Date:

General Science and Ability.

(Part-II)

(Section-I)

(Q2)

(a)

Differentiate between a Star and a Planet. Briefly describe the life cycle of a star from Nebula to a Black hole.

Difference

	Star	Planet
1.	**Definition** A star is a huge ball of hot gases (mainly hydrogen and helium) that produces its own light and heat through nuclear fusion.	**1. Definition** Any celestial body that fulfils the criteria set up by International Astronomical Union for planets can be treated as a planet: (i) It revolves in an orbit around the star (ii) has a sufficient mass so it is nearly spherical in shape. (iii) Has cleared the neighbourhood around its orbit (iv) and is not a satellite itself.

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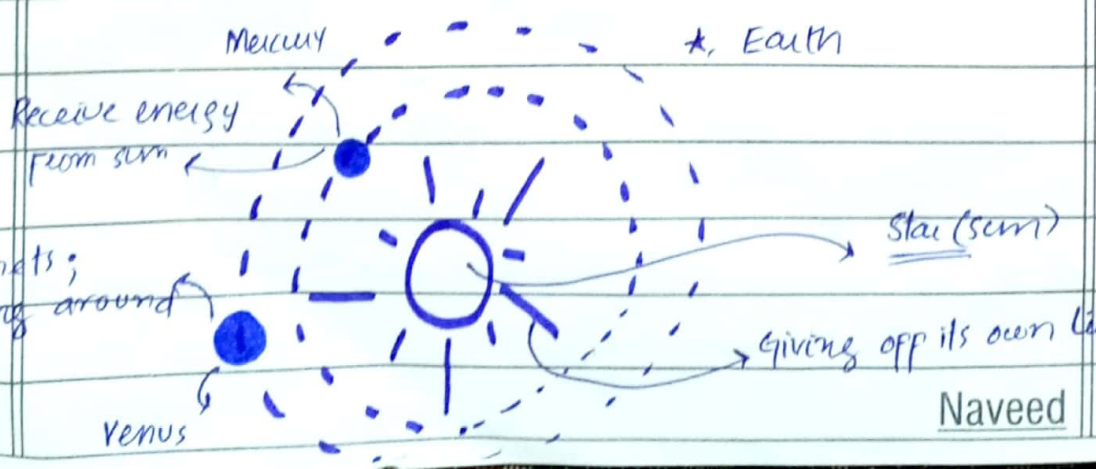
	Stars	Planets
2.	**Energy** Stars are extremely hot and produce their own energy through a process called 'Nuclear fusion'.	**2. Energy** Planets mainly derive their energy from the star and their temperature depends on their proximity to the star. Planets such as mercury that are nearer to sun (star) are hotter compared to those that are far away eg Neptune.
3.	**Orbit** Stars usually orbit around the center of glaxay	**3. Orbit** Planets orbit around the star.
4.	**Size** Stars are usually much larger in size.	**4. Size** Planets are smaller in size when compared to the stars.
5.	**Example** ★ Sun ★ Proxima Centauri	**5. Example** ★ Mercury ★ Venus ★ Earth



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4 Lifecycle of a Star from Nebula To Blackhole

1. Nebula

A star begins its life inside a nebula, a huge cloud of dust and gas. The particles come together due to the gravitational pull.

2. Protostar

As the cloud collapses, it heats up and forms a protostar

3. Main Sequence Star

* When nuclear fusion starts (hydrogen turning into helium), the star enters its longest and most stable phase called the main sequence
* A star spends 90% of its life-time in main sequence stage.
* Our sun is in main sequence stage.

4. Red Giant

* When hydrogen fuel runs out, the star expands and becomes a Red Giant or Supergiant.
* Example: **Betelgeuse is in RedGiant Phase**

5. Supernova

Extremely massive stars explode in a powerful burst called supernova, releasing huge energy.

6. After Supernova, a star can take two paths

Paths

1. Blackhole

* Very Massive stars collapse under gravity and form a blackhole

2. Neutron Star

* Medium stars become neutron star.

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Semiconductors:

"Semi-conductors are the materials that have properties in between that of conductors and insulators"

"Semiconductors have a conductivity between conductors and insulators"

Explanation:

* Semiconductors can be in the form of compounds.
  For example: Galium Arsenide
* Semiconductor can also be in the form of pure elements.
  For example: Gumanium and Silicon
* The resistivity of semiconductors decreases with the increase in temperature.

