

SECTION - B

Q #06

(a.)

Step #1 Consider the three parts are:

$$\begin{array}{ccc} x & y & z \\ (1^{\text{st}}) & (2^{\text{nd}}) & (3^{\text{rd}}) \end{array}$$

Step #02 Conditions and Equations

$$\Rightarrow y = \frac{1}{4}z \quad (1)$$

$$\Rightarrow \frac{x}{y} = \frac{3}{5} \Rightarrow x = \frac{3y}{5} \quad (2)$$

It is easy to conclude that

$$x + y + z = 370 \quad (3)$$

Step #03 Substituting (1) and (2) in eq (3).

$$= \frac{3}{5}z + \frac{z}{4} + z = 370$$

Solving for z :

$$\frac{12z + 5z + 20z}{20} = 370$$

20

$$= \frac{378}{20} = 370$$

$$= y = \frac{370 \times 20}{37}$$

$$= y = 200$$

Step #04: Finding x and y now through
eq. (1) and eq. (2)

$$\Rightarrow x = \frac{3}{5} (200)$$

$$\Rightarrow x = 120$$

$$\Rightarrow y = \frac{1}{4} \times 200$$

$$y = 50$$

Three parts are:

1 st part	=	200	\$
2 nd part	=	120	\$
3 rd part	=	50	\$

Ans

Q #06

(b.)

1. 20% from brother

$$\frac{20}{100} \times 800 = 160$$

2. 30% of the REMAINING from mother

$$\begin{aligned} \text{Remaining} &= 800 - 160 \\ &= 640 \end{aligned}$$

$$\frac{30}{100} \times 640 = 192$$

3. 200 in bank

Total = 160 Rs	from:
+ 192 Rs	brother
+ 200 Rs	mother
<u>552 Rs</u>	bank

More amount required =

$$800 - 552 = 248 \text{ Rs}$$

Q #06

(c.)

	Red	+	Black
(B ₁) Bag 1 :	3		7
(B ₂) Bag 2 :	8		2
(B ₃) Bag 3 :	4		6

1. Probability of choosing this bag:

no. of possible outcomes: 3
occurrence of 3rd bag : 1

$$\therefore P(B_3) = \frac{1}{3} \quad (\text{whichever the ball, probability of } B_3 = 0.\overline{33})$$

Q #06

MATHEMATICALLY :

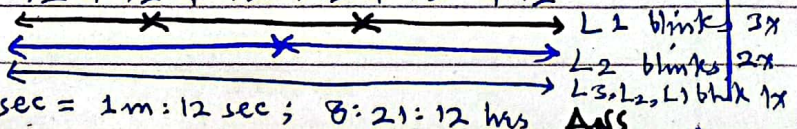
It can be found by JCF:

2	72, 36, 24
2	36, 18, 12
2	18, 9, 6
3	9, 9, 3
3	3, 3, 1
1	1

$$2 \times 2 \times 2 \times 3 \times 3 = 72$$

ANALYTICALLY:

$$72 = 12 + 12 + 12 + 12 + 12 + 12$$



ANSWER: - 72 sec = 1m:12 sec ; 8:21:12 hrs

Q08 (a.)

1st half velocity = 60 km/hr

2nd half velocity = 40 km/hr

Average: = $\frac{\text{sum of values}}{\text{no. of values}}$

$$= \frac{60+40}{2}$$

Avg. v. = 50 km/hr

Q08 (b.)

$\begin{matrix} 1 & & & 2 \\ \text{R} & \text{O} & \text{S} & \text{E} \\ 6 & 8 & 2 & 1 \end{matrix}$ $\begin{matrix} 1 & 2 & 3 & 4 \\ \text{P} & \text{R} & \text{E} & \text{A} & \text{C} & \text{H} \\ 9 & 6 & 1 & 4 & 7 & 3 \end{matrix}$

$\begin{matrix} 4 & 3 & 1 \\ \text{C} & \text{H} & \text{A} & \text{I} & \text{R} \\ 7 & 3 & 4 & 5 & 6 \end{matrix}$

REASONING: It can be seen that A, R, C and E have same representative integers. Since every number has fixed and consistent numbers,

Decoding goes as: **S E A R C H**
2 1 4 6 7 3

Q #08 (c.)

