

### Question #3

a) Explain and draw the structure of the Sun.

The Sun is a huge ball of gas of helium and hydrogen.

Why does it appear bright?

The Sun appears bright due to the nuclear fusion which releases huge amount of energy giving off its own light.

### Composition of the Sun

The Sun is made up of.

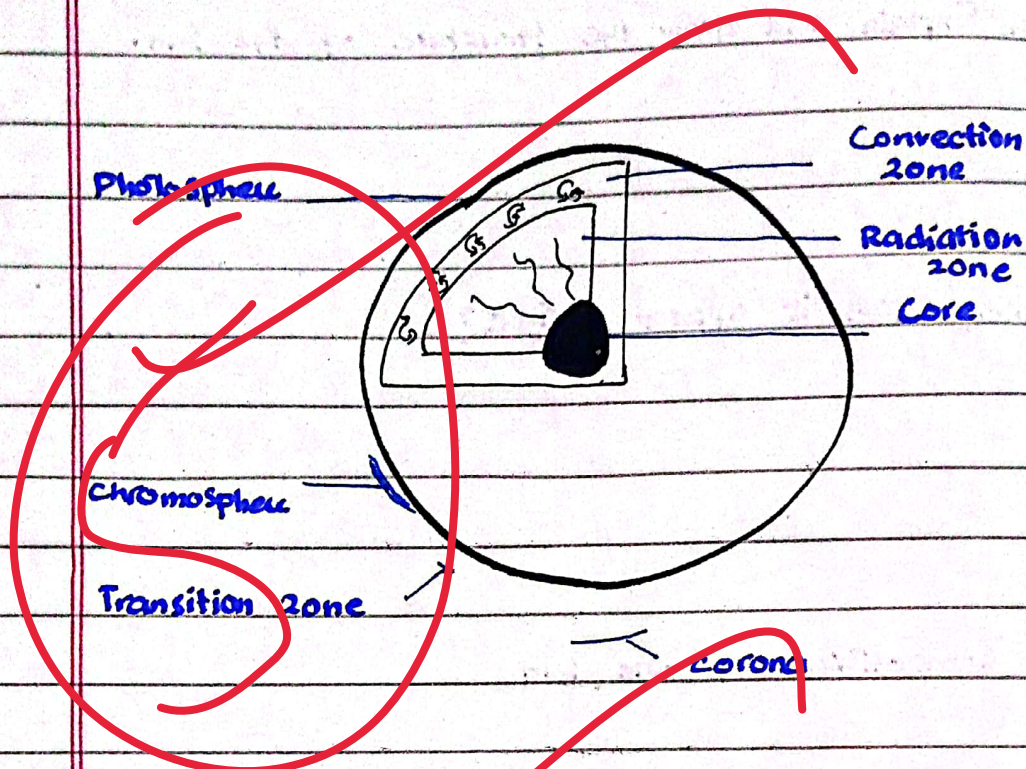
Hydrogen	74%
Helium	24%
Heavy Metals	2%

### Statistics About the Sun

- The Sun is a star of  $1.99 \times 10^{30}$  kg mass
- The diameter is 1.39 million
- The Sun rays reach the earth in 8 minutes and 20 seconds.
- The Sun is 330,000 times the mass of the Earth.



## Structure of the Sun



### 1) Core

- Energy generated here by the nuclear reaction.
- Temperature : 15 million °C

### 2) Radiation zone

- Photons move the energy outwards.
- Temperature : 1.9 million °C

### 3) Convection zone

- convection plasma take heat up and repeats
- Temperature : 1.9 mn - 5500 °C

### 4) Photosphere

- Boundary between sun's interior and



atmosphere.

• Temperature: 5500 °C

### 5) Chromosphere

• Appears red due to electromagnetic emissions

• Temperature: 5800 - 20,000 °C

### 6) Transition zone

• Separates chromosphere and corona

• Temperature: 20000 - 1 million °C

### 7) Corona

• Sun's outer atmosphere

• Temperature: 1.1 - 28 million °C.

