46

3a) Cyclones are formed through complex process of atmospheric conditions and factors such as warm ocean waters, moisture, pressure gradient, coriolis effect. Cyclones are formed over disturbances that might occur over warm water ocean water. This disturbance could be a low pressure area or tropical wave. The warm, moist air above surface of earth and then condenses to form clouds. These clouds grow larger as more moist air is drawn into the disturbance. The coriolis effect, caused by the rotation of earth, causes the winds in the atmosphere to rotate around the center of the disturbance. This creates a spinning motion that gets stronger as more moist air is drawn in, causing a pressure drop in the center. The spinning motion continues to get bigger and stronger, eventually leading to the formation of cyclone. The structure of cyclones comprises of the following 3 parts

1) **Eye:** Center most part of the cyclone. This part has the lowest pressure.

2) **Eye-wall:** This part surrounds the eye and has a radius ranging from 15 - 30 Km.

3) **Ring shape region:** This is the outer most part of the cyclone.

3b) 1) What are Earthquakes:

Earthquakes are natural geological phenomena characterised by the shaking and trembling of the Earth's surface. They occur when there is a sudden release of energy in the Earth's crust, resulting in seismic waves that propagate outward from the source of the energy release. This release of energy can cause the ground to shake, leading to various levels of ground motion and potentially causing damage to structures, landscapes, and ecosystems.

2) Shallow Focus Earthquakes:

These type of Earthquakes occur at a relatively shallow depth within the Earth's crust, typically less than 70 Km deep. Most of the Earth's seismic activity, including destructive earthquakes, happens at a shallow depth range.

3) Deep Focus Earthquakes:

Occur at greater depths within the Earth's crust are referred to as intermediate

— Maxim

or deep earthquakes. ~~Seismic Deep~~ Deep earthquakes occur below 300 Km.

4) Causes of Earthquakes : Diagram?

4.1) Plate Tectonics : Most Earthquakes occur at plate boundaries where plates interact. There are several types of plate interactions:

4.1.1) Divergent Boundaries : Plates move away from each other, causing tensional stress and often resulting in earthquakes.

4.1.2) Convergent Boundaries : Plates move toward each other, causing compressional stress, which can lead to earthquakes.

4.1.3) Transform Boundaries : Plates slide past each other horizontally, causing shear stress and resulting in earthquakes.

4.2) Volcanic Activity : Earthquakes can occur in volcanic ~~Activit~~ regions due to the movement of magma and the pressure it exerts on surrounding rocks.

Maxim

4.3) Magnitude of Earthquake in Morocco:

On september 8, 11:11 pm local time, a earthquake of magnitude 6.8 struck Morocco.

3c) 1) What is Dengue Fever:

is a viral illness transmitted to humans primarily through the bite of a infected female Aedes mosquito, particularly Aedes aegypti and Aedes albopictus.

2) Primary Causes of Dengue Fever:

2.1) Dengue Virus:

Dengue fever is cause by Dengue virus, which belongs to the Flavivirus Family. There are four distinct steorotypes of the Dengue Virus (DEN-1, DEN-2, DEN-3, DEN-4), and infection with one steorotype does not provide immunity againsto the others.

2.2) Aedes Mosquito Vectors:

The primary vectors responsible for transmitting Dengue virus to humans are infected female Aedes mosquitos, particularly Aedes aegypti and Aedes albopictus.

3) Preventive Measures:

3.1) Mosquito Bite Prevention:

3.1.1) Use Bite Repellent: Apply insect repellent containing DEET, picaridin, or other recommended ingredients to exposed skin.

3.1.2) Wear Protective Clothing: Wear long-sleeved shirts, long pants, socks, and shoes to minimize exposed skin.

3.2) Eliminate Mosquito Breeding Sites:

3.2.1) Remove Standing Water: Aedes mosquitoes breed in standing water, so empty, cover, or treat containers that can collect water, such as flower pots, buckets, etc.

