## Section 1
## General Science

Question 3

Part A

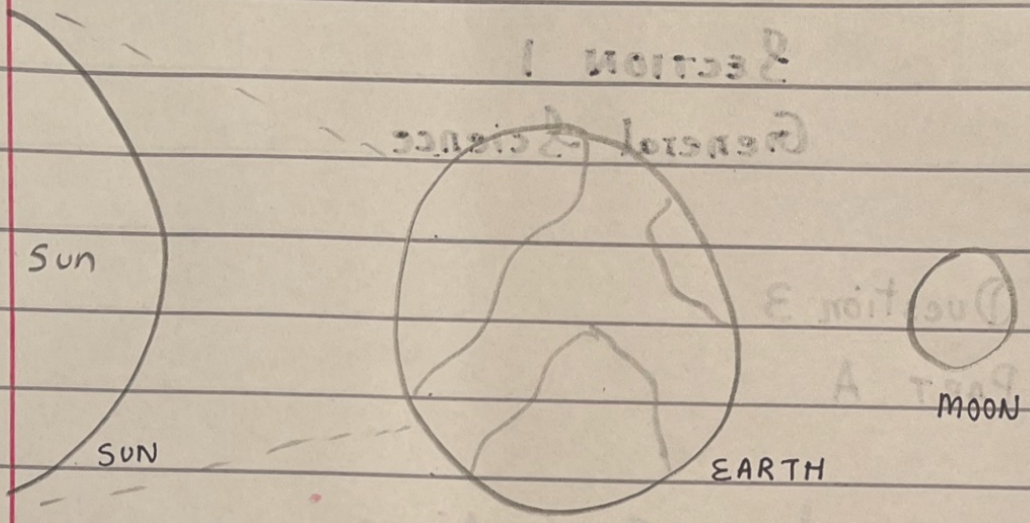
# Lunar Eclipse

## 1. What is an Eclipse?

Eclipse is the phenomenan that blocks the light of a object for the viewer. It is as though something has come between viewer and the eclipsed object. In this case humans experiencing the eclipse are viewers

## 2. Lunar Eclipse

Lunar eclipse occurs when earth comes in between the sun and the moon. As sun is the source of light; it is blocked for the moon causing the notion of eclipse.




Earth blocking the light path between sun and moon.

## 3- Types of Lunar Eclipse

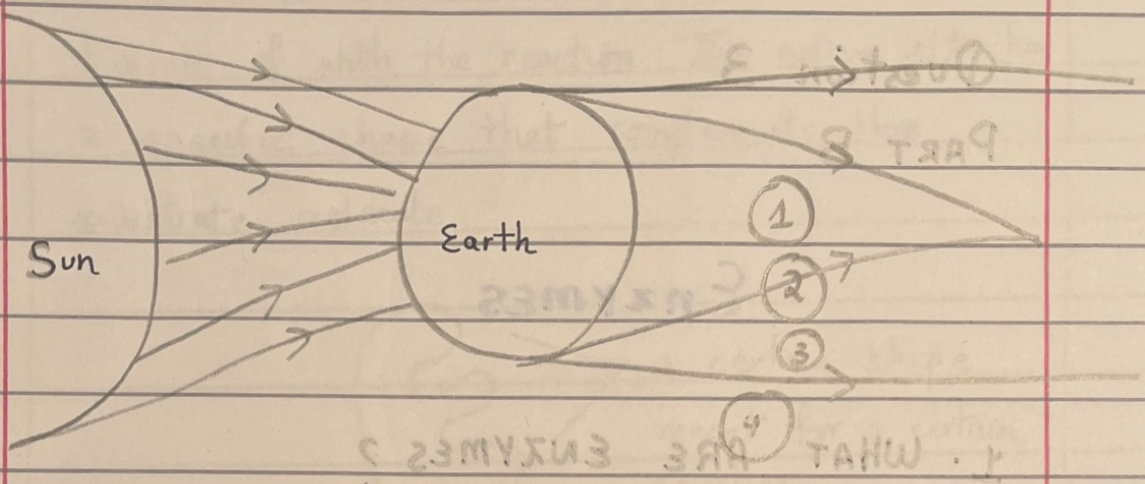
There are three types of lunar eclipse:

1- Penumbral Lunar Eclipse

2- Partial Lunar Eclipse

3- Total Lunar Eclipse

The difference in them comes from the region placement of the moon. The region placement shows the amount of light blocked and hence the difference in appearance of the moon.




