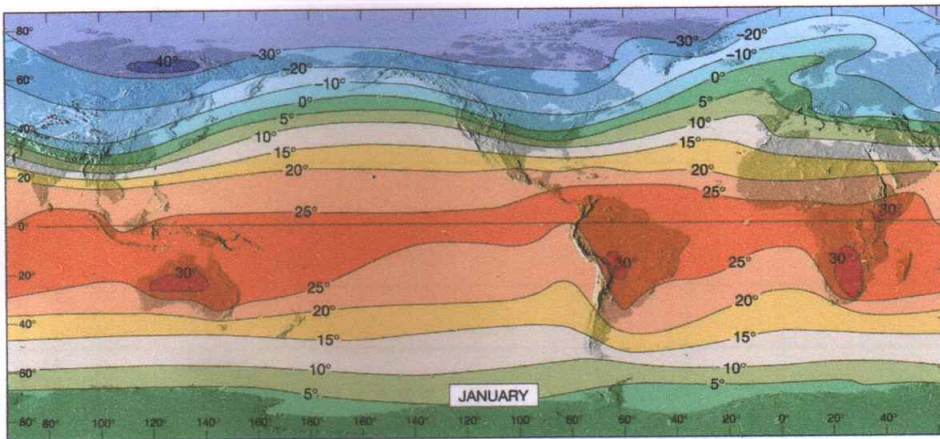
Distribution of Temperature



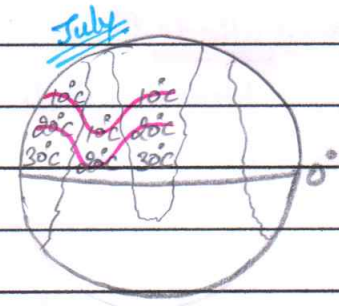
* Isotherms : — It is represented by lines joining places with equal temperature called as isotherms. These are drawn considering temperature at sea level.



January
 ↓
 During winters, Isotherms bend towards poles over oceans & towards equator over continents.

