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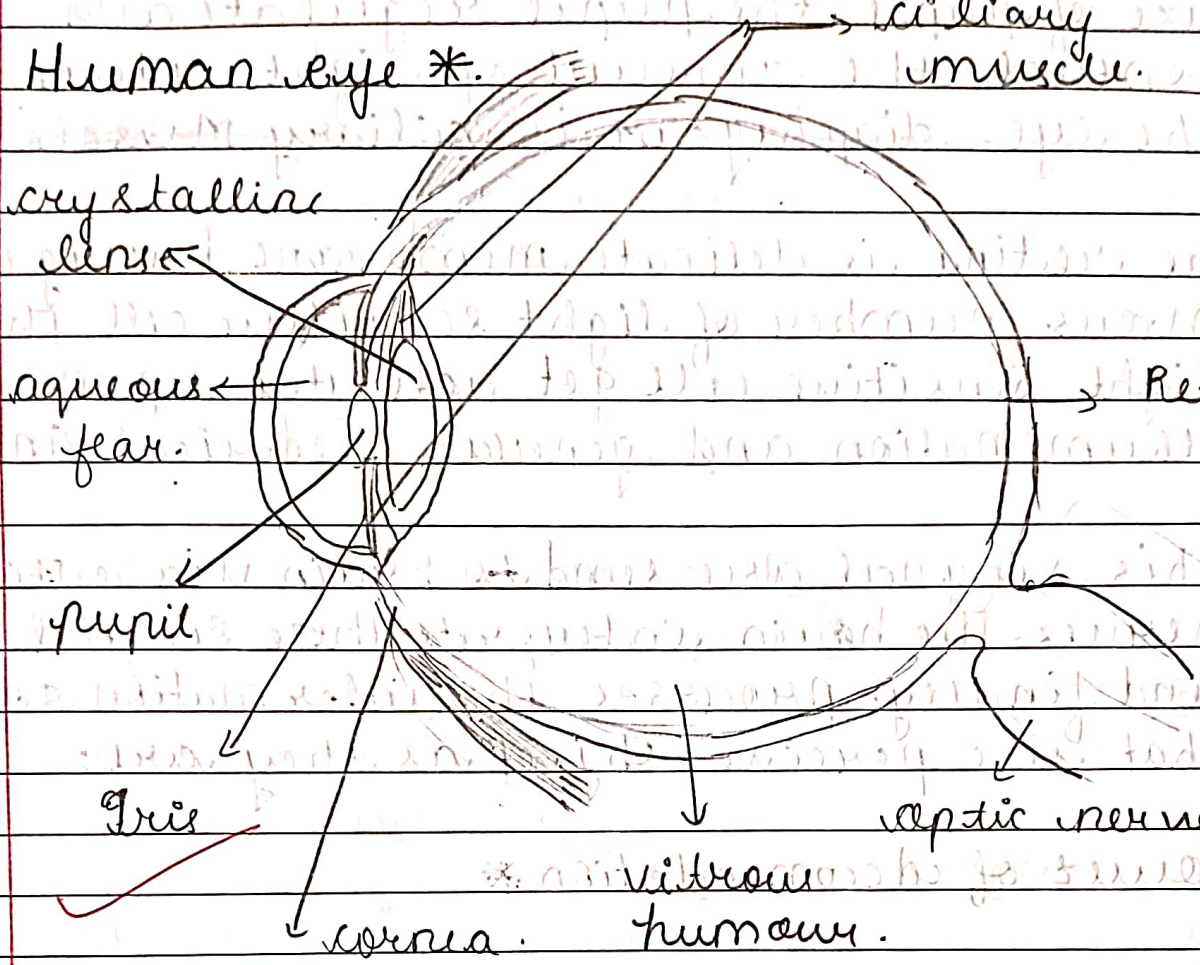
chapter no: 10.

Human Eye and colourful world.

* Human Eye *.



- Human Eye is one of the most delicate, important and valuable organ.

- Light enters the eye through transparent bulging surface called cornea. most of the refraction occurs at the outer surface of cornea.
- it acts as thin membrane.

- the crystalline lense merely provide the final adjustment of focal length required to focus object at different distance of retina

- iris is structure find behind cornea it is dark.