→ denote ray of light

★ Diagram explanation

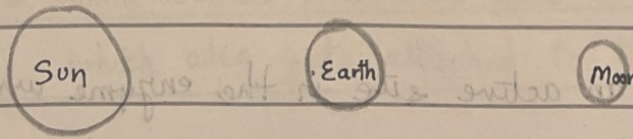
1 : If moon is in this region, there is a total lunar eclipse, total light blockade

2 : If moon is in this region, there is partial lunar eclipse

3 : If moon is in this region, there is penumbral lunar eclipse

4 : If moon is in this region, it is uneclipsed

Syzygy : When three fall in a straight line Sun, Earth and Moon



Question 3

PART B

# Enzymes

## 1. WHAT ARE ENZYMES ?

Enzymes are ~~an~~ organic materials that speed up reactions. Enzymes do not add or substract from the product. They remain unchanged at the end. Aids in ~~food~~ digestion

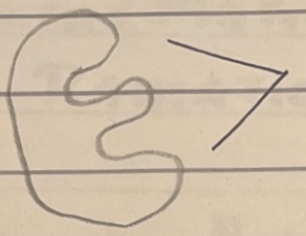
## 2. Composition of Enzymes

- Enzymes are protien in nature
- They dont alter themselves even in reactions involving proteins
- There is also a non protien part present

## 3 Structure of Enzymes

There is an active site in the enzyme where the reaction takes place. The active site doesnot

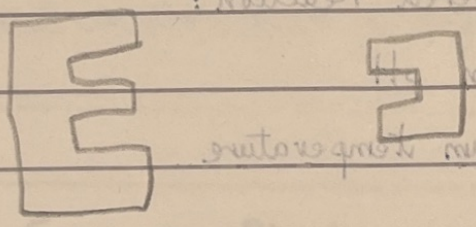
finish of with the reaction. The active site has a specific shape that complements the substrate molecule



a certain shape meant for a certain reaction

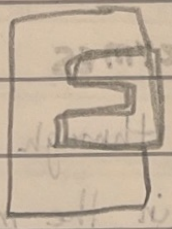
## 4. Working Methadology of An Enzyme

Step 1



enzyme substrate

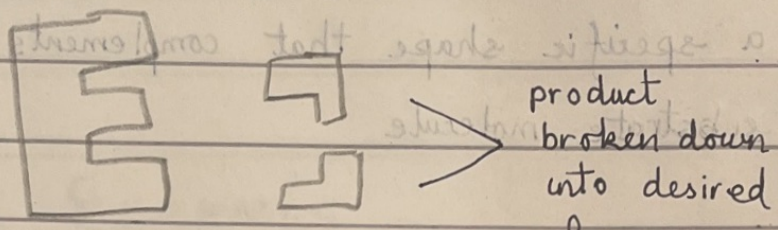
Step 2



enzyme - substrate complex

* some times this step also involves a cofactor which also gets attached to the active site.

Step 3




## 5. Conditionalities of Enzmye Reaction

The following are essential for an enzyme powered reaction:

1- Optimum pH

2- Optimum temperature

Otherwise the enzyme becomes denatured and loses its active site.

## 6. Presence of Enzymes

Enzymes are present through out the digestive cycle, with begins in the mouth, goes to the stomach and then the intestine. Bile juice, pancreatic juice, stomach excreations and saliva all have enzymes to speed up the reaction

Question 3
PART C

# ELECTRO MAGNETIC RADIATIONS

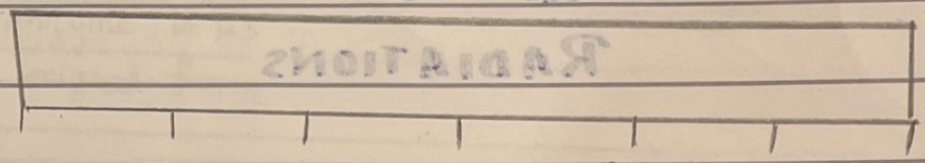
## 1. Electromagnetic Radiations

Electromagnetic ~~radito~~ radiations are radiations that serve ~~serve~~ various purposes. They travel at the speed of light and also in vacuum.

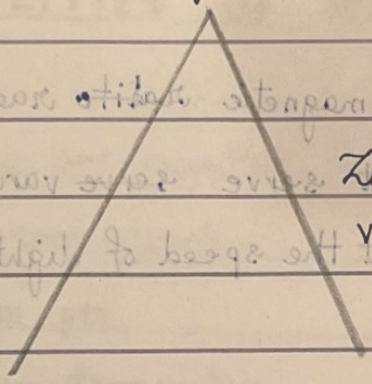
## 2. THE ELECTROMAGNETIC SPECTRUM

The electromagnetic spectrum is the amalgamation of all the electromagnetic radiations. As the speed of all the radiations is that of light; the difference lies in wavelength and frequencies.
Wavelength and frequencies are inversely proportional to each other.

