

Question no. 2: (A)  
Answer: What are Volcanoes?  
Vents on Earth's Crust:

Volcanoes are essentially vent's on the Earth's crust through which underground molten mineral matter-magma- is erupted due to the density variation within the volcano (figure A),

Magma After Volcanic Eruption:

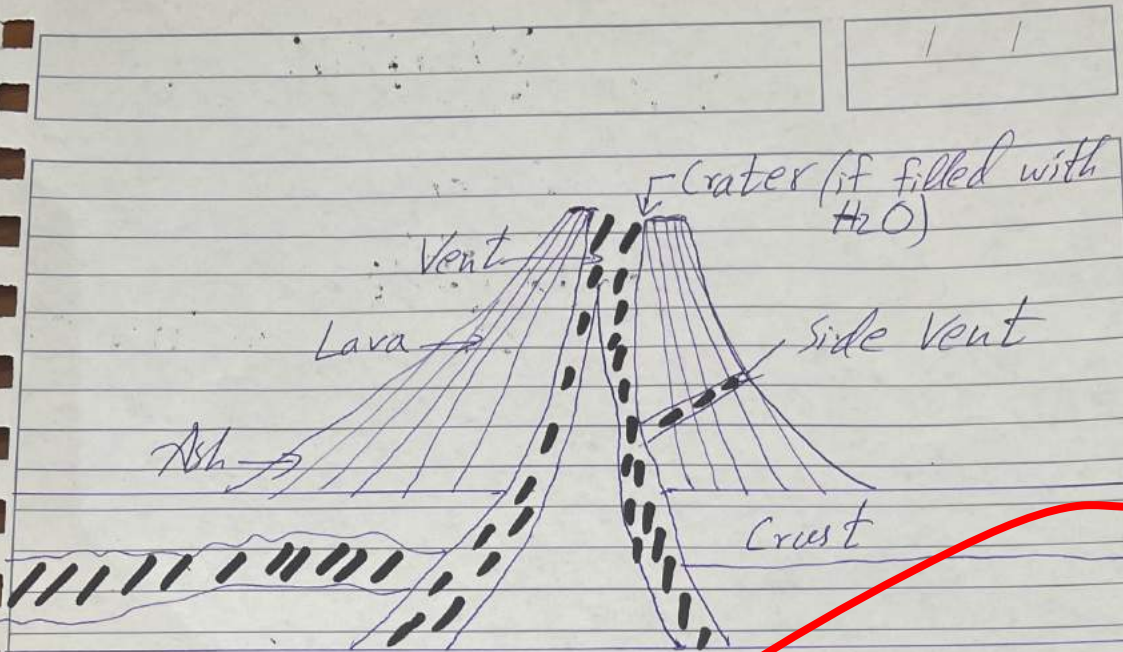
After volcanic eruption, the magma reaches surface of Earth. It is now known as lava. It cools and hardens in the form of a dome or crust.

Examples of Volcanoes:

There are numerous volcanoes found around the world. A few examples of volcanoes are given below:

- (i) The Pacific Ring of Fire which includes two-thirds of the world's volcanoes,
- (ii) Mount Pinatubo, Philippines,
- (iii) Mount Etna, Italy.

You have potential to score 80+ in fpssc exam but With this paper presentation it's difficult to cross even 55. Discuss paper presentation with teacher



**Figure A: Volcanic Eruption.**

**Causes of Volcanic Eruption:**

Although there can be multiple causes of volcanic eruptions, the following are predominant.

**1. Movement of Tectonic Plates:**

(i) When tectonic plates move towards each other, below magma, sediments and seawater are forced into the chamber which eventually overflows and the volcano erupts.

(ii) When tectonic plates move away from each other, magma from below crust rises to fill the gap and so the volcano erupts.

(B)

## Answer: Big Bang:

**Definition:** Big bang may be defined as the rapid expansion of matter from a state of high density and temperature which marked the origin of the Universe (Figure B).



**Figure B:** Origin of Universe from Big Bang.

## Proposer of Big Bang Theory:

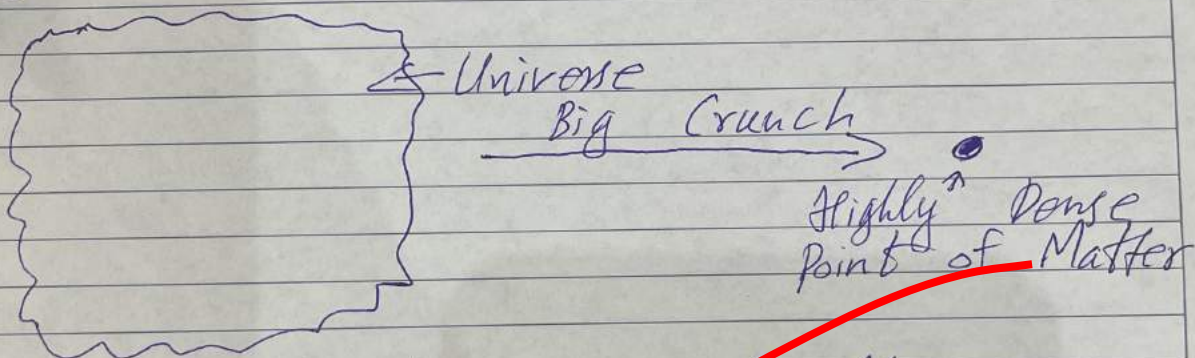
The Big Bang theory was first proposed by Roman Catholic priest and (psychologist) physicist George Lemaitre.