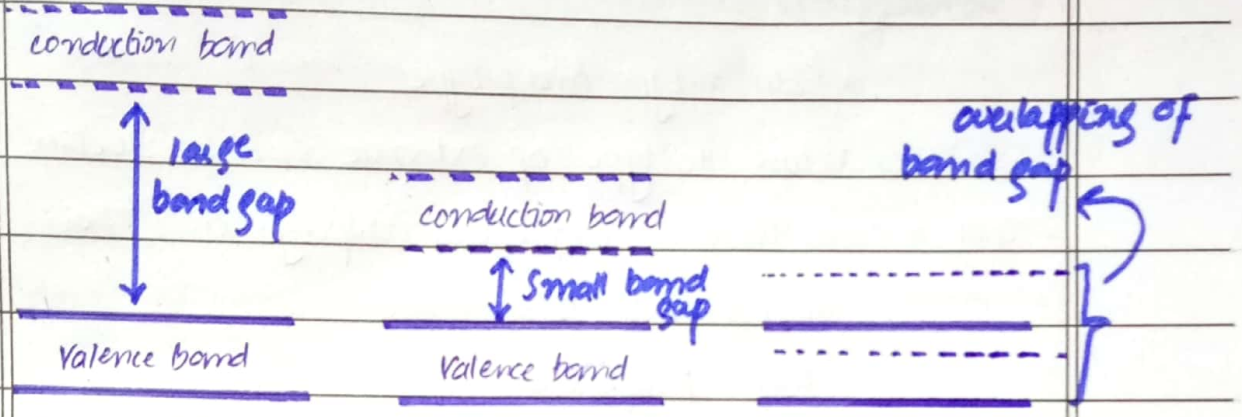
$$\downarrow \text{Resistivity} \propto \frac{1}{\text{Temperature} \uparrow}$$

* Semiconductors are used in many moden day equipments, almost in all electronic devices.
* Semi-conductors make devices smaller, faster, and more efficient.
* The energy bandgap in semi-conductors is smaller than the insulators and large than the conductor.
* This bandgap allows semiconductors to behave as

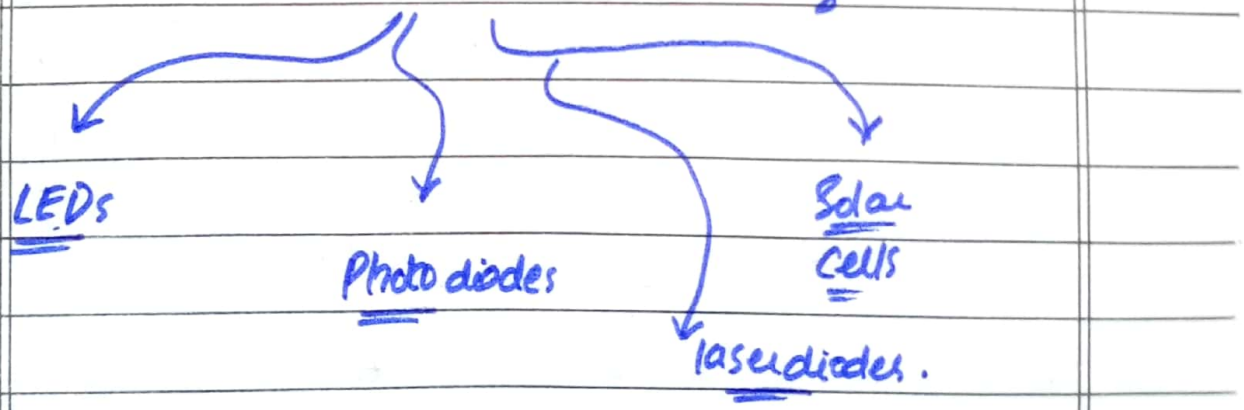
Revised

Date:

as conductors as well as insulators under certain conditions.