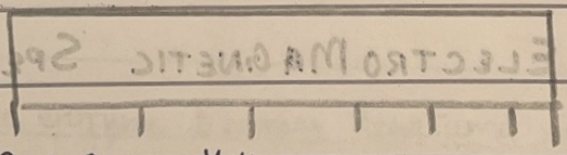
## 3. Components of The Electro Magnetic Spectrum



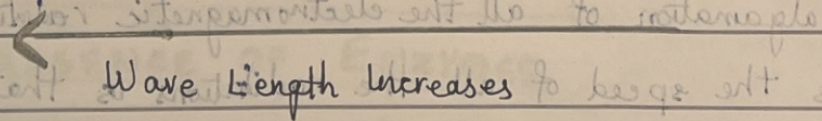
Radio Wave | Micro Wave | Infra-Red | Visible Light | Uttra Violet | Xrays | Gramma Rays



Zoomed in view of visible light



Red Orange Yellow Green Blue Indigo Violet



Wave Length increases

Frequency increases.

Largest wave length: Radio Waves

Smallest wave length: Gramma Rays

Highest frequency: Gramona Rays

Lowest frequency: Radio Waves

## 4. VARIOUS FUNCTIONS OF THE RAYS OF EM SPECTRUM

- Radio Systems
- Wireless Cordless
- Satellites
- Medical Purposes
- Skin treatment
- Vision Rectification
- Identification of objects

Downsides:

Over consumption of these rays can be harmful to health. These rays are known to cause health issues and must be used sparingly under proper guidance from proffesionals.

Question 3

PART D

# INTERCONNECTION OF EARTHQUAKES AND VOLCANIC ERUPTIONS

## 1. PHENOMENAN OF TECHTONIC PLATES AND INTERCONNECTION BETWEEN EARTHQUAKES AND VOLCANIC ERUPTIONS

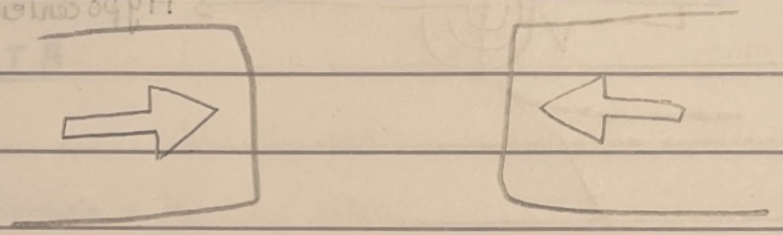
The earths crust ; the top most layer is divide into techtonic plates. There are seven major techtonic plates that make up the world and several small.

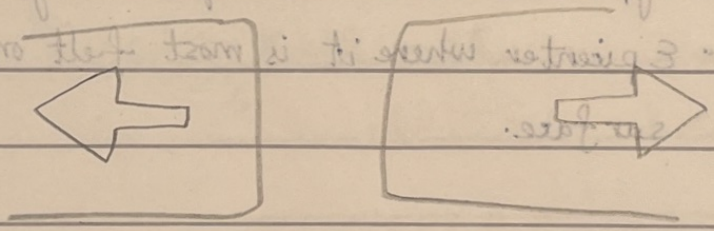
FEATURES OF TECHTONIC PLATES :

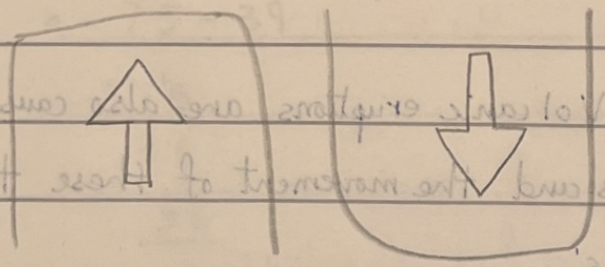
- Fluid mosaic model
- Constant motion
- Floating over the mantle

## 2 Movement of Techtonic Plates That Causes Both

As these techtonic plates move, there are sceneries which can occur:

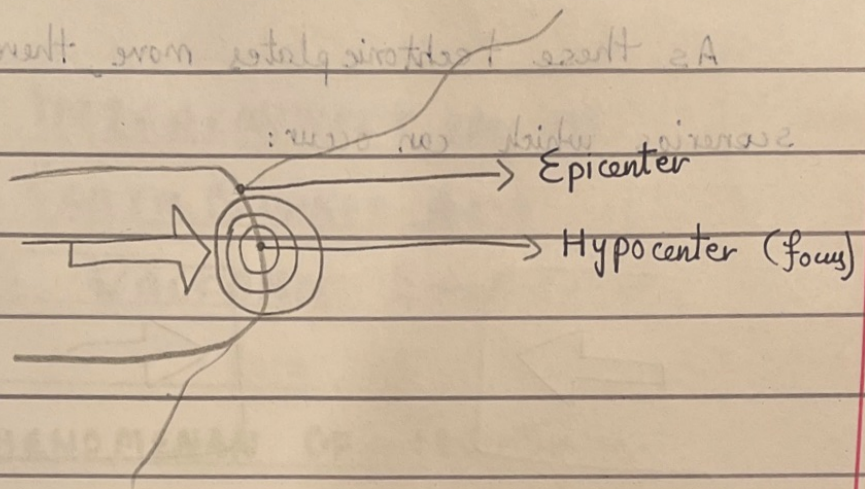






When movement is towards each other, the plates collide and there is a sudden jolt. If that jolt is strong in nature, the earth quake is felt and the richter scale reading is beyond fine.