Sun's Interior = core + radiation zone + convection zone

Sun's Exterior = photosphere + chromosphere + transition zone + corona

Attempt answer comprehensively  
Use real-life examples.  
Include diagrams and flowcharts  
for competitive edge.  
Discuss practical applications of  
scientific concepts.  
Show all steps and working for  
calculations.  
Use diagrams and graphs

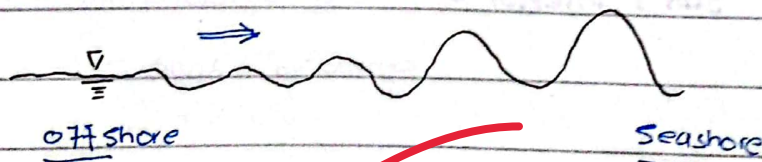
b) What is a tsunami? How is it generated?  
Give examples of a few recent tsunamis.

"A Tsunami is a series of waves caused by earthquakes or undersea volcanic eruptions."

- National Oceanic and Atmospheric Administration.

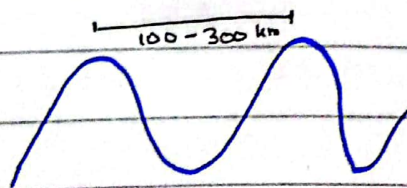
### Characteristics of Tsunami

1. Heightened wave at seashore and short wave offshore: Shoaling  
Begins at 0.5 - 1 m offshore and can reach up to 30 m.



### 2. Long wavelengths

The wavelength can be 100 to 300 km



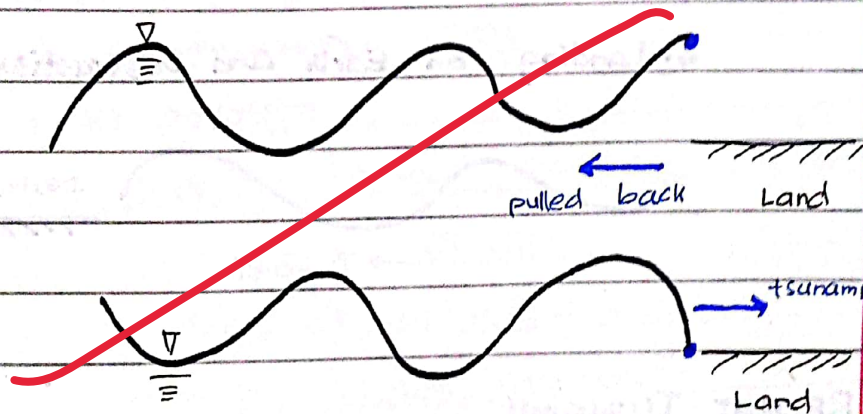


### 3. Required magnitude of earthquake

An earthquake of at least 7.0 m richter scale causes tsunami.

### 4. What part causes destruction?

- If the trough reaches first, it will be pulled back.
- If the crest reaches first, tsunami is caused.



## How is Tsunami GENERATED

### 1. Underlying causes

- Earthquake
- volcanic eruption
- Submarine landslide
- onshore landslide

### 2. Generation of ripples

- Begin offshore at 0.5 - 1 m.



• Increase in height as it approaches

Land - Shoaling

**Earthquake /  
Volcanic Eruption**

disturbance in water

### 3. Formation of Tsunami waves

The waves increase to the height of a tsunami

### 4. Landing on Earth and Destruction

→ Tsunami

Destruction

## RECENT TSUNAMIS

Tsunamis are very rare in the Ring of Fire, where there are frequent earthquakes and waves.

- Tsunami in Japan: January 2011 after an earthquake.
- 2023 - New Zealand tsunami after 7.7 earthquake.
- worst in recent history: 2004 Indian Ocean Tsunami. after a 9.0 earthquake. 300,000 + people died.



c. Discuss Environmental pollution. What could be its harmful effects? Give a few measures to curb it.

Environmental pollution is an foreign element in environment which is potentially harmful.

## MAJOR ENVIRONMENTAL POLLUTION

The major types of pollution that harm the environment are:

### 1. Air pollution

- Toxic or harmful gases and particles are mixed with air.
- Examples of pollutants: Carbon dioxide, carbon monoxide.

### 2. Water pollution

- Water pollution is the result of pollutants drained in water.
- Pollutants include: ~~to~~ industrial wastes, garbage of houses.