Date :

muscular diaphagram that control the size of pupil the pupil regulate and control the amount of light entering the eye. ~~diaphagram is ciliary muscles.~~

- The retina is delicate membrane having enormous number of light sensitive cell the light sensitive cell get activated upon illumination and generate electrical singnal

- This singnal are send to brain via optic nerves. The brain interprets these singnal. and finally processes the information so that we percive object as they are:

* Power of Accomodation *

- The eye lense is composed of a fibrous jelly-like matirial- it curvature can be modified to some of ciliary muscles

- The change in the curvature when muscles are relaxed the lens become thin and its focal length is increased

- power of accomodation is the maximum variation in power of eye lense for focusing near by object + near by or far object clearly by retina

Date : _____

* Persistance of vision
the time for which impression or sensation of an object continues to remain in eye is called persistance of vission it is about 1/16th of a second which ~~the~~ means that minimum time for which we should view and object.

* Defects of vision and their correction

i] Myopia / shortsightedness.

ii] Hypermetropia / long or farsightedness.

iii] Presbiopia

* Myopia:
in this defect a person can see nearby object distinctly but cannot see distance object clearly. in this case, image is formed before retina and not on retina

- Cause :- A person with this defect has a far point nearer than infinity
  - excessive curvature of eye lens
  - elongation of eyeball
- Remedy :- it can be corrected by using concave lense. the concave lense of suitable power will bring back the image on retina.

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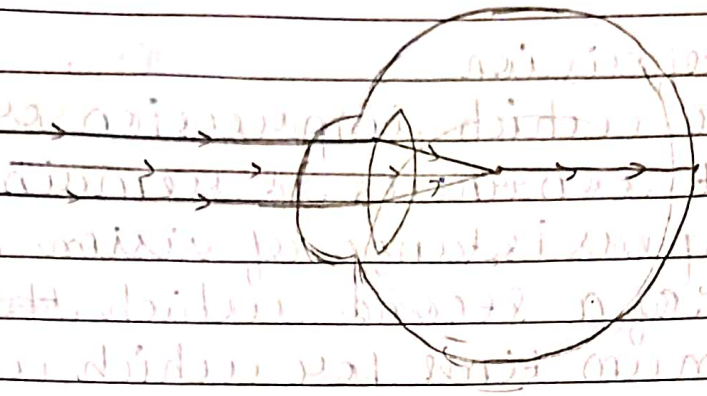
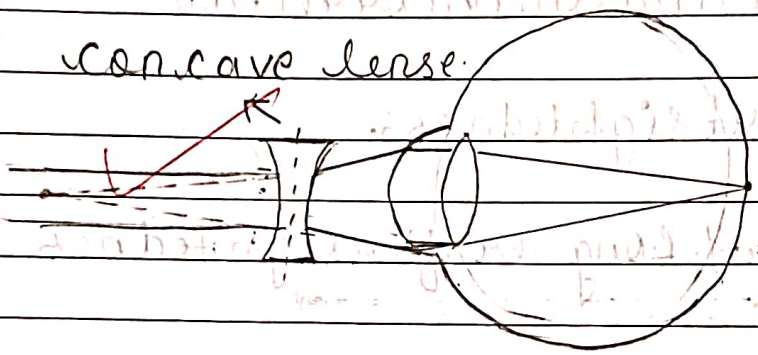


a) myopic eye.

concave lense.



b) correction for myopic eye.

* ~~Hypero~~ Hypermetropia *

~~In this defect a person can see nearby objects distinctly but cannot see distant object clearly in this case eye~~

