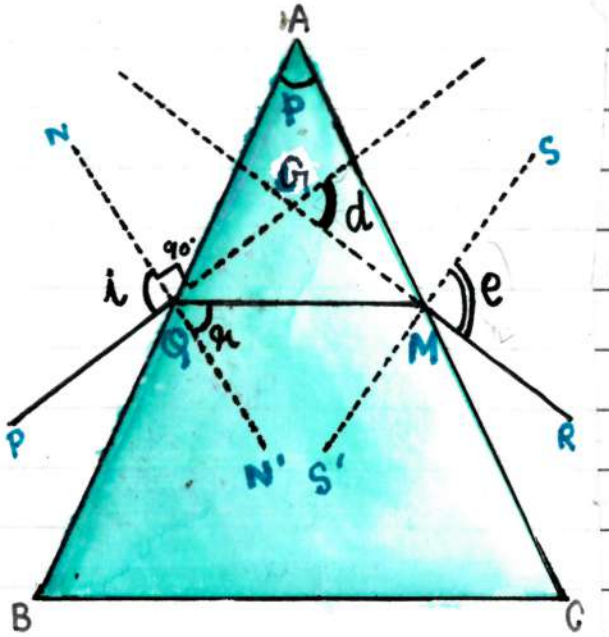
Colourful Wor...

Refration through Prism



$\angle d \propto \angle r \propto$ refractive index

Prism :

- transparent refracting medium
- bounded by atleast 2 lateral surfaces, inclined to each other at a certain $\angle$.
- 2 $\triangle$ar bases = ||el
  3 $\square$ lar lateral surfaces = sides
- angle of prism = angle b/w 2 lateral surfaces

PQ = incident ray
MQ = refracted ray
MR = emergent ray
$\angle i$ = angle of incidence
$\angle r$ = angle of refraction
$\angle e$ = angle of emergence

$\angle p$ = angle of prism

$\angle d$ = angle of deviation
angle between emergent & incident ray.

Colourful Worn

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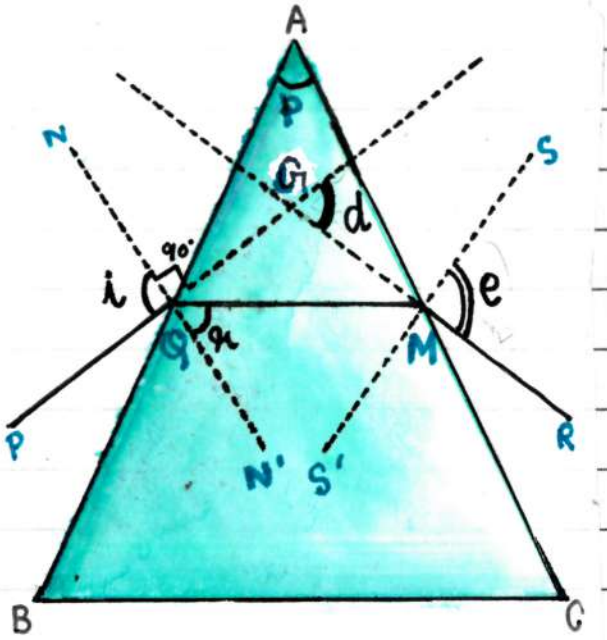

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$\angle D = \angle i + \angle e - \angle A$

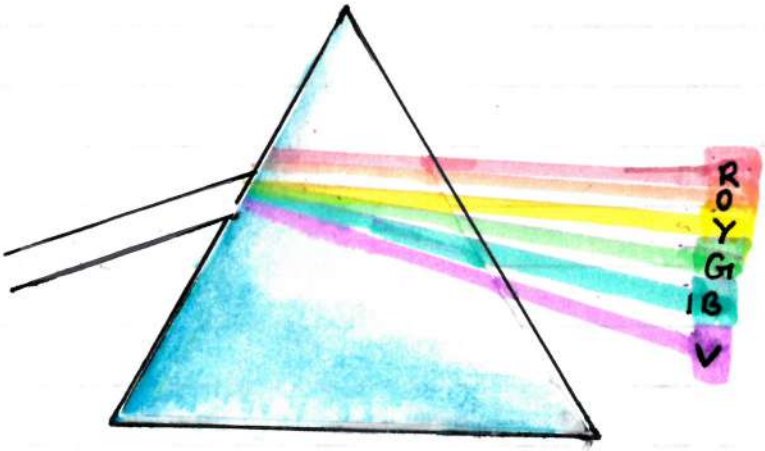
Dispersion of white light by Glass Prism