3.2.2) <u>Keep Drains Clean</u> : Ensure that drains and gutters are clear of debris to prevent water accumulation.

3.3) <u>Vaccine</u> : In many regions across the globe, Dengue vaccines have been developed. This vaccines should be taken to prevent Dengue.

3 d)   1) Bonds:

Atoms need to make bonds with other atoms in order to stabilise. For atoms to achieve stability they must have 8 electrons in their outer most shell, unless its their shell in which case they only require 2 electrons. To attain the desired number of electrons to become stable, atoms form bonds where they share, lose or gain electrons.

2) Ionic Bond: This is a type of chemical bond where an atom completely transfers an electron to anoter atom, so that both can become stable.
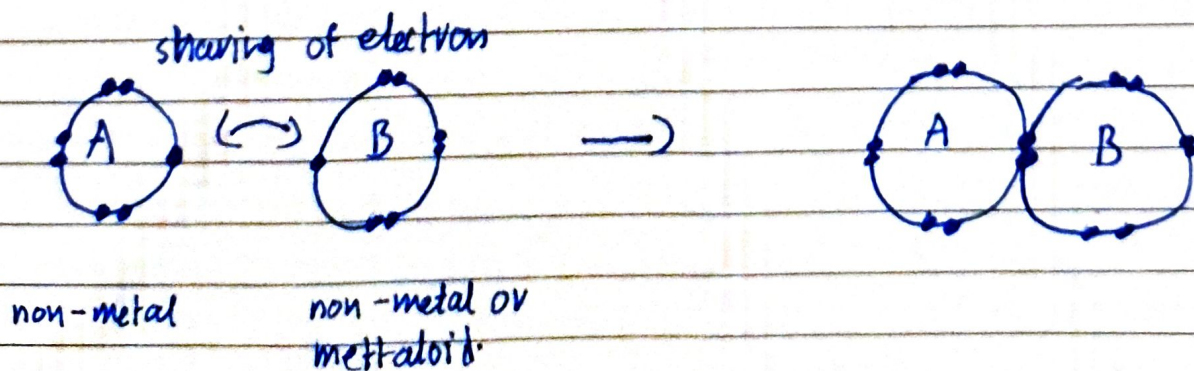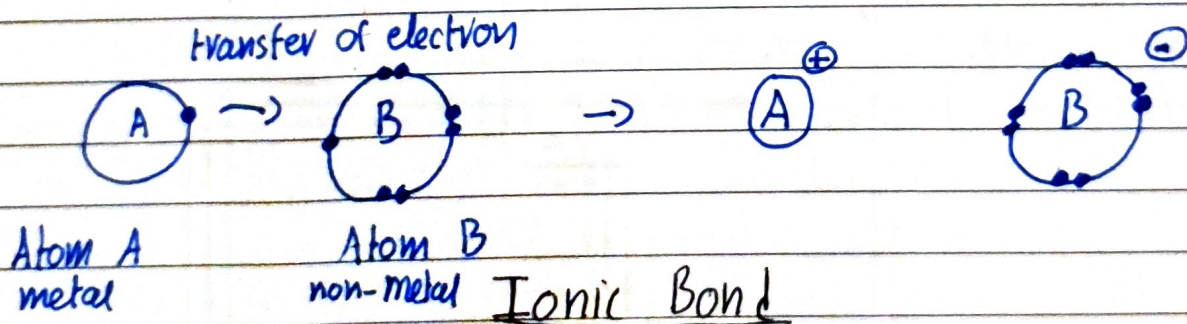
Example: $NaCl \rightarrow$ Table Salt

Na has 1 electron in its outer most shell, where as Cl has 7. For Na to reach stability, it must dispose of the one electron it has in its outer most shell, and Cl needs one more electron to become stable. Therfore, Na tranfers one electron to Cl and as a result an Ionic bond is formed.