* As the semi-conductors have small bandgap, when energy is applied, the electrons easily jump from valence band to the conduction band and become available for conduction. This allows semi-conductor to behave as conductors.
* Otherwise, under normal conditions, they behave as insulators.
* This property make them ideal for controlled conduction.
* Semiconductors are used in making



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Difference

	n-type Semi-conductors	P-type Semi-conductors
	★ Both, n-type and p-type Semi-conductors are type of extrinsic semi-conductors that means there are impurities (doping) in these Semiconductor to enhance their properties.	
1.	**Doping (Pentavalent-Impurity)** The n-type semiconductors are doped with elements that have **extra electrons or negative charge carriers.**	**1. Doping (Trivalent)** The p-type semiconductors are doped with elements that **have extra holes or positive charge carriers**
2.	**Example:** Phosphorous, Antimony	**2. Example:** Gallium, Boron
3.	**Naming** Therefore, due to the excess of certain charge carriers (eg negative), it is named as n-type. n → "negative"	**3. Naming** Due to the excess of positive charge carriers in the donor impurity, it is named as p-type p → "positive"
4.	**Working** The extra electrons that are added make it easier for the current to flow.	**4. Working** The extra holes create missing places where electrons

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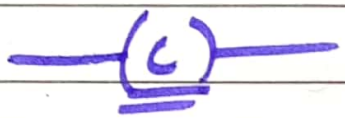
Date:

		can jump into these holes, effectively allowing current to flow.
5.	Application (i) Solar cells (ii) Transistors in computers	5. Application (i) LEDs (forward biased) (ii) laser diodes.



4 Global Warming:

"Global warming refers to the long-term increase in the average temperature of the Earth due to excessive Greenhouse gases in the atmosphere due to anthropogenic activities"

4 Anthropogenic activities:

These are the human activities that are mainly responsible for the excessive emission of the green house gases (GHGs) in the atmosphere that are mainly driving the global warming.

These activities includes:

* Burning of fossil fuels
* Deforestation
* Industrial pollution etc

Date:

4 Mechanism of Greenhouse Effect:

1. **Sunlight reaches Earth**

The sunlight reaches Earth from the sun in the form of short-wave radiation. It warms the Earth.

2. **Earth absorbs and re-emit this heat**

The Earth absorbs this energy and releases it back as long-wave infrared radition.

3. **Greenhouse gases trap this heat**

But the Greenhouse gases trap this heat and stops it from going out. In this way the heat is trapped in our atmosphere

4. **This trapped heat warms the planet**

The trapped heat increases the Earth temperature, just like the glass of a greenhouse that keeps plastic plants warm.

This natural process has become harmful due to the excessive amount of greenhouse gases in our atmosphere that are trapping more and more heat, thereby, increasing the Earth's temperature

↓

'Enhanced Greenhouse Effect'

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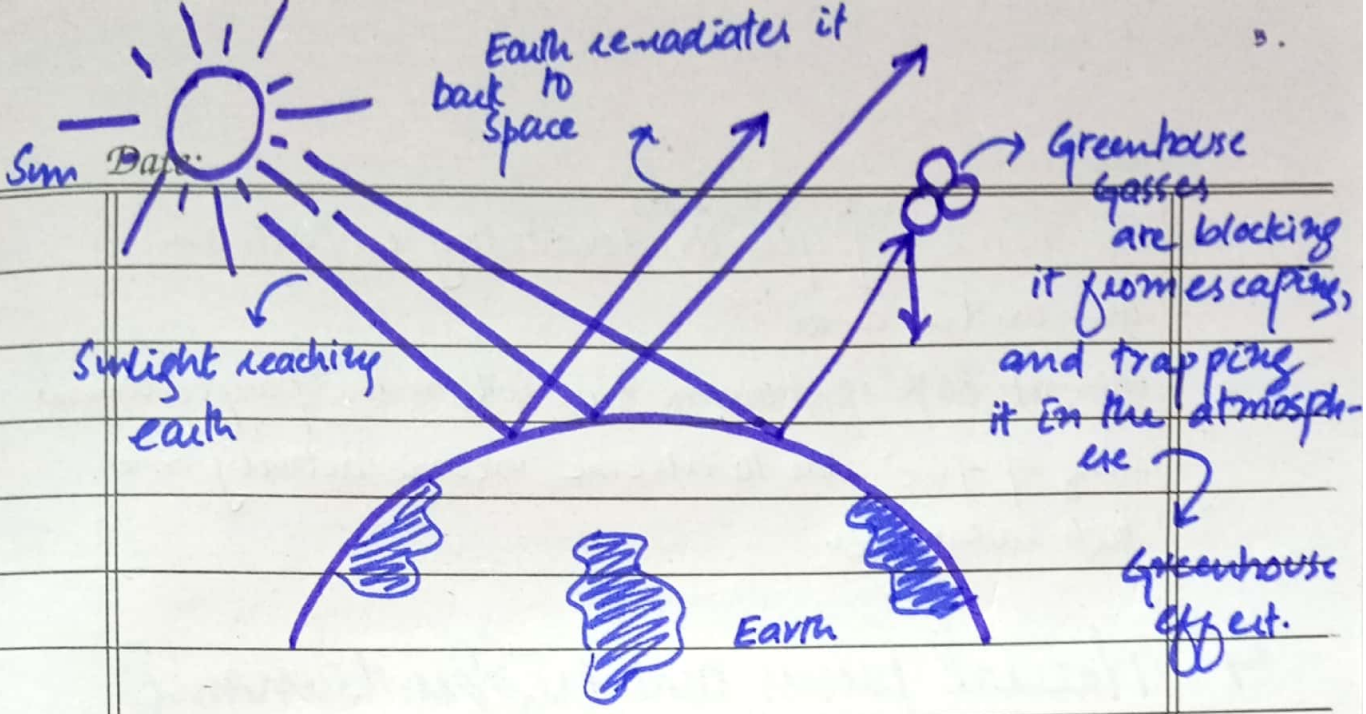