## Continuously Expanding Universe:

According to the Big Bang theory, the Universe, as we know it, is continuously expanding even today.

## Big Crunch:

**Definition:** Big Crunch may be defined as a hypothetical scenario for fate of the Universe, in which expansion of the Universe eventually reverses and the Universe again condenses back to a single point of high density (Figure C).



**Figure C:** Condensation of Universe via Big Crunch.

## Proposer of Big Crunch Theory:

The Big Crunch theory appears to have been proposed by no particular person but developed rather out of the idea that since the Universe is expanding, then it might one day start contracting.

## Big Crunch Theory is Incorrect:

Vast majority of evidence indicates that Big Crunch theory is incorrect.

## Determination of Age of Universe:

We can determine age of Universe using two different methods:

- (i) By measuring/calculating age of galaxies from the travel time of light.
- (ii) By calculating age of Universe from expansion of Universe.

## Calculating Age of Universe from Expansion:

If we can measure how the Universe is expanding today and how it has expanded throughout its entire history, we can calculate age of the Universe.

## Answer: Renewable Energy:

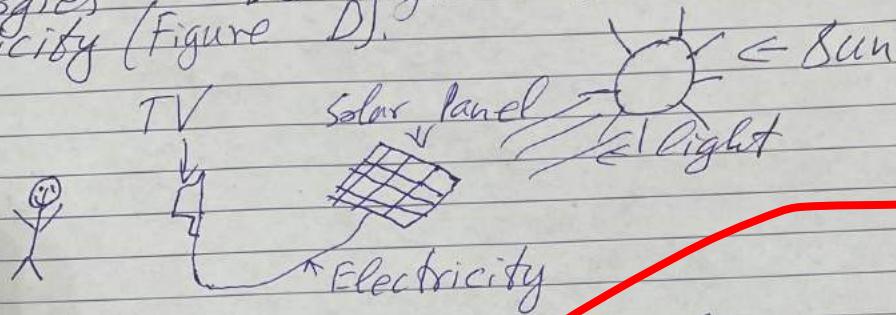
**Definition:** Renewable energy may be defined as the energy that is obtained/acquired from renewable resources that are naturally replenished on a human timescale.

## Sources of Renewable Energy:

### 1. Solar Energy:

**Definition:** Solar energy may be defined as radiant light and heat from the Sun that is

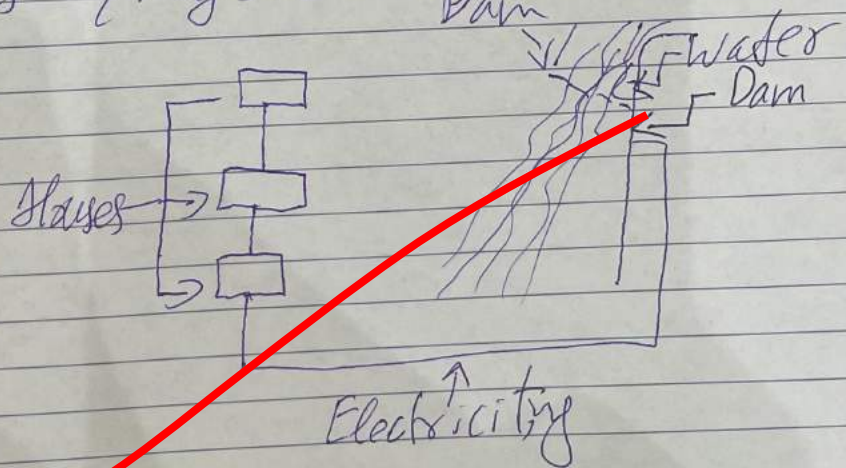
harnessed using a range of technologies to generate electricity (Figure D).



**Figure D:** Electricity generation through solar power.

## 2. Hydropower:

**Definition:** Hydropower may be defined as the electric energy that is harnessed (taken) via water using a range of technologies (Figure E).



**(Figure E:** Hydropower.

### 3. Wind Energy:

**Definition:** Wind Energy may be defined as that energy that is harnessed via wind using a wide range of technologies (Figure F).