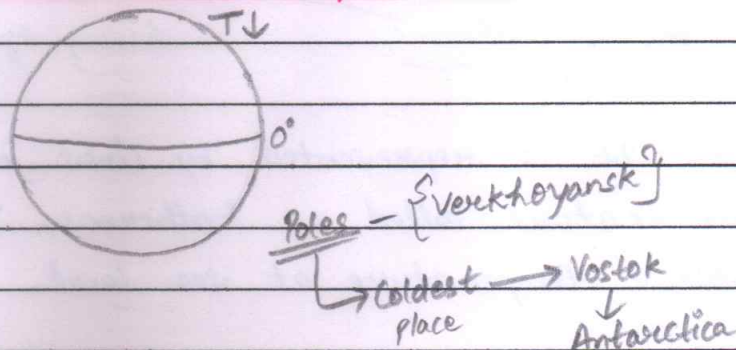


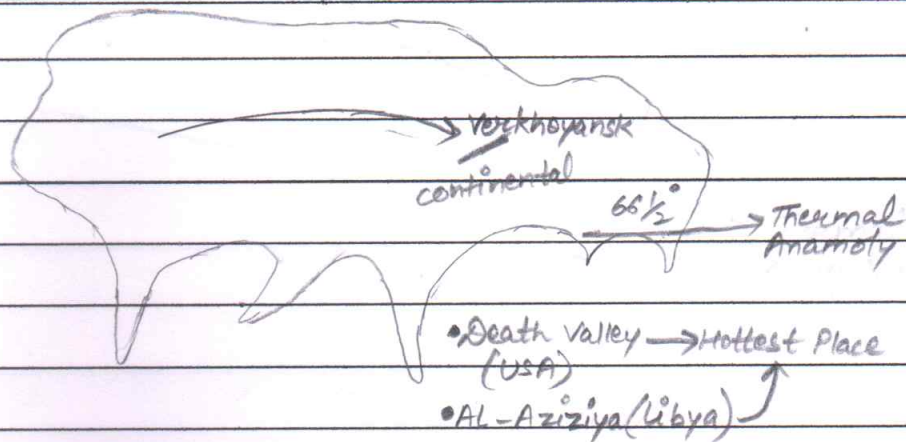
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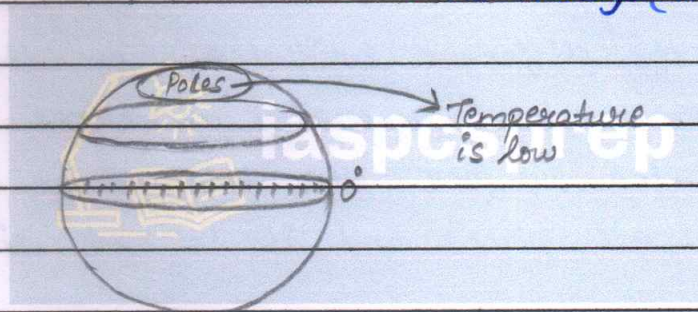
Isotherms at a given latitude should be straight and parallel, but due to presence of oceans and continents with differential specific heat, isotherms bend. During winters, isotherms bend towards poles over oceans and towards equator over continents and vice-a-versa. In southern hemisphere along temperature latitudes, isotherms are parallel and widely spaced.

* Latitudinal Distribution of Temperature: —





Thermal Anomaly! — It is a phenomenon or a condition when place or a region has a different temperature than its latitude. If the temperature is less than the latitude, it is called as negative thermal anomaly and if the temperature is higher than the latitude, it is called as positive thermal anomaly. (e.g.) → Death Valley (USA)
→ AL-Aziziya (Libya)

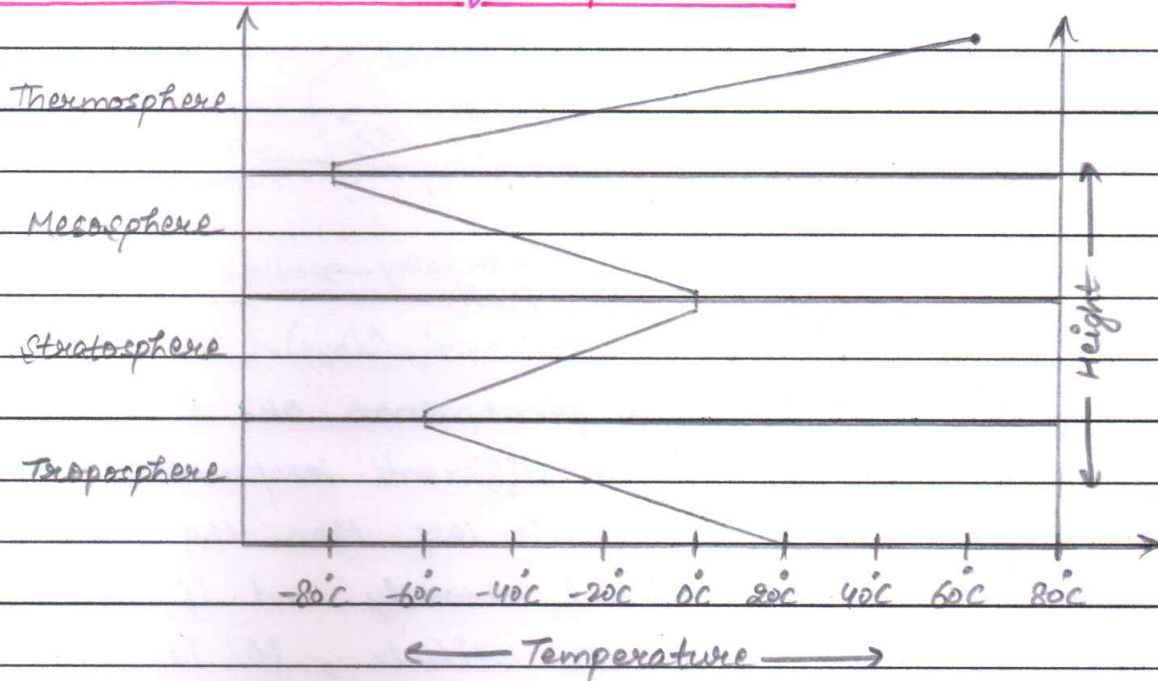


At Poles, temperature is low because of slanting sunrays. During winters, temperature is less than 0°C and also experiences long winters. At Sub-polar latitudes, temperature is higher than 0°C during summers, but winters are cold and harsh.