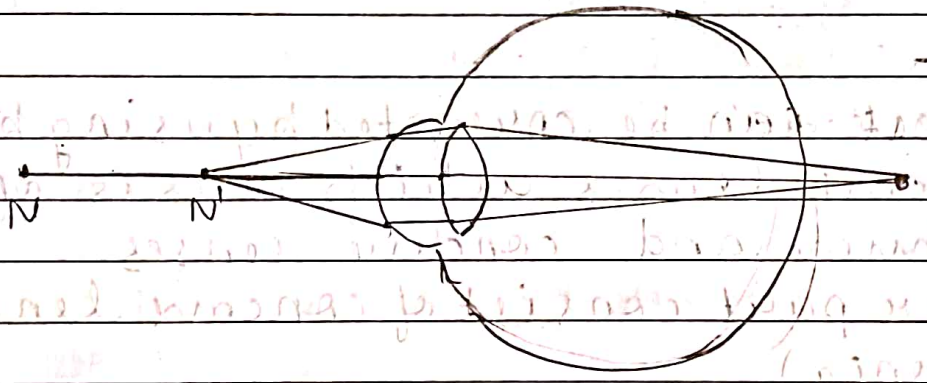
* Hypermetropia *

in this defect person can see distant object clearly but ~~can~~ cannot see nearby objects clearly A person with this defect has the near point farther away from normal near point

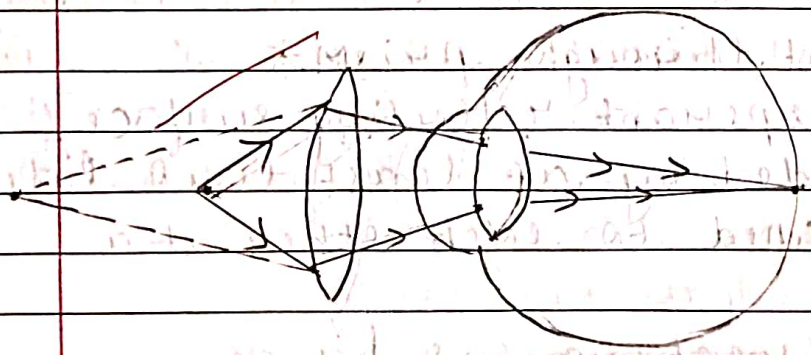
Date : _____

- cause :-
•) focal length of eye become large
•) Eyeball becomes too short so that the imag is formed behind the retina

- Remedy :-
this defect can be corrected by using a convex lense of suitable power This will bring image back on retina.



a) hypermetropic eye.



b) correction for hypermetropic eye.

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* Presbyopia
it is found in old people for most of the people the near point gradually recids away with age. Sometimes a person may suffer from both myopia and hypermetro

- Cause :-
•) Weakness of ciliary muscles.
•) Hardening or loss of elasticity of lin lens.

- Remedy :-
- this defect can be corrected by using bifo or varifocal lenses which consis of both convex and concave lenses
- the upper part consist of concave lense (for myopia)
- and lower portion consist of convex lens (for hypermetropia)

* Refraction of light through prism.*
- prism is transperant refleting surface/ medium bounded by at least two latera surfaces inclined to each other at a certain angle
- ~~it has two rectangular bases~~
- it has two triangular bases and three rectangular lateral surfaces.
- The angle between two lateral surfaces is called angle of prism. (A)

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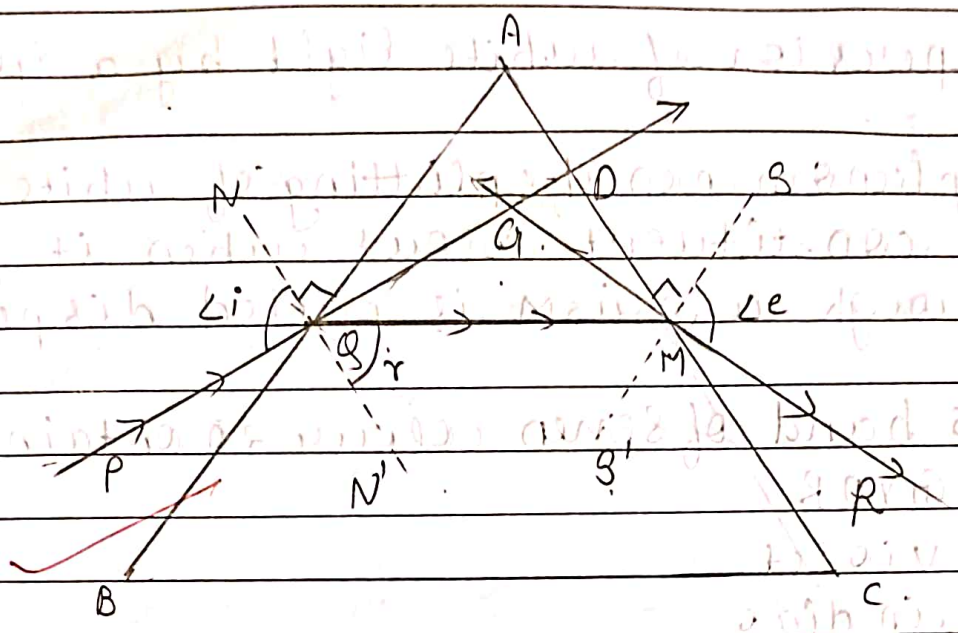