3) Covalent Bond : This is a type of chemical Bond in which both the atoms mutually share electrons inorder to become stable.

Example: Water Molecule -> H_2O
The formation of water molecule consists of one Oxygen atom and two Hydrogen atoms. The two hydrogen atoms have one election in their ~~first~~ outer most shell. Since their outer most shell is the first shell, they both require one electron each to stabilise. The oxygen atom contains 6 electrons in its outer most shell and requires 2 electrons to become stable. Hence, these atoms mutually share electrons, where the two hydrogen atoms share their only electron with the oxygen atom and in return the oxygen atoms shares one electron with each hydrogen atom.

transfer of electron

Atom A   Atom B
metal   non-metal   Ionic Bond

sharing of electron

non-metal   non-metal or
                 mettaloid.

Covalen Bond

4a) 1) <u>Land Pollution:</u>

Refers to the contamination or degradation of the Earth's land and soil due to various human activities and natural processes. It occurs when harmful substances, pollutants, or changing changes to the land's natural characteristics negatively impact its quality.

2) <u>Causes:</u>

2.1) <u>Chemical Discharges:</u>

The release of hazardous chemicals and pollutants from industrial facilities can contaminate the land.

— Maxim........

These chemicals may include heavy metals, solvents, toxic substances, and industrial waste

2·2) Soil Erosion :

Un sustainable farming practices, such as overgrazing and deforestation, can result in soil erosion. This, loss of topsoil can lead to decreased soil fertility and increased vulnerability to pollution.

2·3) Pesticide and Herbicide Use :

The excessive or improper use of pesticides, herbicides, and fertilizers in agriculture can lead to the accumulation of harmful chemicals in the soil.

2·4) LandFills and Illegal Dumping :

Poorly managed landfills can leak pollutants into the soil, potentially contaminating ground water. similarly, unauthorized disposal of household and industrial waste in open areas,

vacant jobs, or natural environments.

2.5) Resource Extraction :

Mining operations can disrupt the land by removing vegetation and exposing soil to pollutants. Chemicals and waste products generated during mining can contaminate the surrounding land.

...generation) will also to charge pho...

I) Geographic Information System :

GIS stands for Geographic Information System, which is a powerful tool used for capturing, storing, analysing, and presenting geographically referenced or spatial data. It combines geographic data (maps) with attributes (data associated with the geographic features) to provide a better understanding of the relationships, patterns, and trends within the data.

Maxim

2) Components of GIS :

2.1) Hard ware : This includes the physical devices needed to operate GIS, such as computers, servers, GPS receivers, scanners.

2.2) Software : is the core component that facilitates data manipulation , analysis and visualisation. eg ArGIS, QGIS etc.

How does it help in environment related function

2.3) Data : Geographic data is fundamental to GIS. It includes spatial data (geometric information) and attribute data (descriptive information).

2.4) Methods : GIS employs various methods and techniques for data analysis. These methods help uncover patterns, relationships, and insights within the data.

2.5) Visualisation : GIS tools provide the capability to visualise geographic data through maps, charts.

2.6) Data Models : Uses data models to represent real-world features in a digital format. common data models include
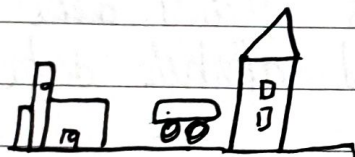
vector data models.

2·7) <u>Remote Sensing</u>: involves using satellite
or aerial imagery to collect data
about Earth's surface.

2·8) <u>GPS</u>: Global Positioning system provides
accurate location information whis is
essential for data collection.

<u>Real World</u>

<u>GIS Data</u>
Full view
Elevations
Buildings
Routes
Boundaries
Water Bodies
Your Data

Fig 1: Over view of
GIS

1) What is Artificial Intelligence:

Artificial Intelligence refers to the simulation of human intelligence in machines that enable them to think and emulate like humans. The term can be applied to any machine that exhibits human like behaviour such as learning and problem-solving. AI enables the machines to learn from experiences and, with the passage of time, revamp its responces.