### 3. Land pollution

- The dumping of pollutants in the land.



## HARMFUL EFFECTS

Each pollution and the pollutant has its own distinct effect.

### 1. The Harmful Effects of Air Pollution

- Reduction of oxygen-carrying capacity in blood due to carbon monoxide.
- Photochemical smog due to nitrogen dioxide.
- Acid rain due to sulphur dioxide.
- Carcinogenic effect due to particulate matter. (PM<sub>10</sub> and PM<sub>2.5</sub>)

### 2. The Harmful Effects of Water Pollution

- Pathogens in water cause disease.
- Acids and alkali in water kill or harm marine life.
- Heavy metals cause damage to human health.

### 3. Harmful Effects of Land Pollution

- Attracts pests and other disease causing organisms.
- Release harmful gases that are harmful.
- Degrades the underlying land.



# MITIGATION OF ENVIRONMENT

These can be mitigated with relevant actions:

## 1. Measures to curb Air pollution

Air pollution can be curbed by:

- using public transport or using personal vehicles less often.
- using renewable energy instead of fossil fuels.
- using filters in industrial vents.

## 2. Measures to curb land pollution

- Not dumping waste in open surfaces

landfilling or incinerating the waste.

- separating different types of wastes.

## 3. Measures to curb water pollution

- Release only as much waste (liquid) that water can oxidize.

Discard other waste differently.

- Clean the existing polluted water bodies.



d. What is wireless network? Briefly discuss the working of satellite.

Wireless communication is the transmission of information over a distance without the help of wires, cables or any other electrical conductor.

### Close Wireless Communication

- A few meters
- TV remote

### Distant Wireless Communication

- Over thousands of kilometers
- Radio communication.

## TYPES OF COMMUNICATION

### Satellite

- All around the world.
- Receives an information, transfer to downlink.

### Infrared

- Has a longer wavelength than red light
- TV remote, security control.



## Radio

- Radio waves have varying frequency signals.
- Broadcast of radio, TV.

## Microwave

- use a satellite for wireless communication.
- radar, remote sensing.

## Wi-Fi

- uses radio signals, antenna, router.
- connect electronic devices.

## Mobile

- connects users across a single frequency band.

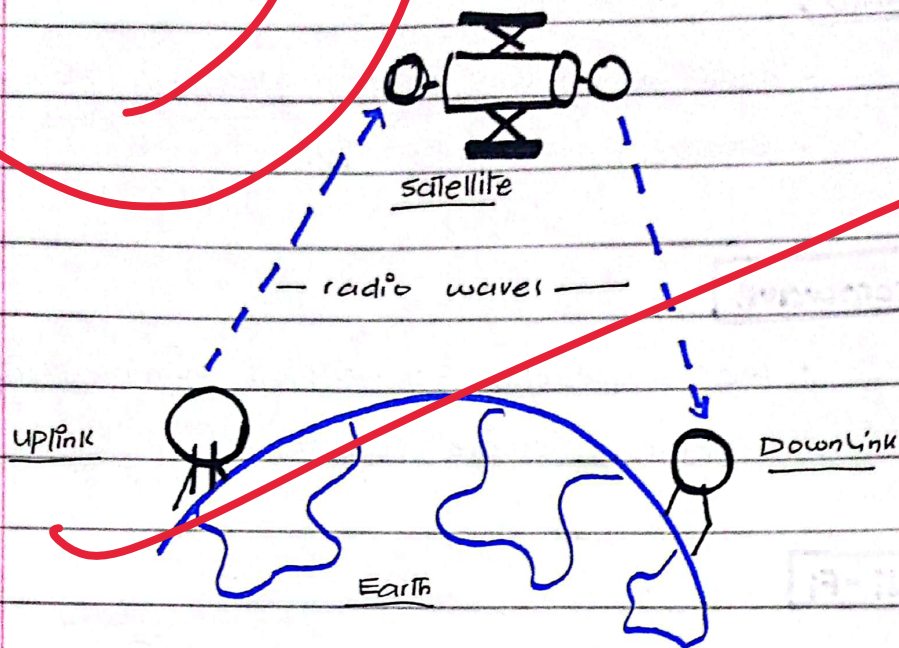
## Bluetooth

- transfer data across various various devices.
- cell phones, earphones, mouse.