Reflection of light through a triangular glass prism

PQ : incident ray.
MR : emergent ray.
∠i : angle of incidence
∠e : angle of emergence.
QM : refracted ray.
∠A : angle of prism
∠r : angle of refraction
∠D : angle of deviation

* Angle of deviation
it is the angle at which the emergent ray (extended backward makes) with the incident ray (extended forward) it depends upon angle of prism i.e. (∠A) angle of incidence (∠i) and angle of emergance (∠e) is given by.

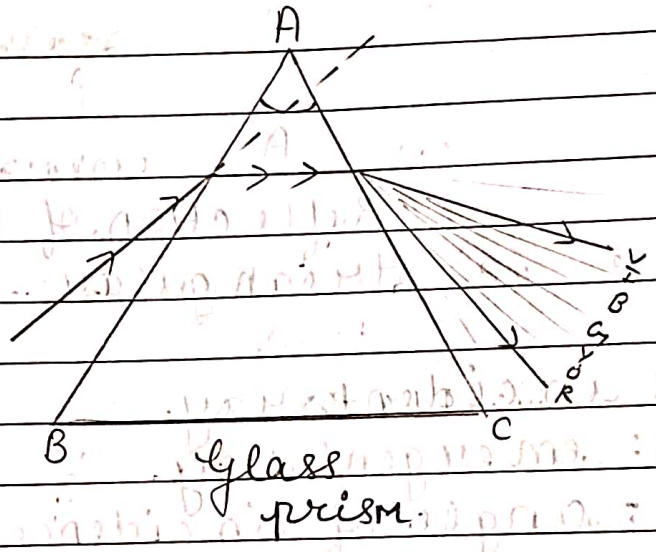
$$\angle D = \angle i + \angle e - \angle A$$

Date :

* Dispersion of white light by a glass pri

The phenomenon of splitting of white light in its constituent colours when it passes through a prism is called dispersion.

The's band of seven colour so obtained the
VIBGYOR
V : Violet
I : indigo
B : Blue
G : green
Y : Yellow
O : Orange
R : red.



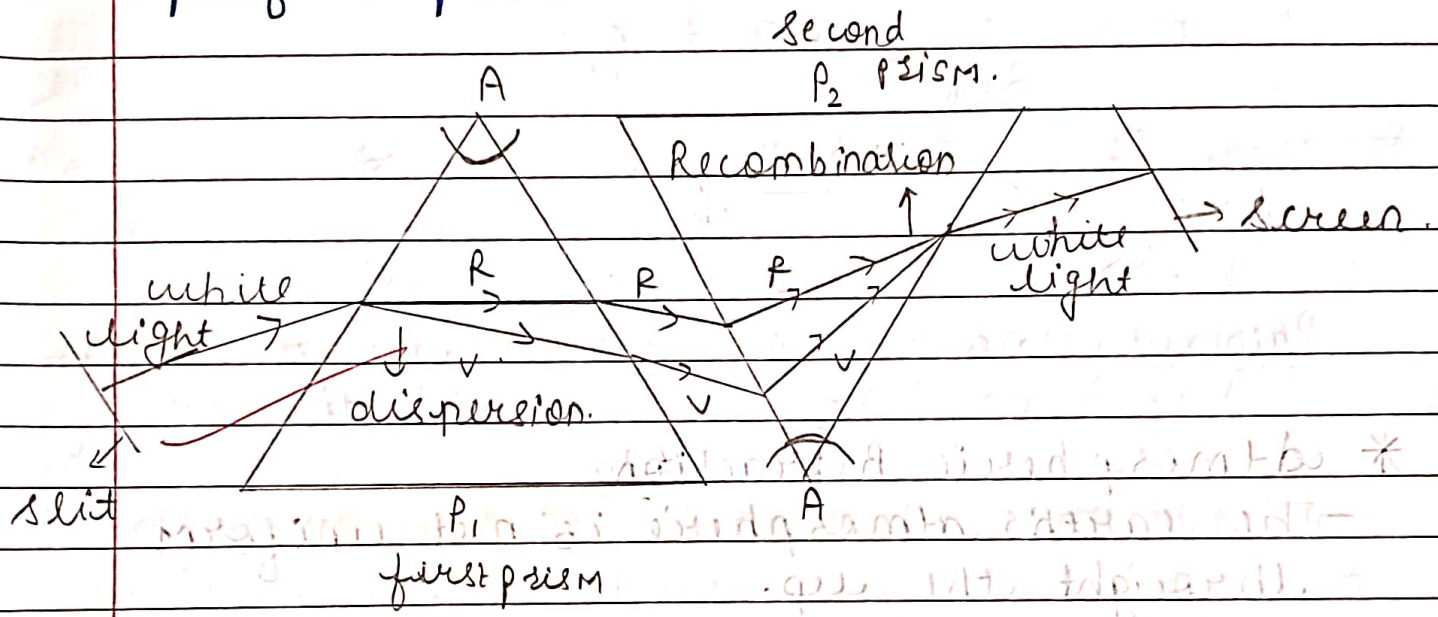
* cause of dispersion *
Light rays of different colour travel with same speed in vacuum and air but in an other medium they travel with different speed and bend through different angle. which leads to dispersion of light

