Class IX Session 2023-24
Subject - Science
Sample Question Paper - 5

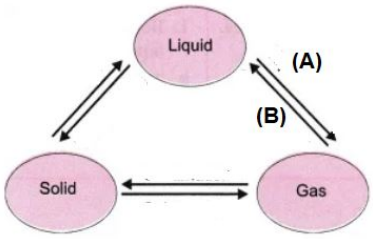
Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

1. Following figure shows three states of matter and its interconversion. Which process display in A and B? **[1]**



a) (A)Sublimation (B) condensation
b) (A) Fusion (B) Solification
c) (A) Vapourisation (B) Condensation
d) (A) Fusion and (B) Condensation

2. Which of the following cell functions will stop, if its ribosomes are destroyed? **[1]**

a) Formation of complex sugars
b) Lipid metabolism
c) Protein synthesis
d) ATP synthesis

3. What does the slope of the velocity-time graph give? **[1]**

a) acceleration
b) force
c) displacement
d) distance

4. Which one of the following is not an exotic breed of cow? **[1]**

a) Holstein-Friesian
b) Brown swiss

c) Sahiwal d) Jersey

5. _____ smoothens the bone surface at the joints. **[1]**

a) Adipose tissue b) Cartilage

c) Ligament d) Tendon

6. The cell organelle involved in forming complex sugars from simple sugars are **[1]**

a) Endoplasmic reticulum b) Plastids

c) Golgi apparatus d) Ribosomes

7. The number of molecules in $CuSO_4.5H_2O$ bonded by H-bond is **[1]**

a) 5 b) 3

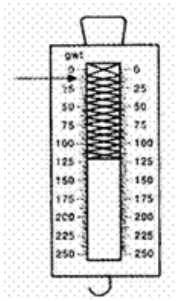
c) 2 d) 1

8. Girth of stem increases due to **[1]**

a) apical meristem b) vertical meristem

c) intercalary meristem d) lateral meristem

9. In the following figure the zero error is: **[1]**



a) 5 gwt b) – 5 gwt

c) 2 gwt d) – 2 gwt

10. Usha swims in a 90 m long pool. She covers 180 m in one minute going either way. The average velocity is: **[1]**

a) $30ms^{-1}$ b) zero

c) $180ms^{-1}$ d) $90ms^{-1}$

11. How many electrons, protons and neutrons will be present in X^-, if atomic number of X is 9 and mass number is 19? **[1]**

a) E = 10, P = 9, N = 10 b) E = 9, P = 10, N = 10

c) E = 10, P = 10, N = 10 d) E = 9, P = 9, N = 10

12. Bone matrix is rich in **[1]**

a) fluoride and calcium b) calcium of potassium

c) calcium and phosphorus d) phosphorus and potassium

13. The basic building units of an onion bulb, are called _____. **[1]**

a) scales b) cells

c) roots d) tissues

14. A mixture of sulphur and carbon disulphide is **[1]**

a) heterogeneous and shows Tyndall effect

b) heterogeneous and does not show Tyndall effect

c) homogeneous and shows Tyndall effect

d) homogeneous and does not show Tyndall effect

15. Which one of the following will form a translucent solution in water? **[1]**

a) Soil

b) Sand

c) Starch

d) Sugar

16. The enrichment of water bodies with nutrients leading to excessive growth of phytoplankton is known as:- **[1]**

a) Ammonification

b) Nitrification

c) Eutrophication

d) Phyto-enrichment.

17. **Assertion (A):** A tiger can accelerate from rest at the rate of 4 m/s^2. **[1]**

Reason (R): The velocity attained by it in 10s is 40 m/s.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** The conversion of gas directly into solid is called condensation. **[1]**

Reason (R): Naphthalene leaves residue when kept open for some time.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** The cells of non-striated muscles or smooth muscles are spindle-shaped, uni-nucleated, elongated, and have no striations. **[1]**

Reason (R): They are found within the walls of elementary canal, bladder, and blood vessels.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** Electrons moving in the same orbit will lose or gain energy. **[1]**

Reason (R): On jumping from higher to lower energy level, the electron will gain energy.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

21. How is the power related to the speed at which a body can be lifted? How many kilograms will a man working with the power of 100 W, be able to lift at constant speed of 1 ms^{-1} vertically? (g = 10 ms^{-2}) **[2]**

OR

A ball is dropped from a height of 10 m. If the energy of the ball reduces by 40 per cent after striking the ground,

how high can the ball bounce back? ($g = 10\ ms^{-2}$)

22. Give reasons for the following observation: **[2]**

The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food you have to go close.