A brother of B

B sister of C

REASONING: A and C are brothers

C is father of D

REASONING: D is nephew of A

ANS

Q #08 (d.)

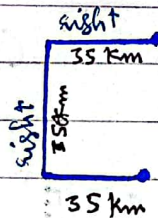
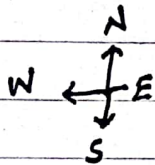


Figure: RIGHT of Kashmirala

Answer: She is 50 km from her point of origin.

3x
2x
1x

SECTION-A

Q #02

(a.)

OCTET RULE (Rule of Octave.)

A rule that requires every shell of an atom to contain or seek to fill its last shell with 8 electrons to be stable chemically, is called as the OCTET RULE.

IN CHEMICAL BONDING, it stands for pursuit of an atom to fill its last shell with 8 electrons. Atoms beyond carbon in the periodic table follow this rule.

IMPLICATIONS: If octet is not complete, the atom is reactive or highly reactive depending on its size and specific electronic configuration.

EXAMPLES: All noble gases have complete octets; thus they are not reactive at all (under standard Temperature and Pressure).

COVALENT BOND:

DEFINITION:

A mutual sharing of an electron is between two atoms is constituted as a covalent bond.

MUTUAL SHARING

In a covalent bond, one electron is paired between two atoms. In contrast to complete transfer, the electron cloud of the atoms overlap which, in turn, tie the two atoms together in what is called as chemical bond.

COVALENT BOND vs IONIC BOND

- | | |
|--|--|
| 1. It is usually weaker as the shared electron is a fragile link | It is a strong bond aided by electrostatic and dipole forces |
| Exceptions: diamond, etc graphene. | |
| 2. Not charged; they have partial charges only | They have clear and strong negative and positive charges. |
| 3. Water insoluble | Water soluble |

WATER INSOLUBILITY: REASON

Since covalent bonds result in slight charges on the sharing atoms, they are unable to be attracted by electrical charges of water molecules (H^+ and OH^- , H_2O). Therefore, they cannot bind themselves with polar molecules of water and remain suspended in the aqueous solution.

EXAMPLES:

1. CCl_4 , Carbon Tetrachloride

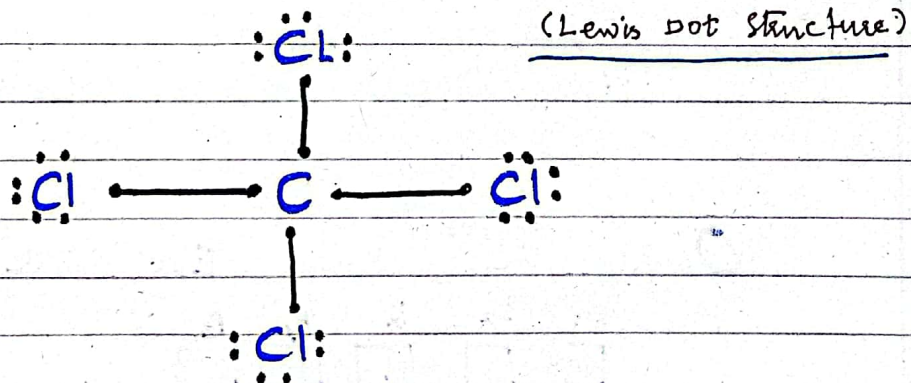


Figure: Molecular shape of CCl_4 .

Although Chlorine (Cl) usually makes ionic bonds and acquires negative charge due to its high ELECTRONEGATIVITY, here it is in a nonpolar, neutral bond with Carbon, bonded by mutual sharing of electrons.

Due to SYMMETRY, it has zero polarity and therefore highly water insoluble.

Q.02 (b.)

