

Section - A.

Q-2-(a) What is octet rule in chemical bonding? Explain covalent bond in detail.

Answer: **Octet Rule:** This rule states that every atom except that of Hydrogen and Helium tends to attain 8 electrons in its last shell. Atoms transfer or share electrons to gain the nearest noble gas electronic configuration, that is, eight electrons in their valence shell. By doing so they get a stable configuration.

Covalent Bond:

A covalent bond is formed by sharing of electron pairs by bonding atoms. The shared pairs of electrons can be one, two or three depending upon the types of participating atoms. Due to low difference of electronegativities of bonding atoms covalent compounds have less ionic character and

are classified as polar covalent compounds and non-polar covalent compounds.

Q-no. 2 (b). Why water molecule is angular in structure.

Answer: Water molecule or chemically H_2O is made up of one Oxygen and two Hydrogen atoms.

Oxygen atom makes two covalent bonds with two hydrogen atoms.

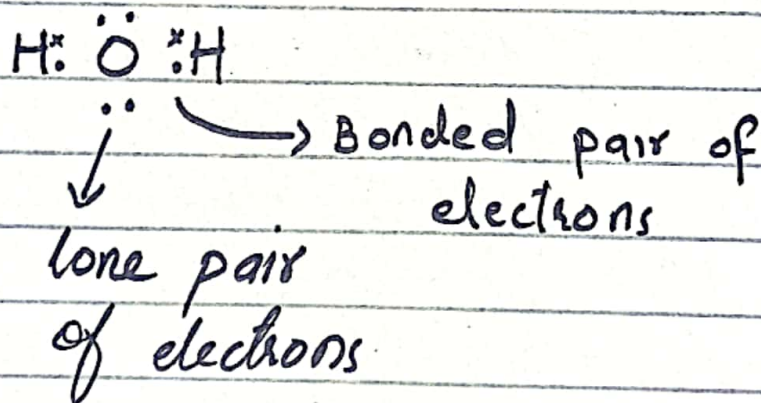
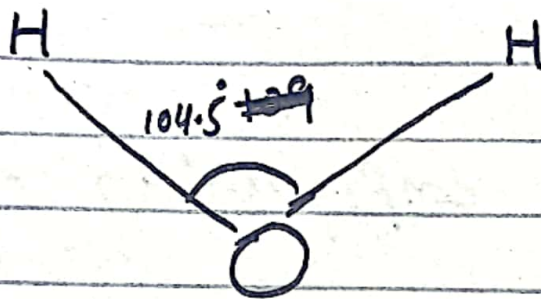
Electronic configuration of Oxygen atom. A neutral Oxygen atom has 8 electrons in its shells.

Two of them occupy first shell while the remaining six electrons belong to the valence shell. In order to satisfy octet rule oxygen needs two more electrons. In a water molecule oxygen atom makes covalent bond with two Hydrogen atoms.

Angular shape of water molecule:

Oxygen in a water molecule makes two covalent bonds with two Hydrogen atoms. Moreover oxygen atom also

has two lone pairs of electrons. The repulsion between lone pairs and bonded pairs of electrons causes bent or V shape of water molecule. The angle between H-O-H is 104.5 degrees.



Q-No. 7. C: Write a note on structure and function of Human Brain.

Answer: Human brain is the central organ that regulates all body functions.

Structure of Human Brain:

Human brain is made up of three parts, forebrain, midbrain and hindbrain.

Forebrain: It is the largest part of the brain. It is further divided into three parts. That are:

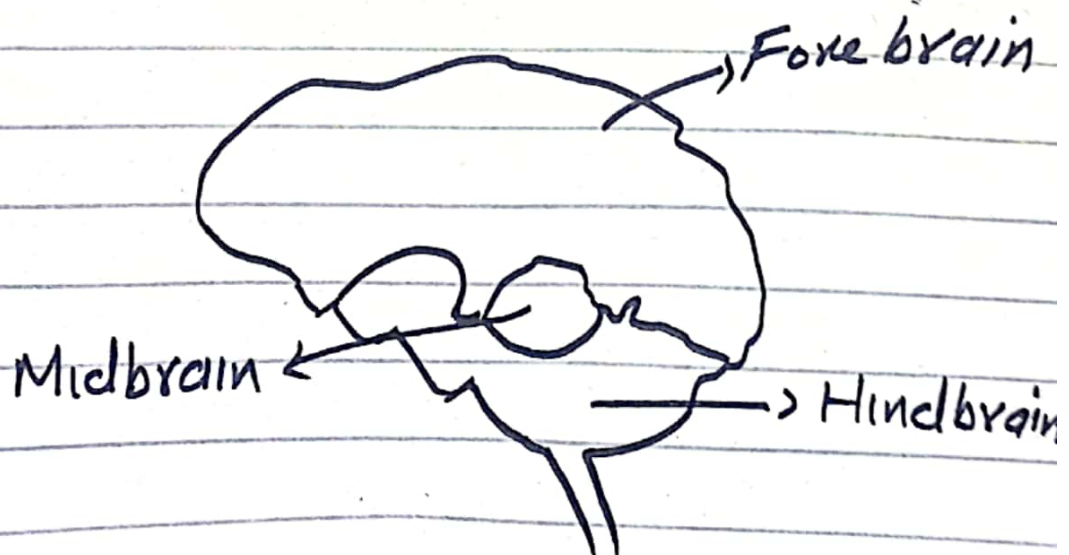
- a) Cerebrum:
- b) Thalamus
- c) Hypothalamus

Midbrain:

It connects the forebrain and hindbrain.

Hindbrain:

The hindbrain contains pons, cerebellum and medulla.



functions of brain

The functions of human brain are as follows.

- The forebrain controls the reproductive functions, body temperature, emotions, hunger and sleep.

- Hindbrain coordinates all processes necessary for survival. these include breathing, heartbeat, sleep and motor learning.

Q.No.6(a) Divide \$ 370 into three parts such that second part is $\frac{1}{4}$ of the third part and the ratio between first and third part is 3:5. Find each part.

Solution: Let the first and the third part be $3x$ and $5x$ respectively.
So, the second part would be $\frac{1}{4}$ th of $5x$.

$$\begin{aligned}\text{Second part} &= \frac{1}{4} \times 5x \\ &= \frac{5x}{4}\end{aligned}$$

According to the question

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

$$\frac{12x + 5x + 20x}{4} = \$370$$

$$37x = \$370 \times 4$$

$$x = \$ \frac{370 \times 4}{37}$$

$$x = \$40$$

So we have

$$\text{First part} = 3x = 3 \times \$40 = \$120$$

$$\text{Second part} = \frac{5x}{4} = \frac{5 \times \$40}{4} = \$50$$

$$\text{Third part} = 5x = 5 \times \$40 = \$200$$

Q-6

(b) Kashif required Rs. 800 for paying his fees. He borrowed 20% from his brother and 30% of the amount was funded by his mother. In his bank he had Rs. 200. How much more does he need?

Solution: Amount required for fee

$$\text{Submission} = \text{Rs. } 800$$

Amount borrowed from his

$$\text{Brother} = 20\% \text{ of } 800$$

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

$$= \text{Rs. } 160$$

Amount funded by his mother

$$= 30\% \text{ of } 800$$

$$= \frac{30}{100} \times 800 = \text{Rs. } 240$$

Amount in Kashif's bank = 200

Amount he further needs

$$= 800 - \text{amount borrowed from brother}$$

- amount funded by mother -

amount in bank

$$= 800 - 160 - 240 - 200 = \text{Rs. } 200$$

Kashif needs 200 more to pay his fee.

Q.6.c. Three bags contain 3 red, 7 black; 8 red, 2 black and 4 red & 6 black balls respectively. 1 of the bags is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from the third bag.

Solution:

Probability of choosing third bag is $\frac{1}{3}$

Probability of drawing red ball from third bag is $\frac{4}{10}$

Probability of drawing red ball from second bag is $\frac{8}{10}$.

Probability of drawing red ball from first bag is $\frac{3}{10}$.

Probability of red ball from bag 3

$$= \frac{1}{3} \times \frac{4}{10}$$

$$= \frac{4}{30}$$

$$\frac{\frac{1}{3} \times \frac{3}{10} + \frac{1}{3} \times \frac{8}{10} + \frac{1}{3} \times \frac{4}{10}}{\frac{15}{30}}$$

$$= \frac{4}{15}$$

Q

Q.6 (d). The traffic lights at three different road crossings change after every 24 sec., 36 sec and 72 seconds respectively. If they all change simultaneously at 8:20:00 hours. At what time will they again change simultaneously.