23. Give two practical applications of reflection of sound waves. **[2]**

24. What are the factors which are responsible for bringing a change in the physical state of a substance? **[2]**

25. A bullet of mass 10 g travelling horizontally with a velocity of 150 ms^{-1} strikes a stationary wooden block and comes to rest in 0.03 s. Calculate a distance of penetration of the bullet into the block. Also calculate the magnitude of the force exerted by the wooden block on the bullet. **[2]**

OR

According to the third law of motion, when we push on an object, the object pushes back on us with an equal and opposite force. If the object is a massive truck parked along the roadside, it will probably not move. A student justifies this by answering that the two opposite and equal forces cancel each other. Comment on this logic and explain why the truck does not move.

26. The relative atomic mass of copper is 63.5u. It exists as two isotopes which are $^{63}_{29}Cu$ and $^{65}_{29}Cu$. Calculate the percentage of each present in if. **[2]**

Section C

27. Define frequency and wavelength with reference to sound. Explain, what is echo? Write full form of SONAR. Give two applications of ultrasound. **[3]**

28. On the basis of the number of protons, neutrons and electrons in the samples given below identify **[3]**

i. the cation.

ii. the pair of isobars, and

iii. the pair of isotopes.

Sample	**Protons**	**Neutrons**	**Electrons**
A	17	18	16
B	18	19	18
C	17	20	17
D	17	17	17

29. Draw the graph for uniform retardation - **[3]**

a. position - time graph

b. velocity - time graph

c. Acceleration- time graph

OR

Deduce the following equations of motion:

i. $S = ut + \left(\frac{1}{2}\right)at^2$

ii. $v^2 = u^2 + 2aS$

30. A test tube loaded with lead shots weighs 50 gf and floats upto the mark 'X' in water. The test tube is then made to float alcohol. It is found that 10 gf of lead shots have to be removed, so as to float it to level 'X'. Find RD of alcohol. **[3]**

31. Give reason for the following: **[3]**

i. Road accidents occurring due to high speeds are much worse than accidents due to low speeds of vehicles.

ii. When a motorcar makes a sharp turn at a high-speed, passenger tends to get thrown to one side.

32. Differentiate between diffusion and osmosis. What is its importance? **[3]**

OR

Differentiate between rough and smooth endoplasmic reticulum. How is the endoplasmic reticulum important for membrane biogenesis?

33. We can control some of the actions of our body, but some are not in our control. Comment on this statement. **[3]**

Section D

34. i. A person weighs 110.84 N on the moon, whose acceleration due to gravity is 1/6 of that the earth. If the value of g on the earth is 9.8 m/s^2, then calculate **[5]**

a. g on the moon

b. mass of person on the moon

c. weight of person on the earth

ii. How does the value of g on the earth is related to the mass of the earth and its radius? Derive it.

OR

i. Suppose the mass of the earth somehow increases by 10% without any change in its size. What would happen to your weight?

ii. Suppose the radius of the earth becomes twice of its present radius without any change in its mass. What will happen to your weight?

35. Draw a well-labeled diagram of a eukaryotic nucleus. How is it different from the nucleoid? **[5]**

OR

i. Describe the role played by the lysosomes. Why are they termed as suicidal bags? How do they perform their function?

ii. What happens to the dry raisins, when placed in plain water for some time? State the reason for whatever is observed. What would happen if these raisins are then placed in concentrated salt solution?

36. Classify each of the following as a physical or a chemical change. Give reasons. **[5]**

i. Drying of a shirt in the sun.

ii. Rising of hot air over a radiator.

iii. Burning of kerosene in a lantern.

iv. Change in the colour of black tea on adding lemon juice to it.

v. Churning of milk cream to get butter.

Section E

37. **Read the text carefully and answer the questions:** **[4]**

A few layers of cells beneath the epidermis are generally simple permanent tissue. Parenchyma is the most common simple permanent tissue. It consists of relatively unspecialized cells with thin cell walls. They are living cells. Collenchyma allows bending of various parts of the plant-like tendrils and stems of climbers without breaking. Sclerenchyma tissue makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. They are long and narrow as the walls are thickened due to lignin. The tissue is present

in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.