What was requires is not answered.

2) Examples of AI:

1) chess game
2) self-driving game
3) smart assisstants e.g Siri

3) How AI has revolutionized the world:

The world has surely changed since ~~AI~~ the time that AI was practically used. AI has demonstrated the ability to perform tasks autonomously, freeing humans from repetitive or dangerous jobs. AI ~~typi~~ machines typically contain vast amount of data and, with the passage of time, they lean and improve their tasks. AI is currently deployed in various fields ranging from ~~tt~~ medical to more labour intensive ~~suct~~ jobs such as

manufacturing in Industries. Even the cell phones are equip with AI features such as Smart Assistants e.g Bixby.

4) How AI is employed in various fields.

As aforementioned A.I has had an immense impact in almost all fields, completely revolutionising them. Few examples of how AI has impacted some of the fields is as follows:

4.1) Entertainment:

AI is successfully employed in many strategic games. The vast database stores all the possible actions and knows perfectly well on how to respond to different moves executed by the player. A typical example of this is a stg single player chess game.

4.2 Industries:

AI is not only used to cover the manufacturing aspects in industries but at can also be used to look after management tasks such as parking operations. Moreover, the more dangerous and labour intensive tasks can be executed by AI, such as molding: using robotic arms.

4.3) AI in Medical Field :

AI can perform move than just repetitive tasks. In the field of medical, AI is deployed to assist doctors in their efforts to reduce mortality rate among patients awaiting care from specialists.

Q6 a) i)   10, 100, 200, 310, <u>430</u>.

10 → 100   100 → 200   200 → 310

90   100   110

Hence, the series started with adding 90 to the initial number and then with each successive number, the initial addition of 90 is increased by 10 and added to the next number of series:

Therefore the missing digit is 310 + 120 = 430

Maxim........

6 a) ii) 3, 7, 23, 95 __479__ .

$$3 \to 7 \qquad 7 \to 23 \qquad 23 \to 95$$
$$\times 2 + 1 \qquad \times 3 + 2 \qquad \times 4 + 3$$

Hences, The initial digit in the series is multiplied by 2 and then added by 1 to derive the next digit. Further more, with each successive digit the multiplication number and the addition number is incremented by 1, as also shown above. Therefore, the missing digit will be

$$(95 \times 5) + 4 \Rightarrow \boxed{479}$$

b) Opposite sides of a rectangle are equal.

Hence, $3x - y = 2x + y$
$3x - 2x = 2y$
$x = 2y \longrightarrow \boxed{Eq \ 1}$

Perimeter $= (3x - y) + (2x + y) + (2x - 3) + (2x - 3)$
$114 = 3x - y + 2x + y + 4x - 6$
$114 = 9x - 6$
$108 = 9x$

$$x = \frac{108}{9}$$

$$x = 12$$

Now finding $y \Rightarrow$ Put x in equation 1

$$x = 2y$$
$$12 = 2y$$
$$6 = y$$

Now Finding Area :

$$Area = L \times W$$

Length $= 3x - y$ OR $2x + y$
         $3(12) - (6)$ $2(12) + (6)$
         30 30

Width $2x - 3$
              $2(12) - 3$
              21

Area $= L \times W$
           30×21
           $= 630$

$$\begin{array}{r} 30 \\ \times 21 \\ \hline 30 \\ 60 \times \\ \hline 630 \end{array}$$

6·c) Nisha = Romi + 15 → Eq ①

Five years ago

Nisha - 5 = (3 × (Romi) - 5) → Eq ②

Put Eq ① in Eq ②

Romi + 15 - 5 = 3 (Romi - 5)

Romi + 10 = 3 Romi - 15

10 + 15 = 3 Romi - Romi

25 = 2 Romi

Romi = 12·5 years old.