↳ **Major Greenhouse Gases:**

1. Carbondioxide (CO_2)
2. Methane (CH_4)
3. Nitrous Oxide (N_2O)

(d)

↳ **Tsunami:**

"Tsunami is a series of oceanic waves that are triggered by sudden disturbances such as underwater earthquakes, volcanic eruptions, or landslides"

↳ **Explanation**

* The word is derived from two words
  - 'tsu' → harbor
  - 'nami' → wave

Date:

the name signifies its devastating impacts on the coastal areas.

* Almost 80% of tsunami occur within the pacific ocean's ring of fire due to extreme volcanic activity and high earthquakes.

4 Natual process that trigger tsunami:

Tsunami are usually generated by sudden disturbances under that displace the sea water. The main natural processes are:

1. Undersea Earthquake

Most tsunami occur due to tectonic plate movements undersea, that led to the earthquakes.

When one plate shifts or slips under the other (subduction zone), the seafloor shifts, pushing a huge volume of water upward.

Example:

2004 Indian Ocean tsunami, caused by a magnitude of 9.1 earthquake off the coast of Sumatra

2. Volcanic Eruptions

Explosive eruptions underwater also displaces the seawater. and led to the massive tsunami.

Example:

Pacific Ring of fire is an active zone that leds to tsunamis due to volcanic eruptions.

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Date:

4 Potential impact on coastal areas:

Tsunami wreack havoc on the coastal areas & and have devastating impacts.

1. **Loss of life**

Tsunami is destructive and destroys every thing in its path. It leads to massive easualties in coastal areas.

Example:

2004 Indian Ocean Tsunami killed approximately 2,30,000 people in 14 different countries.

2. **Loss of Infrastructure**

Tsunami destroy all the coastal infrastructure, homes, schools, and other nearby building.

3. **Impact on Economy**

Tsunami affects the tourism that drives the economy of coastal areas. It blocks tourism and also it takes time to rebuild infrastructure destroyed during tsunami.

4. **Impact on Environment:**

Tsunami leaves massive debri as well as small fishes on the Coast that negatively impacts the environment

5. **Flooding of coastal areas**

lands near the shore can be flooded, damaging crops and affecting food supply and work.

Naveed

Date: (Q#4)

(a)

4 **Rock Cycle:**

"It is a natural process through which rocks are formed, broken down, and transformed into different types over time"

"It is a continuous and dynamic cycle that shows relationship between the three main types of rocks:

1. Igneous
2. Sedimentary
3. Metamorphic

process:

It is driven by 2 forces:

1. Earth's Internal Heat, which moves material around in the core and mantle, leading to slow but significant changes within Earth crust.