(i) The flexibility in plants is due to which tissue?

(ii) Is aerenchyma provides mechanical support?

OR

Is apical and intercalary meristems permanent tissue?

38. **Read the text carefully and answer the questions:** **[4]**

A bee colony consists of a single queen and a large number of worker bees. Drones are present in the early stages but do not occur later on. All the functions of the colony are performed by worker bees. They build the hive, collect food, feed themselves as well as the queen, store food and protect the hive. Genetically, a worker bee does not differ from a queen bee and can even become a laying worker bee, but in most species will produce only male (drone) offspring.

(i) Why are drones absent in the mature bee colony?

(ii) When and how are drones produced?

(iii) What is bee bread?

OR

Why worker bees are females but they do not lay eggs?

39. **Read the text carefully and answer the questions:** **[4]**

A solution of a solid in a liquid such as water can be prepared by adding it slowly to water with constant stirring at a certain temperature (room temperature). If the addition process is continued, a stage is ultimately reached in the dissolution process when no more of the solid dissolves. Rather it starts setlling at the bottom of the container such as a glass beaker. The solution at this stage is said to be saturated. The solubility of a solute is always expressed with respect to the saturated solution. It may be defined as the maximum amount of the solute that can be dissolved in 100 g of the solvent to form a saturated solution at a given temperature. Please remember that the role of temperature is very important. If temperature is increased, the solution becomes unsaturated. In case the temperature is decreased, the solution becomes supersaturated. As a result, crust of the solute gets deposited on the surface.

(i) What do mean by the term Solubility?

(ii) 20 g of a solute are dissolved in 500 g of the solvent. The solubility of the solute is:

(iii) When a saturated solution becomes unsaturated?

OR

What do you mean by concentration of solution?

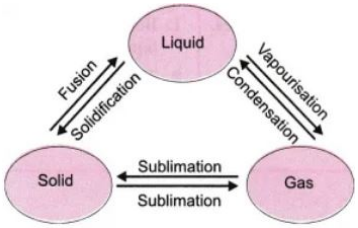
Solution

Section A

1.

(c) (A) Vapourisation (B) Condensation

Explanation: The correct figure is:



2.

(c) Protein synthesis

Explanation: Ribosomes are the site of protein synthesis on rough endoplasmic reticulums. Long-chain of polypeptides are synthesized on the ribosomes.

3. **(a)** acceleration

Explanation: We can find out the value of acceleration from the slope of the velocity-time graph of a moving body.

Acceleration = $\frac{Change\ in\ velocity}{time}$ = Slope of the velocity-time graph provided.

4.

(c) Sahiwal

Explanation: Jersey, Brown Swiss, Holstein-Friesian all are Exotic breeds of cow. Sahiwal, Gir, Red Sindhi, Tharparkar are Indigenous breeds and Karan Swiss, Karan Fries, Frieswal are Cross-breeds.

5.

(b) Cartilage

Explanation: Cartilage smoothens the bone surface at the joints. The cartilage is a connective tissue with a solid matrix composed of proteins and sugars. It is commonly seen in the nose, ear, trachea, and larynx.

6.

(c) Golgi apparatus

Explanation: Golgi bodies consist of a system of membrane-bound vesicles arranged in stacks parallel to each other called cisterns. These membranes have connections with the membrane of endoplasmic reticulum (ER). Functions:

1. It also stores, modifies and helps in the packaging of products in vesicles.
2. In some cases, complex sugars may be made from simple sugars in it.
3. It also helps in the formation of lysosomes.

7.

(d) 1

Explanation: One molecule of water is linked by H-bond because only one molecule of water is present outside the coordination sphere.

8.

(d) lateral meristem

Explanation: The lateral meristematic tissues are responsible for an increase in the diameter or girth of the plant.

9. **(a)** 5 gwt

Explanation: The reading on the spring balance when suspended freely in the air.

10.

(b) zero

Explanation: The average velocity for the entire swing would be zero because its final position and initial position are identical.