A̶t̶i̶s Put Romi's age in Eq ①

Nisha = Romi + 15

= 12·5 + 15

= 27·5

So, present age of Nisha = 27.5 years

Maxim

6d) We need to find the Higest common Factor 210, 252, 294 to ascertain the cartons needed.

HCF of

2	210
3	105
5	35
7	7
	1

2	252
2	126
3	63
3	21
7	7
	1

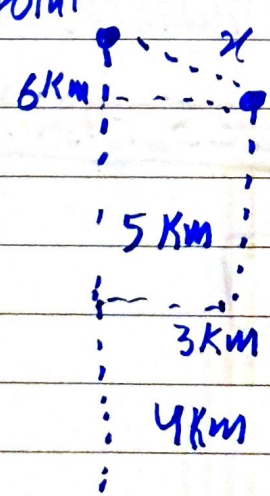| 2	294
3	147
7	49
7	7
	1

Factors of:
210: $2 \times 3 \times 5 \times 7$
252: $2 \times 2 \times 3 \times 3 \times 7$
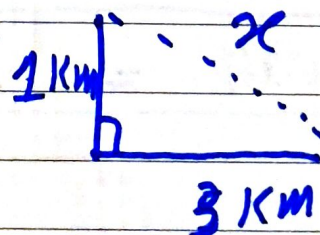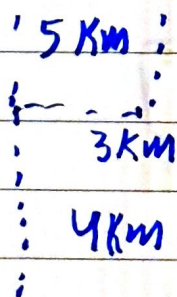294: $2 \times 3 \times 7 \times 7$

Hence $\Rightarrow 2 \times 3 \times 7 = 42$

So 42 cartons needed.

Q8 a)

End Point

6Km   x → starting Point

5 Km

3Km

4Km

1Km   x

3 Km

~~Use Pathe~~

Use Pythgoras Theorem

$$H^2 = B^2 + P^2$$
$$H^2 = (1)^2 + (3)^2$$

$$H^2 = 1 + 9$$
$$H = 10$$
$$H = \sqrt{10}$$

$$H = 3.16 \ Km$$

- Therefore he is 3.16 Km away from starting point and is at North-west side from where he initially started.

8b) First 5 prime no. = 2, 3, 5, 7, 11
Cubes of 5 prime no. = 8, 27, 125, 343, 1331

$$mean = \frac{Sum \ of \ numbers}{total \ numbers}$$

$$= \frac{8 + 27 + 125 + 1331 + 343}{5}$$

$$\boxed{Mean = 366.8}$$

8c)

Men	:	Length ↑	:	time ↑
50 ↓	:	20	:	40 days
70	:	20	:	x

Hence $=$ $\dfrac{50}{70} = \dfrac{20}{20} = \dfrac{x}{40}$

$\Rightarrow \dfrac{50 \times 20}{70 \times 20} = \dfrac{x}{40}$

$40 \times 50 = 70 \times x$

$x = \dfrac{40 \times 50}{70}$

$x = \dfrac{200}{7}$

$x = 28.57$

Hence 70 men will take 28.57 days

$$
\begin{array}{r}
28.57 \\
7\,\overline{\smash{\big)}\,200} \\
\underline{14} \\
60 \\
\underline{56} \\
40 \\
\underline{35} \\
50 \\
\underline{49} \\
1
\end{array}
$$

8d) After Paying debt 1750,000 - 150,000
$$\Rightarrow 16,00,000$$

Distribute in 2:1 Ratio b/w Brother & sister.

$$(2+1)x = 16\,00\,000$$
$$3x = 16\,00\,000$$
$$x = \frac{16\,00\,000}{3}$$

$$x = \text{Rs } 5\,33,\,333.33 \rightarrow \text{Sister's share}$$

Brother's share = 2 times Sister's share
$$= 2(533,333.33)$$
$$\text{Rs} \Rightarrow 1066,666,66$$

Never forget the unit of your answer

3.5