2. The hydrological cycle, which is the movement of water, ice, and air at the surface, powered by the sun.

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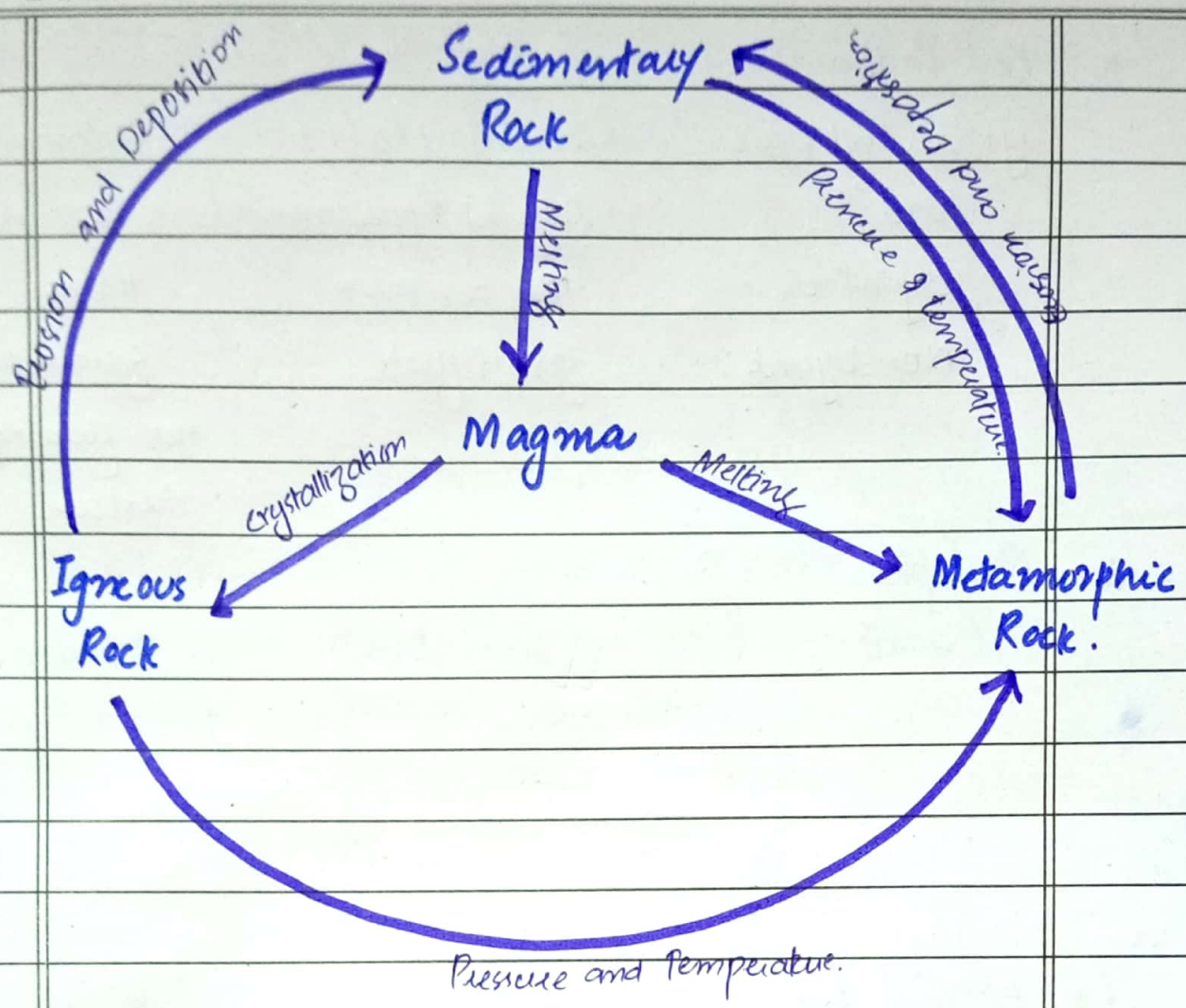

Difference

Igneous Rock	Sedimentary Rocks	Metamorphic Rocks
* Igneous Rocks are formed by cooling and solidification of magma and lava	*, Sedimentary rocks are formed by compaction of sediments (sand, mud, or organic matter)	*, formed when the existing rocks undergo heat and pressure inside Earth.

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Date:

★ **Key Features:**

Igneous Rocks are:	Sedimentary Rocks:	Metamorphic Rocks are:
Hard	Layered Appearance,	Hard,
Crystalline,	May contain	foliated or
Non-layered	fossil fuels.	non-foliated
		texture.

★ **Examples:**

Basalt Limestone Marble.

(b)

↳ Acid Rain

"Acid rain is known as acid deposition, is a form of precipitation with elevated levels of acidic components like Sulphuric and nitric acid."