medium — **PRISM** : split incident white light into a band of colours

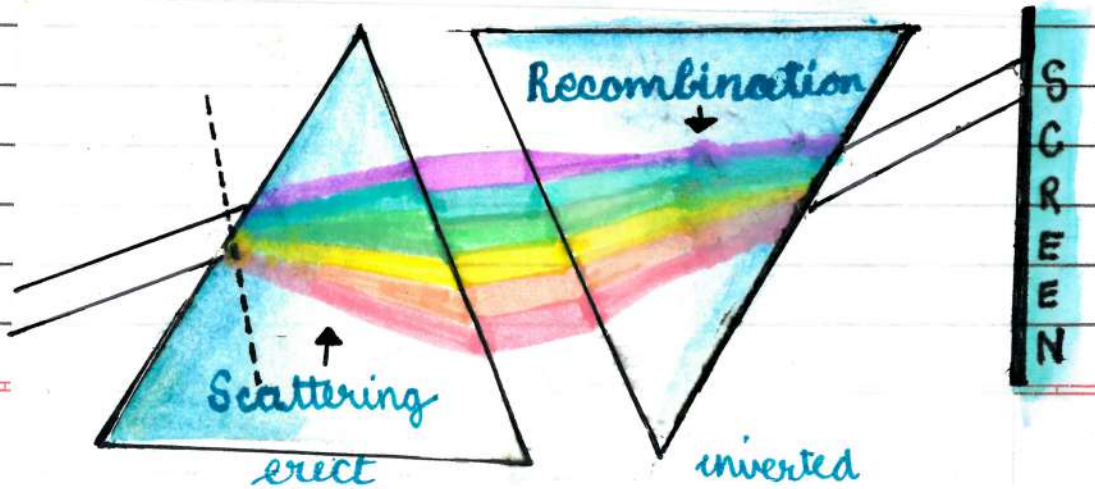
output — **SPECTRUM**: band of coloured components of a light beam.

process — **DISPERSION**: splitting of white light into its 7 constituent colours.

ISAAC NEWTON :



Recombination of white light



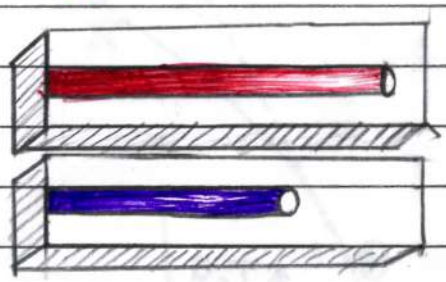
white light : any light that gives spectrum similar to that of sunlight.

Cause of Dispersion

Light rays of different colours,
same speed = vaccum
differents speeds & bending = other mediums

$$\lambda \propto v \propto \frac{1}{\text{Deviate}} \propto \frac{1}{n} \propto \frac{1}{R}$$