11. **(a)** E = 10, P = 9, N = 10
Explanation: Atomic number = 9
Mass number = 19
No of electron = No. of neutrons = 19 – 9 = 10
No. of proton = 19 – 10 = 9

12. **(c)** calcium and phosphorus
Explanation: The bone is a connective tissue with hard matrix, composed of calcium and phosphorus. A bone is connected by another bone with another connective tissue called ligaments. A bone is connected by muscle with another connective tissue called tendon.

13. **(b)** cells
Explanation: Cells are the basic and fundamental unit of life, in both plants and animals.

14. **(d)** homogeneous and does not show Tyndall effect
Explanation: Sulphur and carbon disulphide do not form a uniform composition and the properties of the mixture are not same throughout.
Therefore, it forms a heterogeneous composition.
Moreover, it shows a Tyndall effect, because in water sulphur remains suspended whereas carbon disulphide settles down as a layer at the bottom.

15. **(c)** Starch
Explanation: Starch forms a colloidal solution. Colloidal solutions are translucent and their particles can pass through filter paper to give a translucent filtrate.

16. **(c)** Eutrophication
Explanation: The enrichment of water bodies with nutrients leading to excessive growth of phytoplankton is called **Eutrophication**. **Eutrophication** or more precisely **hypertrophication**, is the enrichment of a water body with nutrients, usually with an excess amount of nutrients. This process induces the growth of plants and algae and due to the biomass load, may result in oxygen depletion of the water body.
Eutrophication is an enrichment of water by nutrient salts that causes structural changes to the ecosystem such as increased production of algae and aquatic plants, depletion of fish species, general deterioration of water quality, and other effects that reduce and preclude use. Eutrophication is almost always induced by the discharge of phosphate-containing detergents, fertilizers, or sewage into an aquatic system.

17. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Initial velocity (u) = 0 , acceleration (a) = 4 m/s^2
$v = u + at$
$v = 0 + 4 \times 10$
$v = 40$ m/s

18. **(d)** A is false but R is true.
Explanation: The conversion of gas directly into a solid is called desublimation. Naphthalene does not leave any residue when kept open for some time.

19. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: The cells of non-striated muscles or smooth muscles are spindle-shaped, uni-nucleated, elongated, and have no striations. They are involuntary in nature.
The non-striated muscles or smooth muscles are found within the walls of the elementary canal, bladder, and blood vessels.

20.

(d) A is false but R is true.

Explanation: Electrons moving in the same orbit will not lose or gain energy. On jumping from higher to lower energy level, the electron will lose energy.

Section B

21. We know that, Power = $\frac{Work\ done\ or\ energy}{time} = \frac{mgh}{t}$ = m.g.$(\frac{h}{t})$

Since, speed = $\frac{Distance}{time} = \frac{h}{t}$

Therefore, mass, m= $\frac{Power}{g \times Speed}$

Hence, mass of a body that can be lifted = $\frac{Power}{g \times Speed} = \frac{100}{10 \times 1}$ = 10 kg

OR

Let, the mass of a ball ='m'

The energy possessed by a ball at height (h) = mgh = m $\times$ 10 $\times$ 10 = 100 mJ. (g= 10 ms^{-2})

If energy is reduced by 40%, then the remaining energy = 100mJ - 40mJ= 60 mJ.

Let h' be the height attained by a ball after bouncing back.

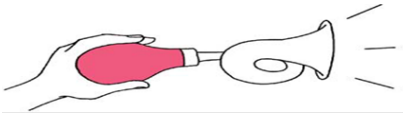
Now, Remaining energy = mgh'

Therefore, 60 m = m $\times$ 10 $\times$ h' or h' = 6 m.

22. Since hot sizzling food has temperature higher than the cold food and at higher temperature diffusion rate (movement) of particles is very fast due to this the smell of hot sizzling food reaches us from several metres away but to get the smell from cold food you have to go close.

23. Two practical applications of reflection of sound waves

i. Megaphones or loudhailers, horns, musical instruments such as trumpets and *shehnais*, are all designed to send sound in a particular direction without spreading it in all directions.



ii. A stethoscope is a medical instrument used for listening to sounds produced within the body, chiefly in the heart or lungs. In stethoscopes, the sound of the patient's heartbeat reaches the doctor's ears by multiple reflections of sound.

24. Temperature and pressure are the two factors which can bring about the change in physical state. But they have opposing effects. Increase in temperature pulls the constituents of a substance apart. Increase in pressure tends to bring them closer.