## 3. EARTH QUAKES MECHANISM




- Hypocenter where earthquake originates
- Epicenter where it is most felt on earths surface.

## 4. CORELATION BETWEEN VOLCANIC ERUPTION

Volcanic eruptions are also caused by earth quakes and the movement of these techtonic plates.

When the plates collide thesy rise upwards and give an outlet to the magma → hot liquid from mantle.

When plates move away, they also give space for the magma to erupt due to no techtonic cover.

# SECTION II
## ABILITY

### Question 6

**PART A**

Determine = k

Given = $\frac{9+8+10+k+12}{5} = 15$

So, $39 + k = 75$

$k = 75 - 39$

$\begin{array}{r} 75 \\ -\ 39 \\ \hline 36 \end{array}$

$\boxed{k = 36}$

## PART B

Given sugar solution : coloured water

4 : 3

It becomes 4 : 5

when 10 litres of coloured water added.

means increase in 2 points equals to 10 litres

1 point = 5 litre

Initial quantity of sugar solution is 4 points

$4 \times 5 = \boxed{20 \text{ litre}}$

## PART C

What to find = Volume

Given = Radius i.e. 12 cm

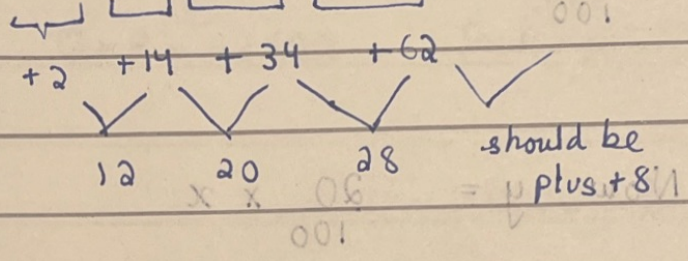
Volume of sphere $= \frac{4}{3} \pi r^3 = \frac{22}{7} \times \frac{4}{3} \times (12)^3$

$= \frac{1728 \times 88}{21} = \frac{152064}{21} = \frac{50688}{7}$

$\boxed{= 7241.1 \text{ cm}^3}$

## PART D

Series: -10, -8, 6, 40, 102, ?




28 + 8 = 36

So that next value number be (36+62) steps forward

Which means: 98 steps forward.

102 + 98 steps = 200

? = 200

## Question 7

## PART A

20% of x = y

Find value of y% of 20

y % of 20 means in mathematical terms:

$$\frac{y}{100} \times 20 = y \times 20,00$$

Now: $y = \frac{20}{100} \times x$

Replace y in the equation:

$$\left(\frac{20}{100} x\right) \times 2000$$

$$20x \times 20 = \boxed{400x}$$

## PART B

Average salary of P and Q = 5050

Q and R = 6250

P and R = 5200

Equations formed:

$$\frac{P+Q}{2} = 5050 \quad , \quad \frac{Q+R}{2} = 6250 \quad \frac{P+R}{2} = 5200$$

So

① ② ③

$P+Q = 10100$ $Q+R = 12500$ $P+R = 10400$

$P = 10100 - Q$ $P = 10400 - R$

Hence

$10100 - Q = 10400 - R$

$R - Q = 10400 - 10100$

$R - Q = 300$

$R = 300 + Q$

Putting it in equation ②

$Q + (300+Q) = 12500$

$2Q = 12500 - 300$

$2Q = 12200$

$Q = 6100$

Now putting in equation ①

$P + 6100 = 10100$

$P = 10100 - 6100$

$\boxed{P = 4000}$

## PART C:

Probability of getting two heads:

$$\frac{105}{500} = \boxed{0.21}$$

Probability of getting one head

$$\frac{275}{500} = \boxed{0.55}$$

Probability of getting no head

$$\frac{120}{500} = \boxed{0.24}$$

## PART D

What we have:

Jamies Dad is 4x Jamies age

In 14 years he will be 2x Jamies age

What to find: Sum of ages now

Let Jamies current age be 'x' and dads 'y'

$4x = y$ → current

$2(x+14) = y+14$ → after 14 years

$2x + 28 = 4x + 14$ means $x = 7$ and $4x = y = 28$

Sum is $28 + 7 = \boxed{35}$