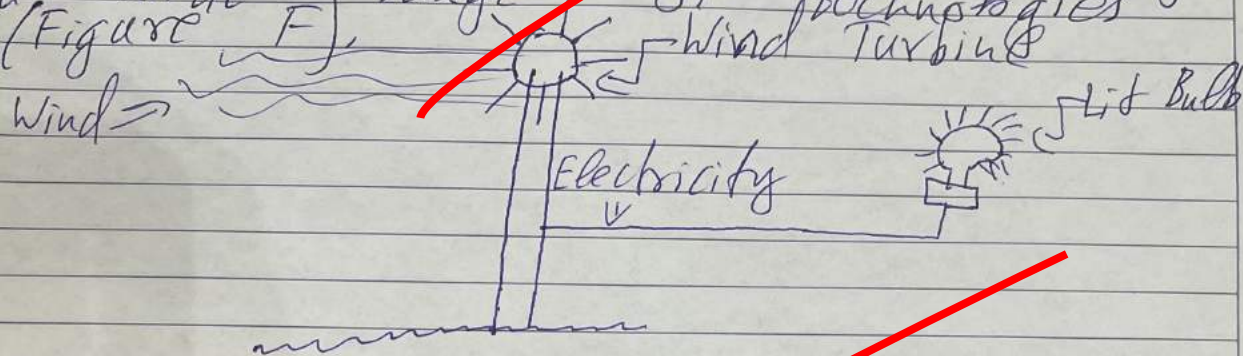


Figure F: Wind Energy

### 4. Geothermal Energy:

**Definition:** Geothermal energy, as the name indicates, may be defined as thermal energy in the Earth's crust.

### Combination of Energy:

Geothermal energy is the energy that combines energy from the formation of the planet (flora) and from radioactive decay.

### Geothermal Energy is Old:

Geothermal energy has been exploited as a source of heat and for electric energy for millenia.

## 5. Bioenergy:

**Definition:** Bioenergy may be defined as the energy made or generated from biomass, which consists of recently living (cut, now dead) organisms, mainly plants.

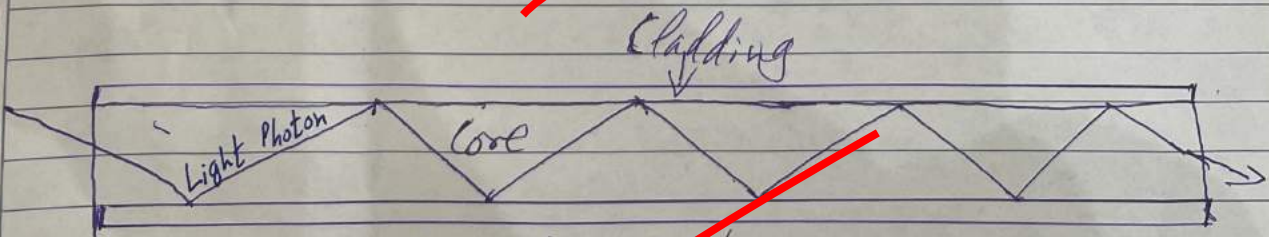
## Types of Biomass Used:

Types of biomass commonly used for bioenergy include

- (i) Wood,
- (ii) Food crops such as corn, and
- (iii) Waste from forests, yards or farms.

## Answer: Optical (d) Fiber:

**Definition:** Optical fiber may be defined as a flexible glass or plastic fiber that can be used to transmit light from one end to the other (Figure 6).



**Figure 6:** Optical Fiber



## Working of Optical Fiber:

**Use of Light:** As shown in Figure A, light photons travel down a optical fiber cable by repeatedly bouncing off the walls of the cable.

## Mirror-Like Reflection:

Each light particle (photon) bounces down the pipe, with continued internal mirror-like reflection. This allows the photons to travel a long distance.

## Direction Travelled By Light:

The light beam (photons) travels down the core of the cable. The core is the middle part of the glass structure.

## Role of Cladding:

The cladding is another layer of glass which is wrapped around the core. Cladding is there to contain the light signals inside the core of optical fiber.

Question no.4:

Answer: Methods (A) Employed in Solid Waste Management:

Various methods are employed used in solid waste management. A few of these methods are given below:

1. Landfilling:

Definition: Landfilling may be defined as the disposal of solid waste by filling at specifically engineered sites of land (Figure H).