~~Reg~~ Red light light has maximum wavelength and violet light has minimum wavelength.

wavelength ∝ velocity ∝ $\frac{1}{\text{deviation}}$

Date :

* Recombination of white light
- ~~Newt~~ Newton showed that the reverse of dispersion of light is also possible he keep to prism close to each other one is inverted position and one is inverted position The light gets dispersed when passed through ~~a~~ first prism.



* Rainbow.*
- Rainbow is a natural spectrum appearing in the sky after a rain shower. it is caused by dispersion of ~~sun~~ sunlight by tiny water droplet present in the atmosphere
- A rainbow is always formed in direction ~~to~~ opposite to that of the sun.
- water droplet act like a small prism.

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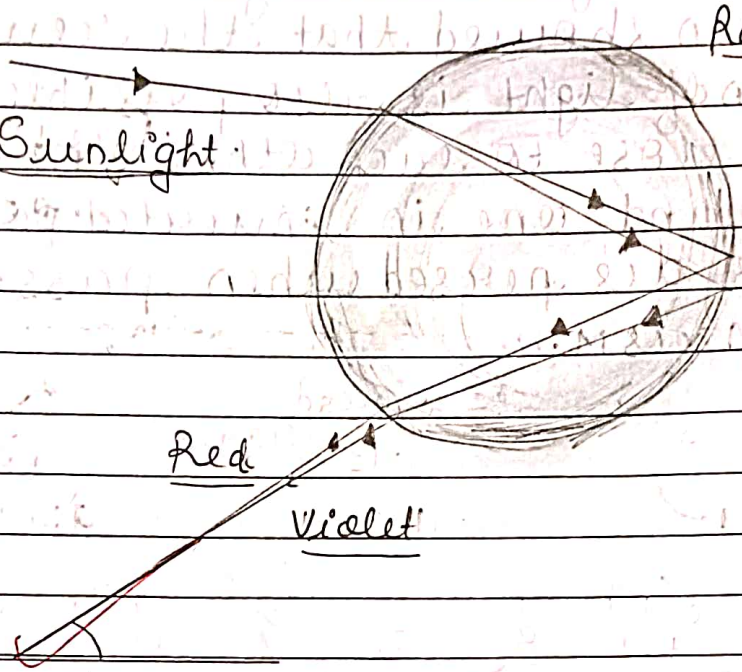
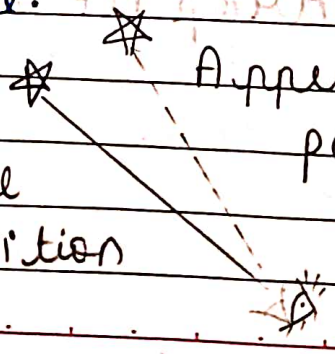


Rainbow formation.