Explanation:

★ It occurs when **Sulphur dioxide (SO_2)** and **nitrogen oxide (NO_x)** are released into atmosphere, often from industrial emissions.

★ These then react with water, oxygen, and other chemicals and form acidic pollutants that come to the ground as **rain, snow, fog or dust.**

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Date:

↳ Chemical Reactions involved in the formation of acid rain:

$$2SO_2 + O_2 + 2H_2O \longrightarrow 2H_2SO_4(aq)$$

$$4NO_2 + O_2 + 2H_2O \longrightarrow 4HNO_3(aq)$$

* Sulphur dioxide (SO_2) and Nitric Oxide (NO_2) mix with water (H_2O) and oxygen (O_2) in the atmosphere, transforming into
  1. Sulphoric Acid ↳ H_2SO_4
  2. Nitric Acid ↳ HNO_3.

* pH is below ↳ 5.6.

↳ Harmful Effects:

(i) On Aquatic Life:

* Fishes and amphibians die when water becomes too acidic. The eggs of these organisms cannot survive in such conditions
* The entire food chain is disrupted.

(ii) On Vegetation:

* Damages leaves and turn them yellow or brown and weakens the plant thereby reducing their ability to photosynthesize.

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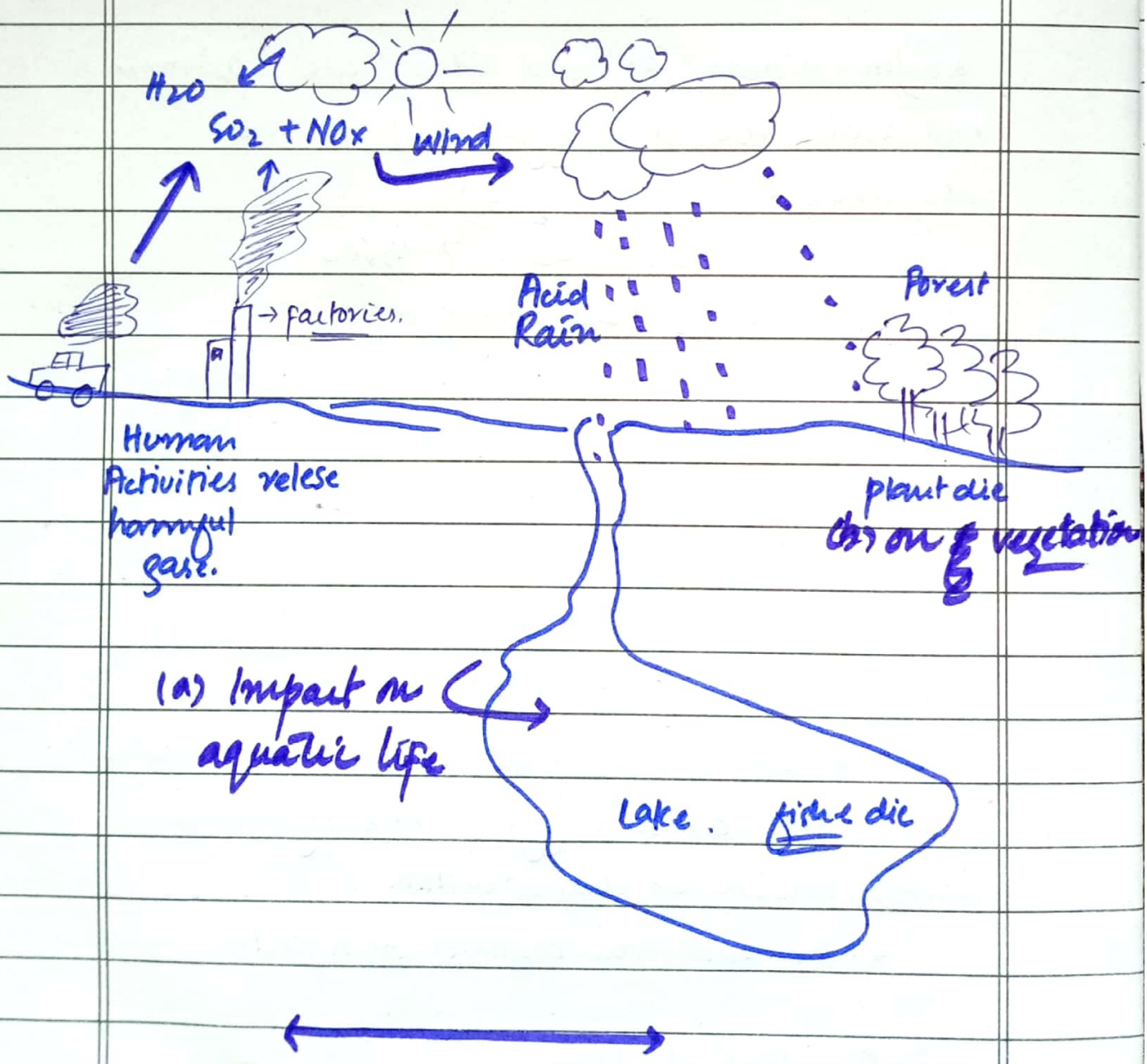
Date:

* Essential minerals eg, calcium are washed away due to acid rain (leaching).

* Crop productivity drops due to nutrient loss and leaf damage.

↳ **Diagram**



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Date: (c)

↳ Role of Remote Sensing in Environmental Monitoring and Disaster Management:

(1) Environmental Monitoring:

* Remote sensing uses satellites and aiel imagery to observe earth from a distance

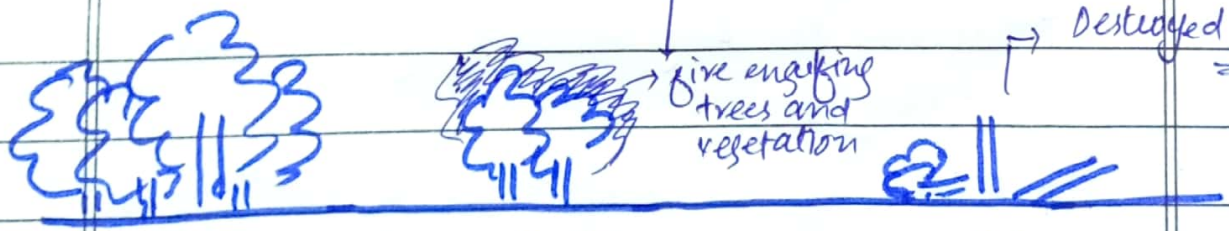
* It helps track deforestation, desertification, water pollution, melting glacier, landure change, and air pollution.

*. It provides continuous, large scale, real time data that helps detect environmental degradation early.

(2) Disaster Management:

* Remote sensing gives quick images before, during, and after disasters like

↳ floods
↳ cyclones
↳ Earthquakes
↳ Wild fires
↳ Drought



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* Remote sensing also helps to identify affected areas, assess damage and it also help in rescue and relief operations.

↳ Role of GIS in Environmental Monitoring and Disaster Management

(1) Environmental Monitoring:

*. GIS analyzes the geographic data and helps to create maps and models.

*. It helps in monitoring soil erosion, water resources, biodiversity, climate patterns etc.

(2) Disaster Management:

*. It can help in identifying

↳ flood zones

↳ Earthquake prone areas

↳ Wildfire risk areas

↳ Avalanche prone Areas.

Himalya Hindukush karakoram

*. It is used for Early warning system, evacuation route planning etc.

*. It also help in coordination of relief and reconstruction after disasters.

Naveed

Solid Waste Management:

"It refers to the systematic handling of waste from its

Generation → final disposal"

Explanation:

It includes

1. collection
2. Segregation
3. Storage
4. & Transportation
5. Treatment
6. Safe disposal

→ of waste produced by households, industries, hospitals,

Environmental Hazards of Improper disposal of Urban waste

(1) Soil pollution

Waste dumped on open spaces and land releases toxic chemics that can contaminate soil and reduces its fertility.

(2) Water pollution:

Leachate from improper waste disposal seeps into rivers, lakes, and groundwater, leading to its contamination + Water borne diseases ---

Date:

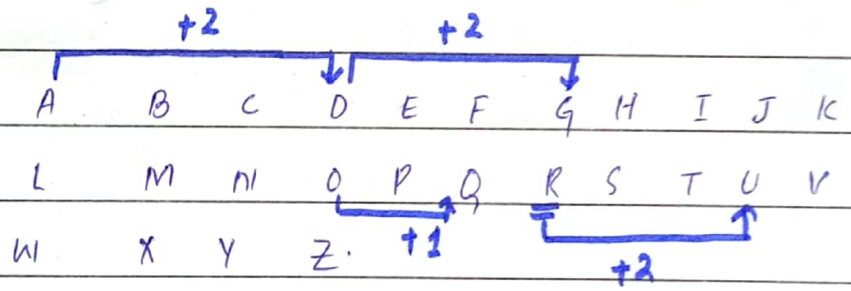
(3) Air pollution

Burning of waste produces harmful gases that worsens air quality ⟶ Respiratory diseases.