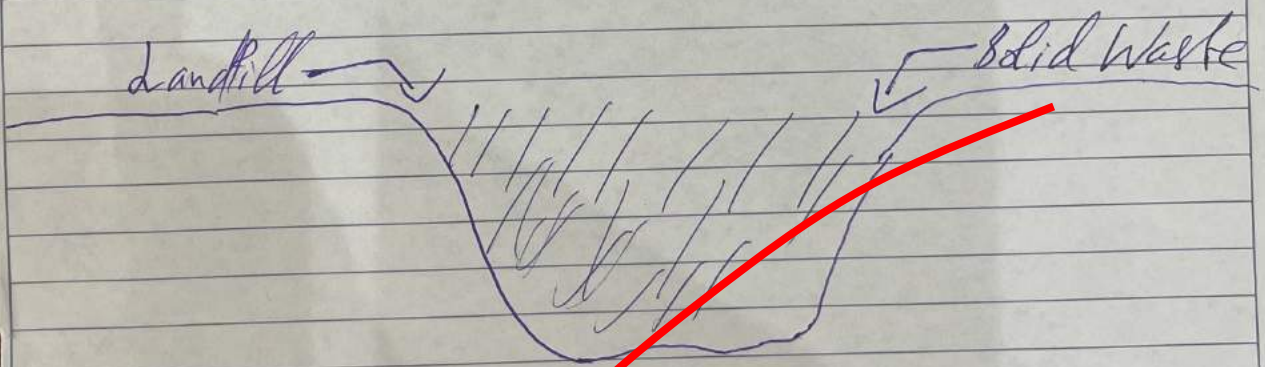
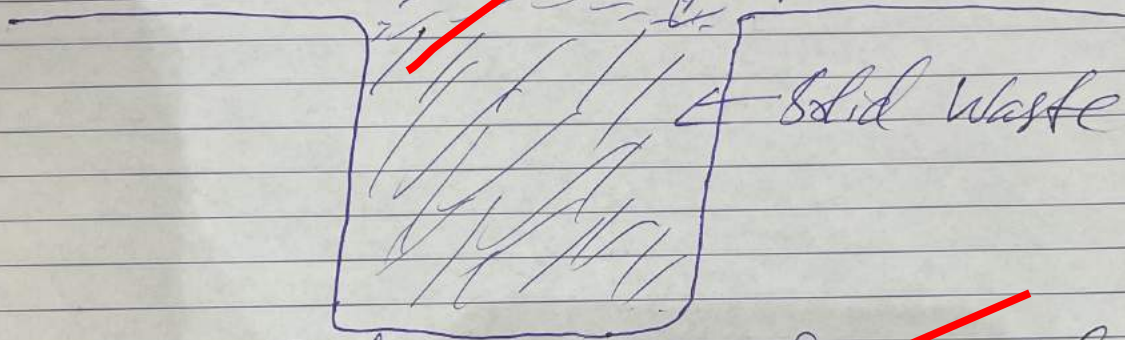


Figure H: Solid Waste Management via Landfilling.

## 2. Incineration:

**Definition:** Incineration, also known as combustion, may be defined as the solid waste management method in which controlled burning of solid waste at high temperature is carried out (Figure I).



**Figure I:** Incineration of solid waste.

### Advantage:

- (i) One advantage of incineration is that the solid waste is completely disposed off.
- (ii) Another advantage is that it requires a small span of time.

### Disadvantage:

- (i) One disadvantage of incineration is that it produces huge amount of  $CO_2$ .
- (ii) Another disadvantage is that it also produces ash.

### 3. Composting:

**Definition:** Composting may be defined as the process of biological decomposition of organic waste (Figure 5).

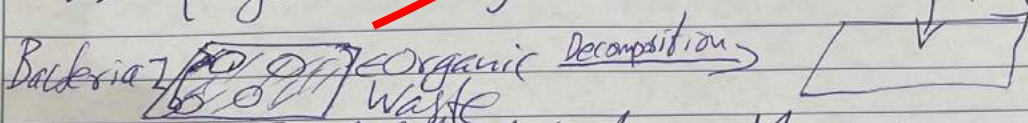


Figure 5: Solid Waste Management via Composting.

### Advantage of Composting:

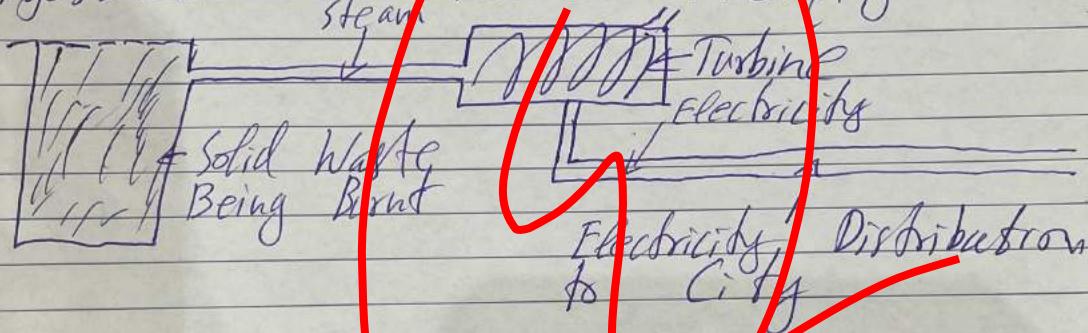
- (i) One advantage of composting is that it is environment friendly, i.e. it does not cause any harm to environment.
- (ii) Another advantage of composting is that, via this process of solid waste management, the volume of waste is reduced significantly.

### Disadvantage of Composting:

- (i) One disadvantage of composting is that, as it utilizes microorganisms (bacteria, viruses, etc), it is a very slow and time consuming process.

## 4. Waste-to-Energy Method:

**Definition:** Waste-to-energy method may be defined as the method of solid waste management in which solid waste is converted to energy frequently by means of anaerobic digestion or incineration (Figure K).