* Atmospheric Refraction
- The earth's atmosphere is not uniform throught the up.
- it consist of different layer which have different density
- The refraction of light which occurs between the layer of atmosphere is called atmospheric refraction

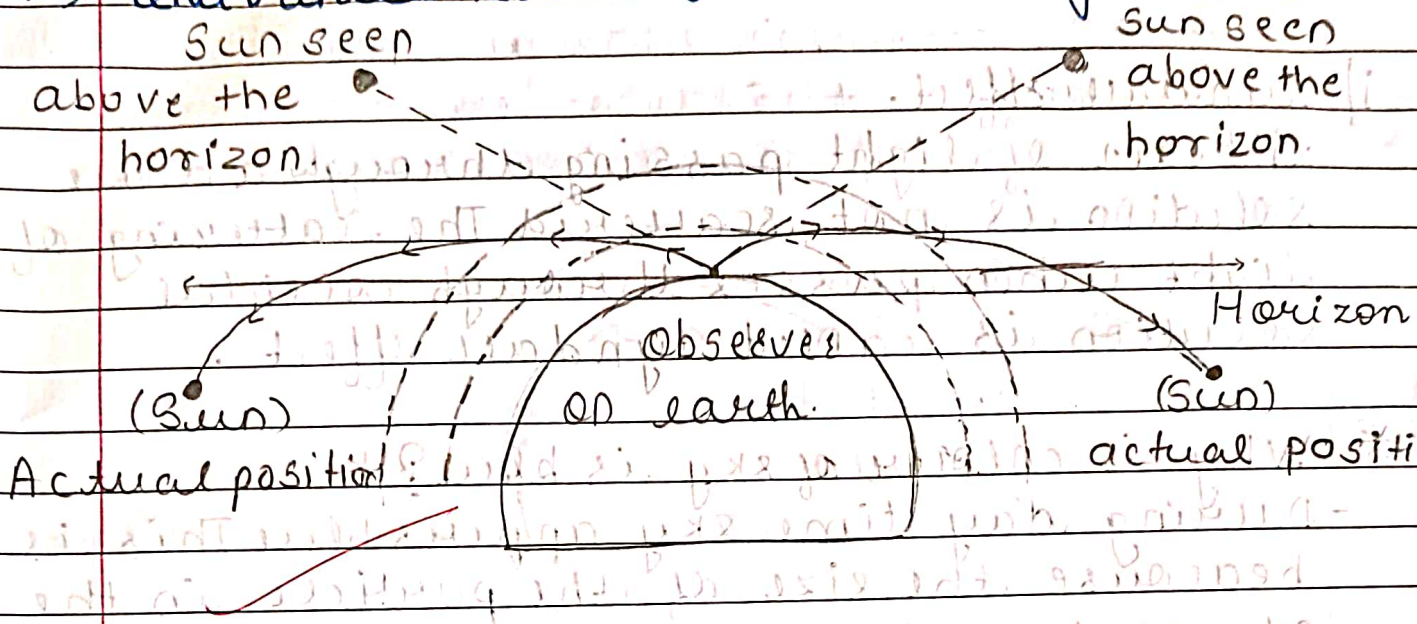
* Some phenomina *
i) twinkling of stars
ii) The stars ~~s~~ seems higher than they actully are.



Date : _____

iii) Planet do not twinkle

iv) Advanced Sunrise and delayed sunset.



* Scattering of light *

the reflection of light from an object in all direction is called Scattering of light The of Scattered light depends on the size of Scattering particle's and wavelength of light

Note

Scattering $\propto d^{\square}$

[d = diameter of particle]

Scattering $\propto \frac{1}{\lambda^4}$

[λ = wavelength of light]

Date :

* Some phenomena Based on scattering of light.

i] Tyndall Effect.
A beam of light passing through a true solution is not scattered The scattering of light when passes through colloidal solution is called tyndall effect.

* Why is colour of sky is blue? *
- During day time sky appears blue This is beacouse the size of the particle in the atmosphere is smaller that the wavelen of visible light so they scatter the light of shorter wavelengths

- The scattered blue light enters our eye

Did you know?
The passengers flying at higher altitude see the sky is Black colour ~~to~~ because scattering of light not prominant