Solution: The time when three signals change simultaneously is their least common multiple. Now we shall find their LCM

$$\begin{array}{r|l} & 24, 36, 72 \\ 2 & 12, 18, 36 \\ 2 & 6, 9, 18 \\ 2 & 3, 9, 9 \\ 3 & 1, 3, 3 \\ 3 & 1, 1, 1 \end{array}$$

LCM of 24, 36 and 72 is $2 \times 2 \times 2 \times 3 \times 3 = 72 \text{ sec} = 1 \text{ min } 12 \text{ sec}$

The traffic lights change every 72 sec simultaneously.

The time when the traffic signals change simultaneously is

$$\begin{array}{r} 8 : 20 : 00 \text{ hrs} \\ + 0 : 01 : 12 \text{ hrs.} \\ \hline 8 : 21 : 12 \text{ hours.} \end{array}$$

Q.No.7 (a) Ishaq can do a tailoring job in 6 hours. Abbas does the same job in 4 hours, Irfan does it in 8 hours. Ishaq and Abbas started doing the work. Abbas leaves after 2 hours and Irfan replaces him. How long would it take to complete the work?

Solution. Working speed of Ishaq is $= \frac{1}{6}$
Working speed of Abbas $= \frac{1}{4}$
Working speed of Irfan $= \frac{1}{8}$

Two hours work of Ishaq and Abbas $= 2 \left(\frac{1}{6} + \frac{1}{4} \right)$

$$= 2 \left(\frac{2+3}{12} \right) = \frac{10}{12}$$

$$\text{Remaining work} = 1 - \frac{10}{12} = \frac{2}{12} = \frac{1}{6}$$

$$\text{Working speed of Ishaq \& Irfan} = \frac{1}{6} + \frac{1}{8}$$
$$= \frac{4+3}{24} = \frac{7}{24}$$

$$\text{Time to complete the remaining task}$$
$$= \frac{1}{6} \div \frac{7}{24} = \frac{1}{6} \times \frac{24}{7} = \frac{4}{7} \text{ hours}$$
$$= \frac{4}{7} \times 60 \text{ min} = 34.28 \text{ minutes}$$

Total time required to complete the work = 2 hours + 34.28 minutes
= 2 hours 34 minutes 17 seconds

Q-7.(b) A farmer needs to build a boundary wall around his farm. If the area of the farm is 576 m^2 . What will be the area of the wall, if it's 2 metres high on 3 sides and 3 metres high on one side?

Solution: If the farm is square.

then side length of farm = $\sqrt{576}$
= 24 m

$$\begin{aligned} \text{Area of wall} &= 3 \times 24 \times 2 \text{ m} + 1 \times 24 \times 3 \text{ m} \\ &= 144 \text{ m}^2 + 72 \text{ m}^2 \\ &= 216 \text{ m}^2 \end{aligned}$$

Q-7 c. There are 7 students in a group having age 18, 18, 19, 19, 19, 21, 21. Calculate the mean, median, mode and range of their ages. Also define these mentioned terms.

Solution: Mean: Mean, arithmetic mean or average is the central value

in the given data set. It is obtained by dividing the sum of values by the number of values.

Mathematically

$$\text{Mean } \bar{x} = \frac{\text{Sum of observations}}{\text{No. of observations}}$$

Median: It is the central value of given data. Half of the values are less than and the other half of value is greater than the median.

Median for odd number of values.
 $= \frac{n+1}{2}$ th value.

where n is number of values.

Median for even number of values.

$$= \left(\frac{\frac{n}{2} + \frac{n+1}{2}}{2} \right)$$

Mode: Mode is the most frequent value in the given data.

Mean of the given data

$$= \frac{18 + 18 + 19 + 19 + 19 + 21 + 21}{7}$$

$$= \frac{135}{7} = 19.286$$

Median of the given data

$$= \left(\frac{n+1}{2}\right)^{\text{th}} \text{ value}$$

$$= \left(\frac{7+1}{2}\right)^{\text{th}} \text{ value} = 4^{\text{th}} \text{ value}$$

So median = 19

Mode of the given data

Since 19 is the most occurring value in the given data
So mode is 19.

Q-7-d. How does a mental ability test differ from IQ test?

Ans:- Mental ability test and IQ test both are standard tests to test specific areas of cognitive ability of an individual. Although both of them overlap in some domains but they are not the same.

IQ test: An IQ test is a set of standardized tests aimed to measure different areas of one's intellectual

ability. It consists of reasoning, logic and problem solving skills.

Mental Ability Test:- Mental ability tests are designed to measure the mental strengths of one. These tests include tests of mathematical problems, Attention, memory, colour recognition and mental processing of an individual.