**Figure K:** Waste-to-Energy method of solid waste management.

### Advantage:

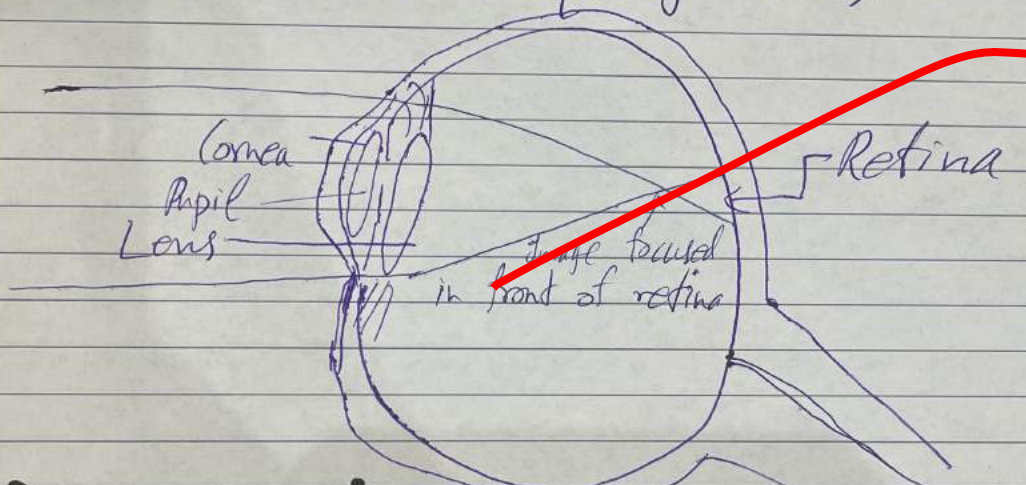
- (i) One advantage of waste-to-energy method is that it provides energy to masses.
- (ii) Another advantage is that it is beneficial to people.

### Disadvantage:

- (i) One disadvantage is that it produces and causes pollution.
- (ii) Another disadvantage is that it produces a lot of waste.

## Answer: Myopia:

**Definition:** Myopia may be defined as an eye disease where light from distant objects focuses in front of, instead of on the retina (Diagram A).



## Diagram A: Myopia

### Result of Myopia:

The result of the eye disease myopia is that distant objects appear blurry while objects which are close appear normal.

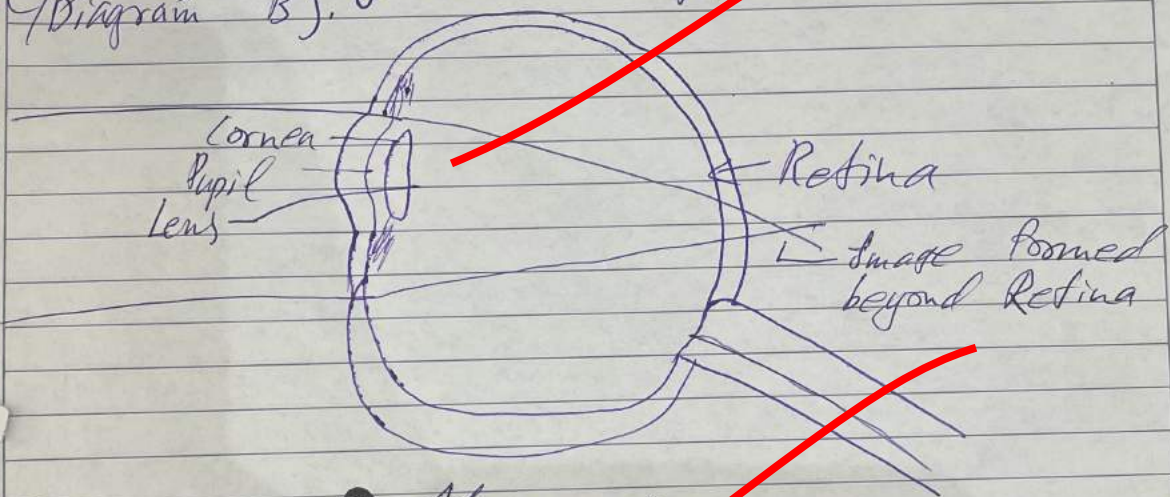
### Symptoms of Myopia:

Other symptoms of myopia may include

- (i) Headache
- (ii) Eye strain

## Hyperopia:

**Definition:** Hyperopia (also known as farsightedness) is a condition of the eye in which far objects appear to be seen clearly whereas (distant) near objects appear blurry. (Diagram B).