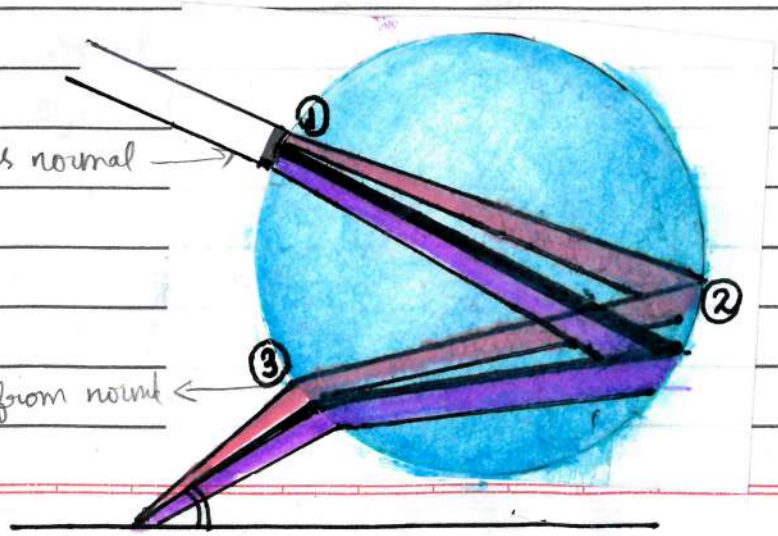
∴ RED = ↑λ ↓D ↑v
VIOLET = ↓λ ↑D ↓v



Rainbow

how? Refraction/Dispersion ① → Total internal Reflection ② → Refraction ③

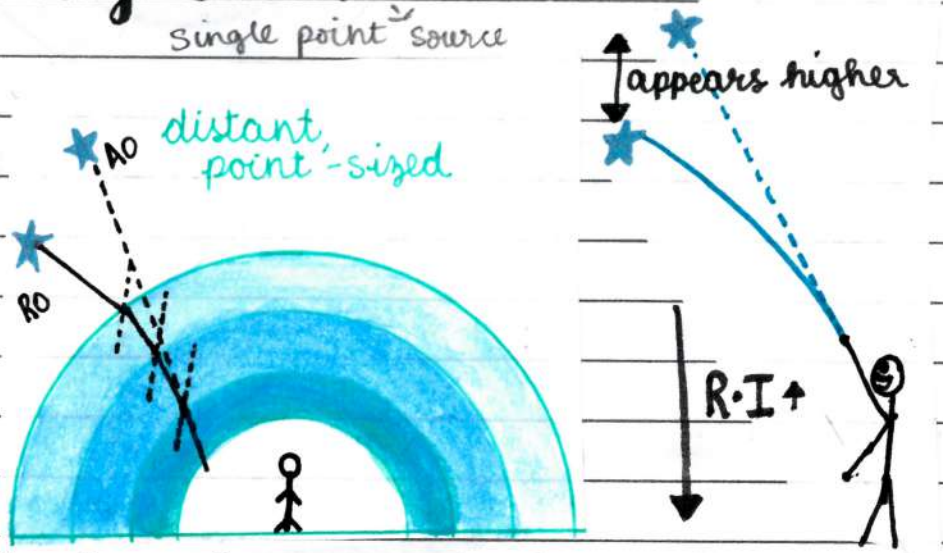
what? natural spectrum
why? dispersion of ☼ light.
where? Formed = in direction opposite to sun



Atmospheric Refraction

Refraction happening in atmosphere due to different gasses of different densities of light

Twinkling Stars



how? 1 ray multiple refraction

bends towards normal each time

why? atmospheric refraction of Sunlight

where? intensity of light changes

planets?