At temperate latitudes, summer remains moderate and winters record colder temperature i.e. sub-zero. In lower latitudes, temperature is high throughout the year, although hottest or maximum temperature is recorded to the north and south equator.

At Equator, due to dominance of water and frequent rainfall, temperature is moderated.

* Vertical Distribution of Temperature :



The vertical distribution of temperature refers to the distribution of temperature in the different layers of the atmosphere at the different latitudes from the Earth's surface. The temperature generally decreases due to the elevation from the surface. The decrease in temperature is different in all places and it is not similar everywhere.

Range of Temperature

① Annual Range

② Daily Range

Max. → 2 pm
Min. → 4 am

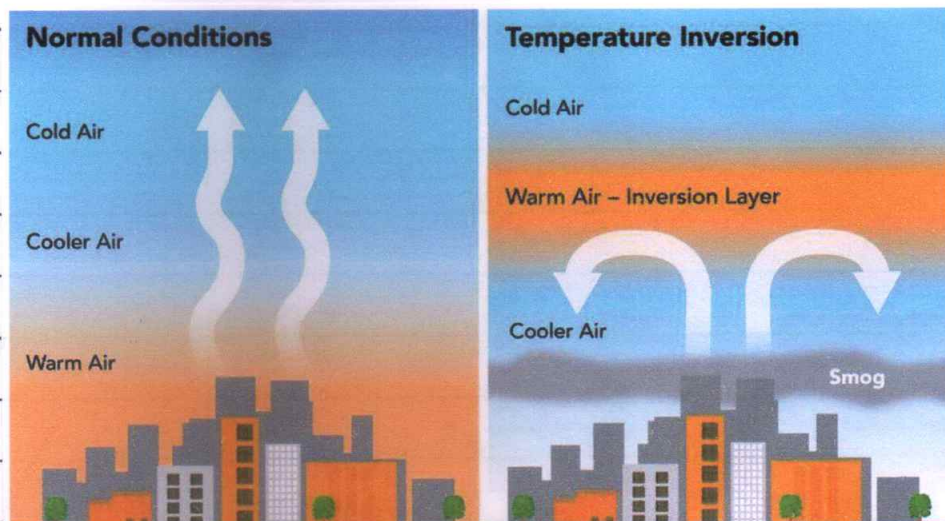
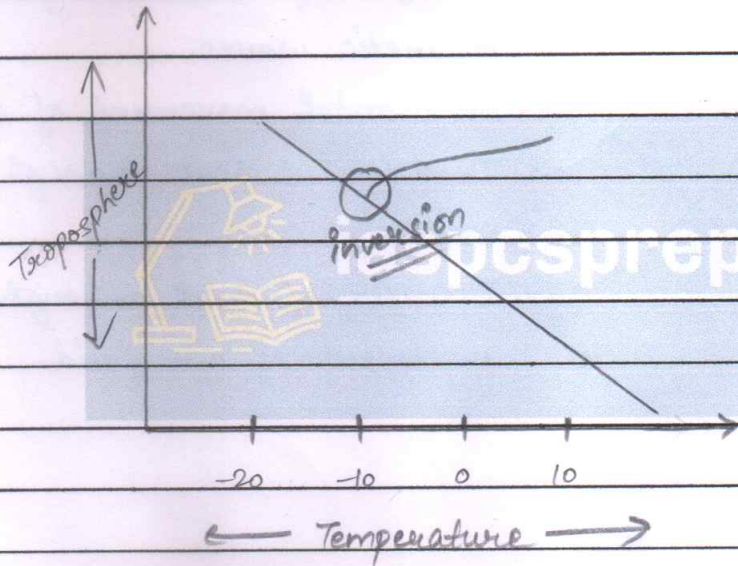
Range	=	Max. Temperature (July)	-	Min. Temperature (January)	
• Equator	→	35°C	-	30°C	= 5°C
• Tropical	→	35°C	-	20°C	= 15°C
• Temperate	→	20°C	-	0°C	= 15°C-20°C
Max. Range of Temperature at Poles	→	10°C	-	(-40°C)	= 50°C