ANGULAR MOLECULAR STRUCTURE OF WATER:

DIAGRAM:

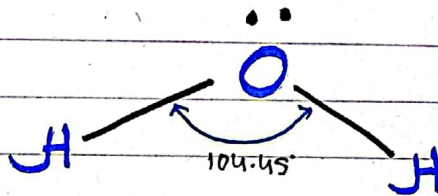
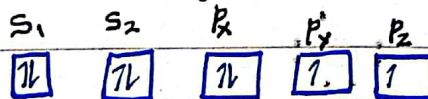


Figure: Angular molecular structure of H_2O

Oxygen has following Electronic Configuration



↓
Lone Pair

↓
Bond Pair

CONCEPT OF:

1. LONE PAIR

It is a pair of electron that is not involved in bond formation

It is more spread than its counterpart and therefore occupies more space

2. BOND PAIR

It is involved in bond, with less spread

BACK TO WATER MOLECULE:

Oxygen of water molecule uses its two unpaired electrons to bond with two Hydrogens whereas the already paired lone pair of oxygen does not participate. As it is more free and repels more strongly and spreads farther in its cloud, it bends the bond pairs closer to each other, giving water an angular, asymmetric shape.

Q #02 (C.)

HUMAN BRAIN

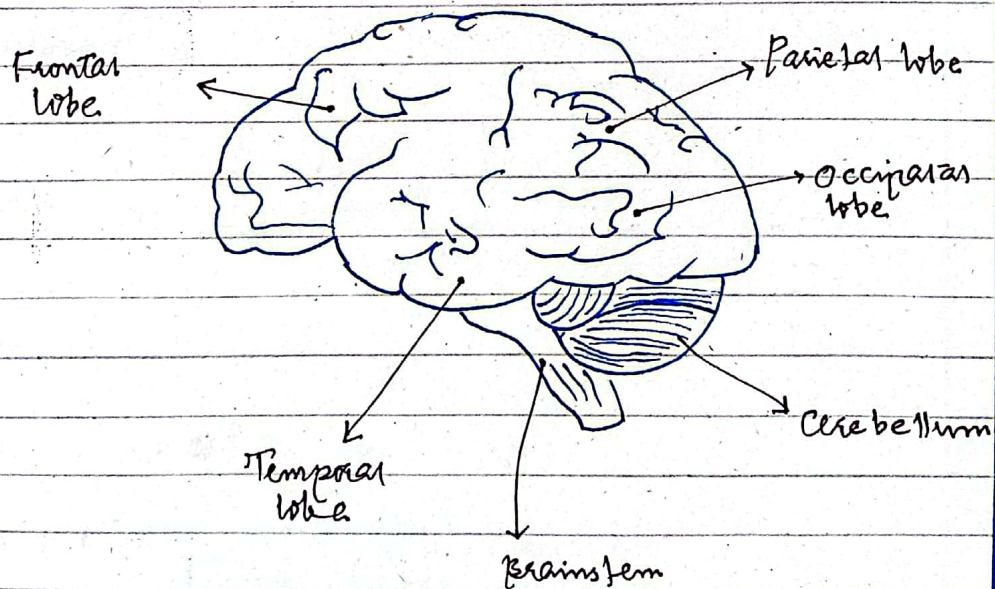


DIAGRAM: Structure of Human brain mapping its major parts with labels.

Structure of Human Brain:

Human brain is a complex organ which has different structural units each having a unique and distinct role to play in a coordinated manner.

1. Cerebrum

It is the largest chunk of human brain. It has two distinct hemispheres that are joined by a dense band of fibre called the corpus callosum.

It is further divided into 4 lobes:

1. Frontal lobe:

It is associated with
parts of speech
planning
reasoning
problem-solving.

2. Parietal lobe:

It helps in
movements
perception of stimuli
sense of direction

3. Occipital lobe:

located at behind or back of brain
it process visual data

4. Temporal lobe:

it is associated with
auditory stimuli
speech.