larger

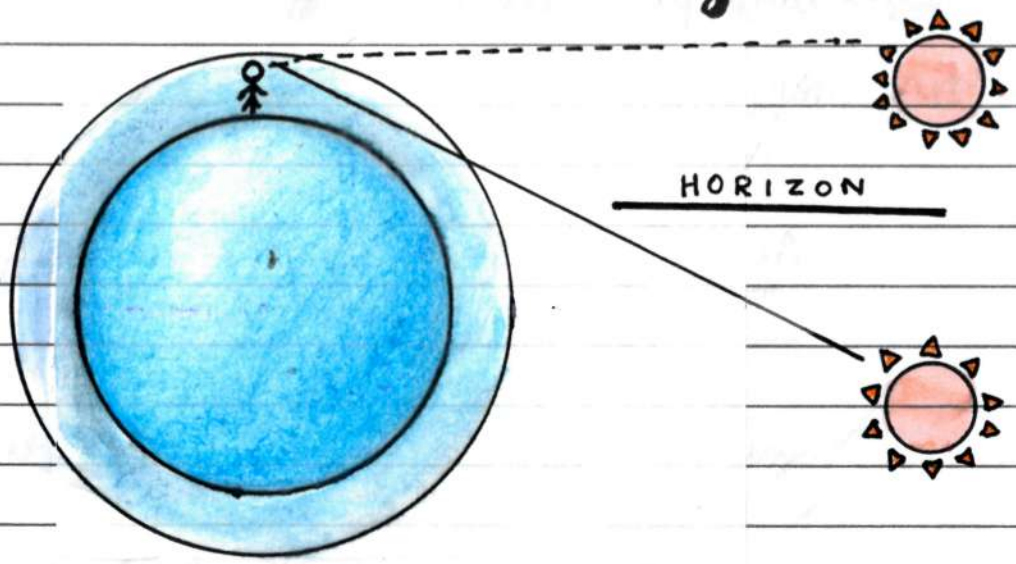
closer to earth

collection of large no. of point sized sources

∴ total variation in amount of light entering eye AVERAGE OUT = 0 → NULLIFY twinkling

Advance Sunrise , Delay Sunset

how?



what? Sunrise = 2 mins before
Sunset = 2 mins after

collection of point source of light

why? apparent flattening of sun's disc at sunrise & sunset.

Scattering

- Scattering = Reflection of light from an object in all direction
- Distance $\propto$ Scattering $\propto \frac{1}{\text{Intensity}}$
- colour depends on → partical size ✓
  → wavelength ✓

$S \propto \text{size} \propto \frac{1}{\lambda}$

very fine = blue $\downarrow\lambda$
larger = red $\uparrow\lambda$
largest = white $\uparrow$est λ

Tyndall Effect

why? earth's atmosphere - heterogeneous mixture
smoke ← tiny H_2O droplets ↓ air molecules ↓ → suspended parts of dust

light REFLECT DIFFUSELY → us

what? Tyndall Effect: scattering of light by colloidal part.
where? - sunlight - canopy of dense forest
- tiny droplets in mist (H_2O)

Why is Sky Blue in Colour?

- day time - SKY - Blue
- particle size in atmosphere < λ of visible light
- ∴ scatter shortest λ = **BLUE**

⇓

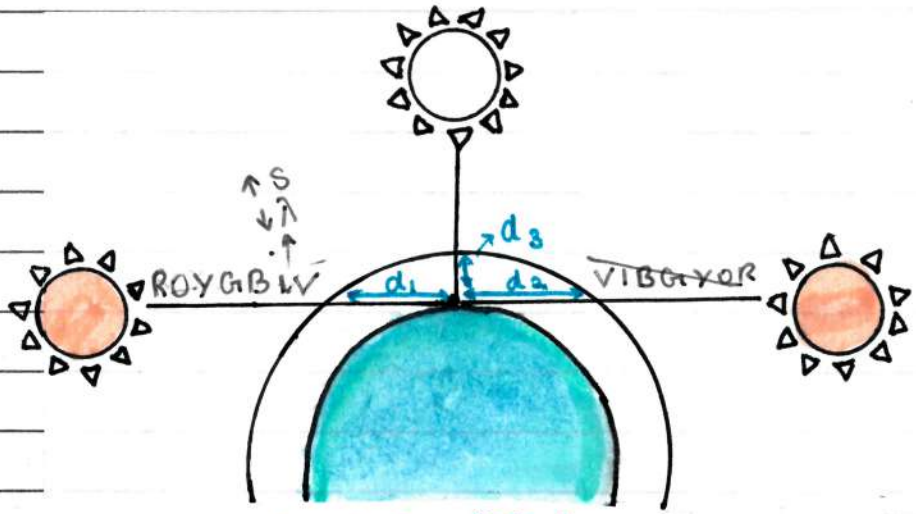
enters eye

- SKY = BLACK - passengers - ↑ altitudes

⇓

scattering ∵ no particles

Colour of Sunrise & Sunset



d_1 & $d_2 > d_3$

R ↑ λ ↓ Scattering ↑ intensity ⇒ Reaches eyes

V ↓ λ ↑ Scattering ↓ intensity ⇒ finally 0

- Sunrise & Sunset = Red

Light ↑ distance layers of thick air → reaches 👁

near horizon ⇓ LONG WAVELENGTH

↳ most ↓ λ (Blue) Scattered away

- Noon = ↓ distance ↓ Scattering (Blue, Violet)