(Section-II)

(Q#8)

① ROAD ⟶ UQDG



Rules

R + 2 ⟶ U

O + 1 ⟶ Q

A + 2 ⟶ D

D + 2 ⟶ G

Therefore, road is coded ~~as~~ as uqdg.

② So,

LAKE ⟶ OCNH

Rule

L + 2 ⟶ O

A + 1 ⟶ C

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Date:

K + 2 → N

E + 2 → H.

Hence,

LAKE is coded as OCNH

(b)

Analyzing Step by Step

① man → tells → women. (1)

② Mom's sister + Sister's husband

③ Woman (1). + son of sister's husband. Father of women's (1)'s son.

④ It mean she is the wife of man's sister's son.

Answer;

⑤ The woman will be the

Neice-in-law of the man

As she is married to the man's Nephew.

(c)

(1)

4, 12, 6, 18, 9, 27, 13.5

Date:

Explanation

$4 \times 3 = 12$

$12 \div 2 = 6$

$6 \times 3 = 18$

$18 \div 2 = 9$

$9 \times 3 = 27$

$27 \div 2 = 13.5$

(c)

1, 2, 6, 24, 120, 720

Explanation

$1 \times 2 = 2$

$2 \times 3 = 6$

$6 \times 4 = 24$

$24 \times 5 = 120$

$120 \times 6 = 720$

(d)

Given:

shortest person = 150cm

Tallest person = 180cm

① Range = Maximum - Minimum

= Tallest - Shortest

= 180 - 150 = 30 cm.

② The third tallest friend:

Given

$K < P < Q < S < T$

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Date:

The third tallest according to order will be

"Q"

(Q#7)

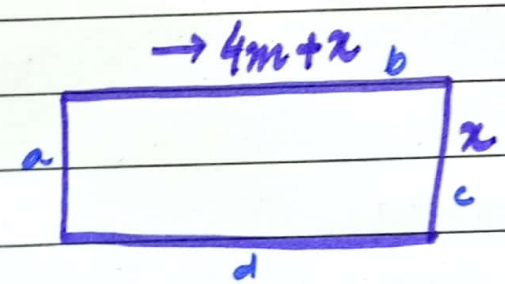
(b)

Length of the rectangular swimming pool = 4 m more than its width.

perimeter = 72 m.

volume of water to fill pool = ?

depth = 2.5 m.



→ let a = c = x

So,

perimeter = a + b + c + d

= x + 4m + x + 4m

perimeter = 2(L + W)

36 m = L + W

36 m = (4m + x) + x

36 m = 4m + 2x

Perimeter = 2(L + W)

72 = 2[(x+4) + x]

72 = (2x + 4) x 2

72 = 4x + 8

4x = 72 - 8

4x = 64

x = 64/4

x = 16

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Date:

So,

width = 16 m

length = $x + 4 = 16 + 4 = 20$ m.

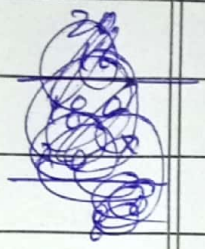
Volume

$= l \times w \times \text{depth}$

$= 20 \times 16 \times 2.5$

$= 320 \times 2.5$

$= 800\ m^3$



20
16
120
20 x
320

320
25
1600
640 x
8000

(d)

Let the present age of father = y

Let the present age of son = x

10 yrs back ← → presently

Father's age

$y - 10 = 4(x - 10)$

$x + y = 75$ yrs

So,

$y - 10 = 4x - 40$

$y = 4x - 40 + 10$

$y = 4x - 30$

By putting value of 'y'

$x + 4x - 30 = 75$

$5x = 75 + 30$

$5x = 105$

$\boxed{x = 21}$ ↳ Present age of son.

for father.

$x + y = 75$

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Date:

$21 + y = 75$

$y = 75 - 21$

$\boxed{y = 54}$ current age of father

75
21
54