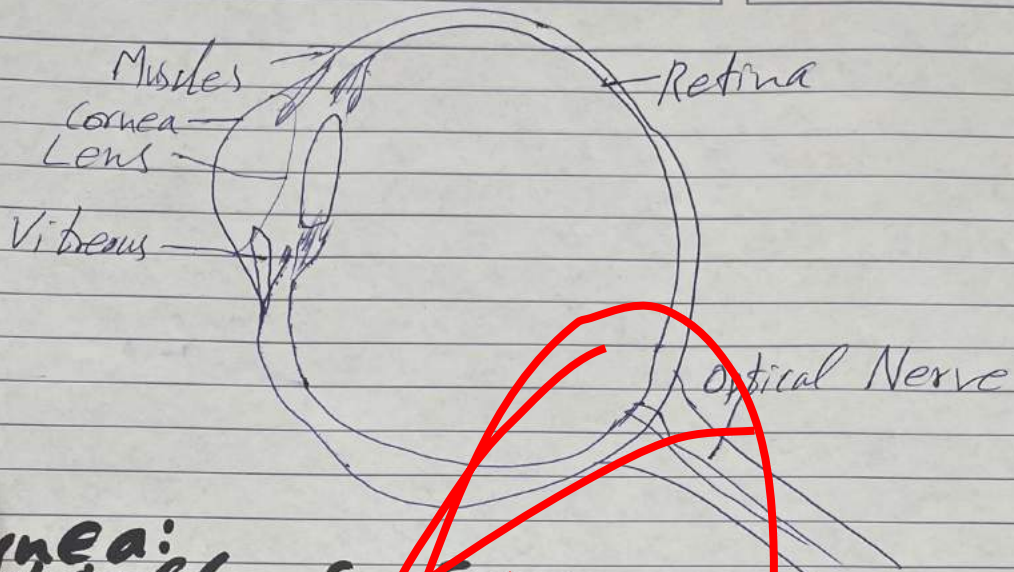


## Diagram B: Hyperopia

**Insufficient Accommodation by Lens:** The object appears blurred due to incoming light being formed beyond instead of on, the retina of eye, due to insufficient accommodation by the lens.

## Major Parts of Eye:

The major parts of eye are given below:



### **1. Cornea:** **Windshield of Eye:**

Cornea is a part of eye which acts like a windshield, protects the inside of eye from damage.

### **Lubrication of Cornea:**

The tears fluid, which lubricates and covers eye and the work of lubricating cornea.

### **Bending of Light:**

The cornea also does part of the work of bending it as it enters the eye.



## 2. Sclera: White Part of Eye:

The white part of the eye, which is majority of eye, is known as sclera.

## Shape and Structure of Eye:

Sclera is actively involved in forming the shape and structure of the eye.

## 3. Conjunctiva:

### Inside of Eyelids:

Conjunctiva is a thin, clear layer which is involved in covering sclera and also lining inside of eyelids.

## 4. Iris:

### Iris contains Muscles:

Iris contains the muscles which are involved in controlling the size of the pupil.

## Variety of Colours:

Iris is also responsible for eye colour. The iris can be

- (i) brown,
- (ii) blue,
- (iii) green, or
- (iv) hazel.

## 5. Pupil: Adjustable

Pupil is inside the eye like a window of eye.

## Window of Eye:

black circle inside the iris. It is adjustable inside the eye.

## Controls Amount of Light:

The pupil is actively involved in widening and narrowing. It does so to control the amount of light entering eye.

## Answer: Uses of (D)

(i) Microwave: The uses of microwave are given below:

- (i) Microwaves are used in communication.
- (ii) They are also used in radio astronomy.

(iii) They are ~~not~~ also used for remote sensing.  
(iv) Due to their heating application, they are used in cooking as well.

## (ii) Uses of Ultraviolet (UV):

The uses of ultraviolet (UV) are given below:

(i) UV are used for killing insects.

(ii) They are also used for creating fluorescent effects.

(iii) They are used for curing inks and resins.

(iv) Last but not least, they are also used in phototherapy and tanning.

## (iii) Uses of X-Rays:

The uses of X-rays are given below:

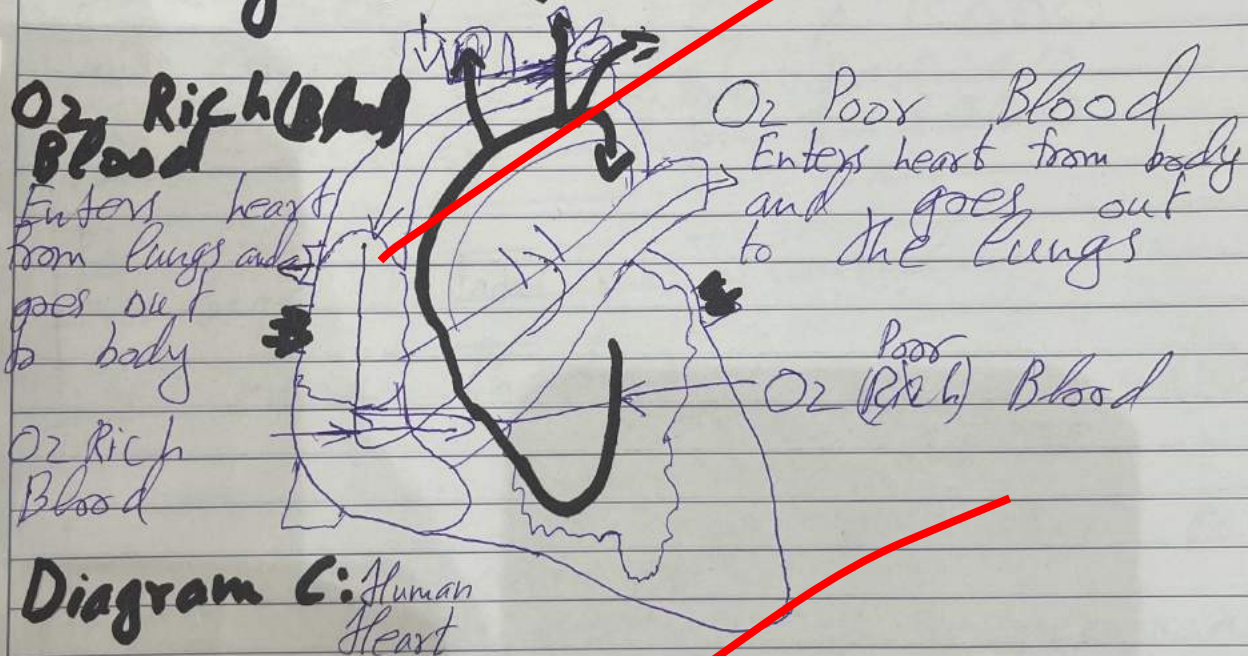
(i) X-Rays are mainly used for diagnosing bones and joints.