## WORKING OF A SATELLITE

A satellite works by receiving data from an uplink sent from the earth and sends it back to downlink on earth.





Question # 04:

a) What is hepatitis? Explain its causes, symptoms and prevention.

Hepatitis is the inflammation of the liver due to viral infection.

Types of Hepatitis and Causes of Hepatitis

Hepatitis A - Ingestion of contaminated water

Hepatitis B - contact with blood or body fluid

Hepatitis C - Transfusion through blood or fluid

Hepatitis D - parenteral - blood or fluid

Hepatitis E - feco-oral transmission



## CAUSES OF HEPATITIS

### Symptoms of Hepatitis

They can be divided into two phases

#### 1. Initial Symptoms

- muscle and joint pain
- fever
- feeling sick
- head ache

occasionally jaundice.

#### 2. Symptoms of chronic hepatitis he

- unusually tired
- depression
- jaundice
- general feeling of being unwell.

### Preventing Hepatitis

It can be prevented by:

- safe injections and medical equipment
- vaccination
- screening of blood



## b. Elaborate a few methods of food

### preservation.

methods of food preservation

include:

#### Freezing

- Below  $10^{\circ}\text{C}$  microorganism <sup>growth</sup> slow down
- Below  $-10^{\circ}\text{C}$ , no multiplication.

#### Drying

- Removes water from food
- Also removes cell water of microorganisms
- multiplication of microorganisms stop.

#### Acidifying

- kills microorganisms.
- citrus acid
- Bacterial culture.

#### Sugaring or Salting

- sugar syrup or salt brine.
- plasmolysis - microbes try to balance the concentration, thus die.

#### Smoking

- old method.



- formaldehyde in smoke kills microorganisms.

## Using chemicals

- only permitted ones
- sorbic acid inhibit mould in cheese
- Sodium benzoate for drinks.

use it  
capital

## Oxygen control

- ~~creating anaerobic conditions~~
- ~~kill the microbes~~
- ~~waxing & skin-light films.~~

## Radiation

- ~~Inactivate enzymes responsible for vegetative sprouting~~
- ~~kill disease causing bacteria~~
- ~~UV light, x-rays, microwaves.~~



6. Explain fertilizers. What are their types?

They are inorganic material of natural or synthetic origin added to soil to supply one or more nutrients essential to growth of plants.

Types of fertilizers based on nutrient supplied

1) Nitrogenous Fertilizers

- urea
- Ammonium Sulphate

2) phosphatic fertilizers

They include:

- single superphosphate
- Triple super phosphate.

3) potassic fertilizers

Sulphate of potash

- muriate of potash

Types of fertilizers based on mode of mode of operation

1) Direct Fertilizers

- Assimilated by plants directly.
- Nitrate, superphosphate

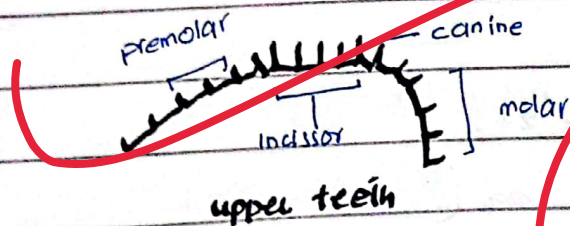


## 2) Indirect Fertilizers

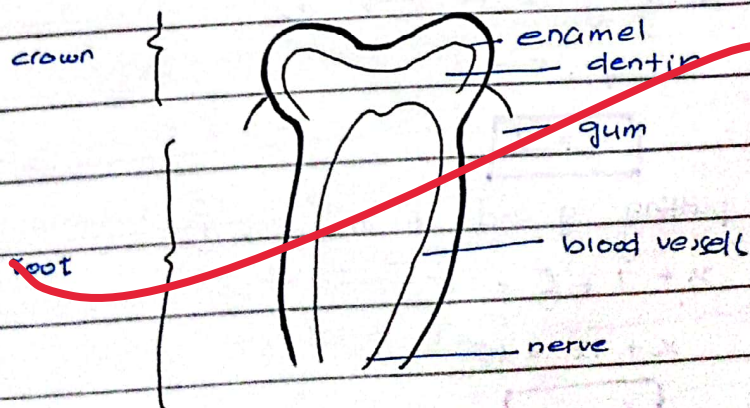
- mechanically improve the quality of soil.
- lime, gypsum.