The exterior portion of the brain called CORTEX is highly convoluted to accommodate large surface area, similar to alveoli of lungs.

2. CEREBELLUM

It is the second largest section of brain, located in the posterior portion of medulla and pons. It is segregated from cerebrum by cerebellar tentorium and transverse fissure.

It ^{also} consists of two hemispheres:

1. Outer Grey Cortex
2. Inner White Medulla

3. MEDULLA OBLONGATA:

It is located at the lowest region of the brain. It connects spinal cord and the cerebral cortex.

Functions of brain:

1. CEREBRUM:

It is responsible for:

1. Thinking
2. Intelligence
3. Memory
4. Consciousness
5. Tactile processing
6. Vision and other senses

2. CEREBELLUM:

It is responsible for:

Equilibrium sensing

Relaying information

Coordinating eye movements

Skeletal movements and many more

3. MEDULLA OBLONGATA:

Its functions include:

Controlling autonomic functions
(e.g. digestion, heart beat)

Maintain posture

Control reflexes.

Q#02

(d.)

CELLULAR ORGANIZATION

Definition:

"Structure of cell and organization of its components is called as CELLULAR ORGANIZATION."

FUNCTIONS OF SUBCELLULAR ORGANELLES:

1. Lysosome:

i. Phagocytosis

- A - a bodily defense mechanism against infection by microorganism
- B - prevent occlusion of mucous surfaces

ii. Autophagy ("self-eating")

- A - Natural cell-housekeeping

iii. Extra Cellular Digestion

(by releasing enzymes.)

2. Mitochondria:

i. Cellular Respiration

A metabolic process to generate ATP by extracting energy from sugars, fats)

ii. Power House of the Cell

It generates energy to power processes of cell.

iii. Immunity

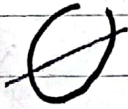
It serves to regulate immunity

3. Golgi Apparatus:

- i. Cell secretions
- ii. Transportation of proteins or enzymes
- iii. Formation of glycolipids

4. Endoplasmic Reticulum

- i. Mechanical support
- ii. Transport
- iii. Storage
- iv. Detoxification of drugs.



Q #03 (9.)

POLIO MYELITIS

It is a disease caused by a poliovirus and its wild type 1 can lead to paralysis, even death.

CAUSES OF POLIO

It is caused by one of 3 types of poliovirus whereas the other two have been eradicated. Its transmission is caused by:

1. Fecal-oral contact
(poor hand washing practices)
2. Contaminated ingestion

SYMPTOMS OF POLIO

It usually has very mild symptoms. Initially, they can be:

- i. fever
- ii. stiffness of joints and neck
- iii. pain in limbs
- iv. vomiting

∴ Paralytic polio causes the most serious symptoms, includes paralysis

INACTIVATED POLIO VACC. SPV vs ORAL POLIO VACCINE OPV

- | | |
|---|-------------------------------------|
| 1. Injected | Oral administration |
| 2. No live virus | Live attenuated type of vaccine |
| 3. Not useful in epidemics as it does not prevent viral spread. | Useful in epidemics |
| 4. Easy to store and transport | To be stored at subzero temperature |

Q #02

(b.)

Nervous System is based on two parts:

1. Central Nervous System (CNS)
2. Peripheral Nervous System (PNS)

C N S :

It is constituted by two parts:

1. Brain
2. Spinal Cord

The brain is protected by the skull (the CRANIAL CAVITY) and brain and spinal cord together are protected by a triple-layered membrane called MENINGES.

The spinal cord travels from pons part of the brain to the lumbar region of the lower back.

Other PARTS OF CNS:

Sometimes, the retina, optic nerves, and olfactory nerves are considered to be its parts because of being connected to the brain directly.



ALZHEIMER DISEASE

The most common type of dementia, it leads to decline (progressively) in memory, learning and thinking abilities.

It usually occurs in sexagenarians and above age.

Symptoms:

1. Decline in Memory (first symptom)
2. Diminishing reasoning
3. Behavior transformed strangely
Taking longer to complete simple, routine tasks.