} values are not true

- (1.) Maximum annual range or seasonal range of temperature is recorded at poles and minimum range is recorded at equator.
- (2.) Daily range is recorded maximum at 2 pm and minimum at 4 am. Daily maximum range is observed at Deserts and Daily minimum range is observed at coastal areas.

Inversion of Temperature

It is the reverse of normal phenomenon that is temperature increases with increase in elevations.



Practice Question

Q(1) Define Thermal Anomaly. Illustrate with few examples.

Q(2) Give reasoned account on vertical and horizontal variation in atmospheric temperature.

Class Quiz

Q(1) Match the following processes of heat transfer in the atmosphere (List-I) with their descriptions (List-II) :-

List-I

A. Conduction

B. Convection

C. Radiation

D. Advection

List-II

1. Transfer of heat through electromagnetic waves

2. Horizontal movement of air or fluid

3. Transfer of heat through direct contact

4. Transfer of heat through the movement of air fluid

Codes :-

	A	B	C	D
a)	1	2	3	4
b)	3	4	2	1
<input checked="" type="checkbox"/> c)	3	4	1	2
d)	4	3	1	2

Q(2) Diurnal temperature variation refers to :-

- a) Temperature variation throughout the day
- b) Temperature variation throughout the year
- c) Temperature variation along lines of latitude
- d) Temperature variation along lines of longitude

Q(3) Match the following factors affecting temperature (List-I) with their descriptions (List-II) : —

- | <u>List-I</u> | <u>List-II</u> |
|-----------------------|-------------------------------------|
| A. Latitude | 1. Influence of nearby water bodies |
| B. Proximity to water | 2. Movement of water in the ocean |
| C. Ocean Currents | 3. Elevation above sea level |
| D. Altitude | 4. Distance from the equator |

Codes : —

- | | A | B | C | D |
|--|---|---|---|---|
| a) | 4 | 2 | 1 | 3 |
| b) | 4 | 3 | 1 | 2 |
| c) | 4 | 1 | 3 | 2 |
| <input checked="" type="checkbox"/> d) | 4 | 1 | 2 | 3 |

Q(4) Which of the following term correctly match with their characteristic : —

1. Temperature inversion → Occurs when a layer of warm air lies above cooler air near the Earth's surface.
2. Temperature anomaly → A deviation from the average temperature over a specific period.

Select the correct answer from the options given below : —

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

Q(5) The process of trapping heat within the Earth's atmosphere is

primarily associated with :—

- a) Convection
- b) Greenhouse effect
- c) Thermal inversion
- d) Albedo effect

Q6. Which of the following factors does NOT affect temperature?

- a) Latitude
- b) Altitude
- c) Humidity
- d) Longitude

Q7. Match the following temperature ranges (List-I) with their corresponding descriptions (List-II) :—

- | <u>List-I</u> | <u>List-II</u> |
|---------------|---------------------------------|
| A. Tropical | → 1. Moderate temperatures |
| B. Temperate | → 2. High temperatures |
| C. Polar | → 3. Extremely low temperatures |
| D. Arctic | → 4. Below freezing point |

Codes :—

- | | A | B | C | D |
|--|---|---|---|---|
| <input checked="" type="checkbox"/> a) | 2 | 1 | 4 | 3 |
| b) | 1 | 2 | 3 | 4 |
| c) | 2 | 1 | 3 | 4 |
| d) | 1 | 2 | 4 | 3 |