## d. What is the anatomy of a human tooth?

Human teeth are 32 by the age of adult-hood.



## Anatomy





## SECTION - II

Question # 06:

Q. If sum of a 3-digit ... What  
is the three digit number?

Solution

Let the number be  $xyz$

$$x + y + z = 15 \quad \text{--- (1)}$$

$$y + z = 12 \quad \text{--- (2)}$$

$$y - z = 2 \quad \text{--- (3)}$$

From eq (3)

$$y = z + 2$$

putting in eq (2)

$$z + 2 + z = 12$$

$$2z = 10$$

$$z = 5$$

putting  $z$  in eq (3)

$$y - 5 = 2$$

$$y = 7$$

putting  $y$  and  $z$  in eq (1)

$$x + 7 + 5 = 15$$

$$x + 12 = 15$$

$$x = 3$$

Thus the number is

$$\boxed{375}$$

Answer



b. A man ordered pizza and find the price of total pizza.

Sol<sup>n</sup>

Small pizza : medium pizza : Small pizza  
slices ratio:

$$2 : 3 : 4$$

Each slice = 40 g

$$\text{price of small pizza} = 320$$

meaning

$$\text{price of one slice} = \frac{320}{2} = \text{Rs } 160$$

$$\text{price of medium pizza} = 160 \times 3 = \text{Rs } 480$$

$$\text{price of large pizza} = 160 \times 4 = \text{Rs } 640$$

Total price

$$320 + 480 + 640$$

$$= \text{Rs } 1340$$

weight of small

$$2 \times 40 = 80 \text{ g}$$

weight of medium pizza

$$3 \times 40 = 120 \text{ g}$$

weight of large pizza

$$4 \times 40 = 160 \text{ g}$$

$$\text{Total weight} = 80 + 120 + 160$$

$$= 360 \text{ g}$$



6. Diameter of a circle is 6cm. Find the circumference and area of circle.

Solution

$$\text{radius} = r = 6 \text{ cm}$$

$$\begin{aligned} \text{Circumference of circle} &= 2\pi r \\ &= 2 \times \pi \times 6 \\ &= 12\pi \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ &= \pi \times (6)^2 \\ &= 36\pi \text{ cm}^2 \end{aligned}$$

d. Identify the missing :

i. 13, 24, 46, 90, 178, 354

$\begin{matrix} \curvearrowright & \curvearrowright & \curvearrowright \\ (13 \times 2) - 2 & (46 \times 2) - 2 & (178 \times 2) - 2 \end{matrix}$

ii. 5, 6, 9, 14, 21, 30

$\begin{matrix} \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright & \curvearrowright \\ +1 & +3 & +5 & +7 & +9 \end{matrix}$

3



Question # 7:

a) IQ and EQ

IQ is the number to express the relative intelligence of a person.

- Intelligence Quotient

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}}$$

Emotional Quotient is the emotional ability to perceive, control and manage one's emotions according to situations.

$$EQ = w \times IQ$$

where,

w = wisdom

b. What is the present age of Aman?

Solution: current age = x

20 years later:

$$x + 20 = 10(x - 10)$$

$$x + 20 = 10x - 100$$

$$10x - x = 20 + 100$$

$$9x = 120$$

$$x = 13.3 \text{ years}$$



b. Peter can mow the lawn

$$\text{Peter} = 40 \text{ min}$$

$$\text{John} = 60 \text{ min}$$

c. A person multiplied the number

Let the number be  $x$ :

$$x \times \frac{3}{5} = \frac{3x}{5}$$

$$\Rightarrow \frac{3}{5} \times 100$$

$$60\%$$

And

$$x \times \frac{5}{3} = \frac{5x}{3}$$

$$\Rightarrow \frac{5}{3} \times 100$$

$$= 166.67\%$$

$$\% \text{ error} = 166.67 - 60$$

$$= 106.6\%$$