(ii) They are sometimes used for processes used to detect problems affecting soft tissues, such as internal organs.

# Answer: Working (B) of Human Heart in Blood Circulation:

**Heart:**  
**Definition:** Heart may be defined as a muscular organ that pumps blood through the blood vessels of the circulatory system (Diagram C).

## Working of Human Heart:



## Direction of O<sub>2</sub> Poor Blood:

Blood comes into right atrium from body, moves into right ventricle, and is pushed into pulmonary arteries to the lungs.

## Direction of O<sub>2</sub> Rich Blood:

After picking up O<sub>2</sub> from lungs, the blood travels back to the heart via pulmonary veins into the left atrium, to the left ventricle, and to the body's tissues through the aorta.

## SECTION-II

Question no. 6:

(A)

Solution:

Given Data

Votes Received by Candidate A = 15000

Votes Received by Candidate B = 10000

Votes Received by Candidate C = 8000

To Find

Percentage of total votes of winner = ?

We know that

$$\text{Percentage} = \frac{\text{Large value} \times 100}{\text{Total value}}$$

First we will add all votes to obtain total value

$$\begin{aligned} \text{Total value} &= 15000 + 10000 + 8000 \\ &= 33,000 \text{ votes} \end{aligned}$$

By putting values, we get

$$\text{Percentage} = \frac{15000}{33000} \times 100$$

$$= \frac{15}{33} \times 100$$
$$= 45\% \text{ Ans}$$

Hence ~~(6A)~~ percentage of ~~total~~ votes of winning candidate is 45%.

**Solution:**

**(B)**

Given Data

Ratio of Angles = 3:4:5

To Find

Angles = ?

We know that

Angles are in ratio 3:4:5

Let angles be  $3x, 4x, 5x$  (i)

We know that sum of angles of triangle is 180

$$\therefore 3x + 4x + 5x = 180$$

Divide by 12 on both sides

$$\frac{12x}{12} = \frac{180}{12}$$
$$x = 15$$

Put  $x=15$  in eq. (i)

$$3(15) = 45 \quad \text{(ii)}$$

$$4(15) = 60 \quad \text{(iii)}$$

$$5(15) = 75 \quad \text{(iv)}$$

Hence angles are 45, 60, 75 Ans

(c)

**Solution:**

Given Data

$$\begin{aligned} \text{Boys in group} &= 4 \\ \text{Girls in group} &= 6 \\ \text{Total Girls} &= 102 \end{aligned}$$

To Find

Total boys = ?

First we will find number of girl groups.

We will divide total girls with girls in each group

$$= \frac{102}{6} = 17$$

So, there will be 17 girl groups

Now we will find total number of boys

We will multiply number of groups with boys in each group

$$\text{Total boys} = (17) \times (4)$$

Hence, 68 boys will be required. Ans

**Solution:**

(d)

Given Data

Ratio of present ages of A & B = 6:7

Ratio of ages after 5 years = 7:8

To Find

Present Age of A & B = ?

Let

Present Age of A = a

Present age of B = b

⇒

$$a : b = \del{6:7} 6:7$$



Let common multiple be  $c$

$$\therefore \begin{aligned} a &= 8c && \text{(i)} \\ b &= \del{7c} 7c && \text{(ii)} \end{aligned}$$

Age of  $a$  after 5 years =  $a+5$   
Age of  $b$  after 5 years =  $b+5$

hence

$$(a+5) : (b+5) = 7:8$$

$$\Rightarrow \frac{(6c+5)}{(7c+5)} = \frac{7}{8}$$

By cross multiplication

$$48c + 40 = 49c + 35$$

Subtract  $48c$  on both sides

$$\del{48c} + 40 - \del{48c} = 49c - 48c + 35$$

Subtract by 40 on both sides

$$\del{40} - \del{40} = c + 35 - 40$$

$$(\del{c})$$

$$= c - 5$$

$$\Rightarrow c = 5$$

By putting  $e = 5$  in (i) and (ii)

$$a = 6(5)$$

$$a = 30 \text{ years (iii)}$$

$$b = 7(5)$$

$$b = 35 \text{ years (iv)}$$

Hence present ages of A & B are 30 years and 35 years respectively.

**Question no. 9: (A)**

**Solution:**

Given Data  
Sum of 3 consecutive odd numbers = 273

To Find

Odd number = ?

Let Smallest odd number =  $x$

Hence Next 2 odd numbers =  $x+2$  and  $x+4$

$$(x) + (x+2) + (x+4) = 273$$

$$\Rightarrow x + x + 2 + x + 4 = 273$$

$$\Rightarrow 3x + 6 = 273$$

Subtract 6 on both sides

$$3x + 6 = 273 - 6$$

$$3x = 267$$

Divide by 3 on both sides

$$\frac{3x}{3} = \frac{267}{3}$$

$$x = 89$$

First number =  $x$

$$= 89$$

Second number =  $x + 2$

$$= 89 + 2$$

$$= 91$$

Third number =  $x + 4$

$$= 89 + 4$$

$$= 93$$

Hence the three required consecutive odd numbers are 89, 91 and 93

Then 8  
red

7+8

(i) 4, 16, 36, 64, ?, 144 (B)

Solution:

We can see that 12 is added in first number 4 to get 16.

$$4 + 12 = 16 \quad (i)$$

Then 8 is added to 12 to get 20. And 20 is added to 16 to get 36.

(ii)

$$8 + 12 = 20$$

$$20 + 16 = 36 \quad (ii)$$

The same pattern is carried on till 144

∴ we will add 36 to

64

$$36 + 64 = 100 \quad \text{Ans}$$

Hence the missing number is 100.

(ii) 30, 29, 27, ?, 20, 15

**Solution:**  
We can see that first 1  
is subtracted from 30 to  
get 29  
 $30 - 1 = 29$  (i)

Then 2 is subtracted from  
29 to get 27

$$29 - 2 = 27 \quad \text{(ii)}$$

The same pattern is carried  
on till 15.

So we will subtract 3  
from 27

$$27 - 3 = 24 \quad \text{Ans}$$

Hence missing term is 24.

**Solution:** (iii)

We can see that first 6  
is added to 1 to get 7

Then 8 is added to 7  
to get 15  
 $1 + 6 = 7$   
 $7 + 8 = 15$

Then 10 is added to 15 to get 25

$$10 + 15 = 25$$

∴ we will add 12 to 25

$$12 + 25 = 37$$

∴ The missing term is 37.

(iv)

**Solution:**

We can see that 2 is added to first number 0

$$0 + 2 = 2$$

Then, multiple of 2 which is 4 is added to 2

$$4 + 2 = 6$$

Then, multiple of 2 which is 6 is added to 6

$$6 + 6 = 12$$

Then, multiple of 2 which is 8 is added to 12

$$8 + 12 = 20$$

Then, 10 (multiple of 2) is added  
to 20

$$10 + 20 = 30$$

So, according to pattern, we will  
add 12 (multiple of 2) to 30

$$12 + 30 = 42 \text{ Ans}$$

Thus, missing term is 42.

**Solution:** (v)

We can see that first number  
48 is multiplied by 0.5

$$48 \times 0.5 = 24$$

Then, 24 is multiplied by 3

$$24 \times 3 = 72$$

Then, 72 is multiplied by 0.5

$$72 \times 0.5 = 36$$

Then, 36 is multiplied by 3

$$36 \times 3 = 108$$

So, according to pattern, we will multiply  
108 with 0.5

$$108 \times 0.5 = 54 \text{ Ans}$$

(i)  
(ii)  
**Solution:** The correct word for the jumbled spelling THRST is SHIRT.

(ii)  
**Solution:** The correct words for the jumbled spelling GNDREA are DANGER, GANDER, GARDEN, RANGED.

(iii)  
**Solution:** The correct words for the jumbled spellings SCHAMOT are COMBAT, MASCOT, SATCOM, MACHOB, MOCHAS, STOMACH.

(iv)  
**Solution:** The correct word for the jumbled spelling ONLNDO is LONDON.

(v)  
**Solution:** The correct word for the jumbled spelling HIODALY is HOLIDAY.



Then, multiple of 2 to which  
is 10 is added to which  
20

$$10 + 20 = 30$$

So, according to pattern we  
will add 12 (multiple of  
2) to 30

$$12 + 30 = 42 \quad \text{Ans}$$

Thus, missing term is 42.

**Solution:** (v)

We can see that first number  
48 is multiplied by 0.5

$$48 \times 0.5 = 72$$

(d)

**Solution:**

Given Data

According to given

$$\text{Sara's Age} = x \quad \text{(i)}$$

$$\text{Sara's Mother Age} = 6x \quad \text{(ii)}$$

$$\text{Ali's Age} = 2x \quad \text{(iii)}$$

After three years

$$\text{Sara's Age} = x + 3$$

$$\text{Sara's Mother Age} = 6x + 3$$

$$\text{Ali's Age} = 2x + 3$$

~~(i)~~  
~~(ii)~~  
~~(iii)~~

Now,

The sum

$$(x+3) + (6x+5) + (2x+3) = 72$$

$$9x + 9 = 72$$

Subtract by 9 on both sides

$$9x + 9 - 9 = 72 - 9$$

$$9x = 63$$

Divide by 9 on both sides, we get  $x = 7$

$$\frac{9x}{9} = \frac{63}{9}$$

$x = 7$  which is Sara's age

Put  $x = 7$  in eq (i), (ii) and (iii), we get

$$6x + 3 = 6(7) + 3$$

Sara's Mother Age = 45 years

$$\text{Ali's Age} = 2x$$

$$= 2(7)$$

$$= 14 \text{ years}$$