25. Mass of bullet (m) = 10 g = 0.01 kg

Initial velocity of bullet (u) = 150 ms^{-1}

Final velocity of bullet (V) = 0

Time (t) = 0.03 sec

Acceleration on bullet (a) = ?

Force acting on wooden block (F) =?

Distance penetrated by bullet (s) =?

We know:

v = u + at

0 = 150 + a $\times$ 0.3

$\Rightarrow$ -a $\times$ 0.03 = 150

$\Rightarrow$ a = $\frac{-150}{0.03}$ = -5000 ms^{-2}

We know; S = ut + 1/2 at 2

= 150 $\times$ 0.03 + $\frac{1}{2}$ $\times$ (-5000) $\times$ $(0.03)^2$

= 4.5 - 2.25 = 2.25 m

We know, F = ma

Force acting on bullet (F)

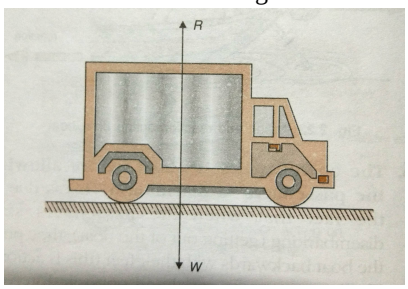
= 0.01 $\times$ (-5000)

= -50 N

Negative sign denotes that wooden block exerts force in the direction, opposite to the direction of motion of the bullet.

OR

The various forces acting on the truck at rest are as follows:



Here, the weight of the truck W is balanced by the reaction R of the ground on the truck. But the frictional force due to the ground is much more than the force of push. Therefore, the truck does not move.

26. Let the percentage of $^{63}_{29}Cu$ isotope = x

∴ The percentage of $^{65}_{29}Cu$ isotope = 100 – x

From the above data, the relative atomic mass of Cu = $\frac{63 \times x}{100} + \frac{65 \times (100 - x)}{100}$

But the given relative atomic mass of Cu = 63.5u

∴ $\frac{63 \times x}{100} + \frac{65 \times (100 - x)}{100} = 63.5u$

$63x + 6500 - 65x = 6350$

$-2x = 6350 - 6500$

$= -150$

or $2x = 150$

$x = 75$u

∴ Percentage of $^{63}_{29}Cu$ isotope = 75%

Percentage of $^{65}_{29}Cu$ isotope = 100 – 75 = 25%

Section C

27. Frequency: The number of complete sound waves (or oscillations) produced in one second is called frequency of the sound wave.

Wavelength: The minimum distance in which a sound wave repeats itself.

Echo: The repetition of sound caused by the reflection of sound waves is called an echo.

The full form of SONAR is Sound Navigation and Ranging.

Two applications of ultrasound are:

i. Ultrasound is used in industries for detecting flaws in metal blocks without damaging them.

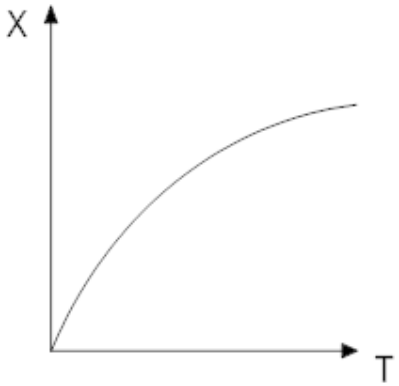
ii. Ultrasound is used to investigate the internal organs of the human body such as liver, gall bladder, pancreas, kidneys, etc.

28. i. Sample A has more protons than electrons. Hence, it is a cation.

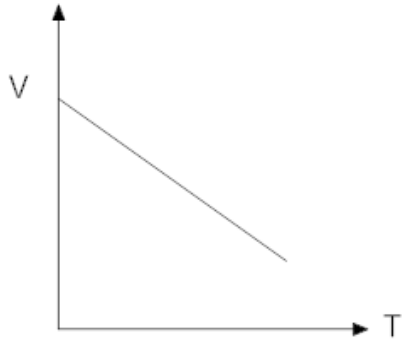
ii. Sample B and C have same mass number (Mass number = Number of protons + number of neutrons = 37) but different atomic numbers (i.e. 18 and 17respectively). Hence, they are a pair of isobars.

iii. Samples C and D have same atomic number but different mass numbers. Hence, they are a pair of isotopes.

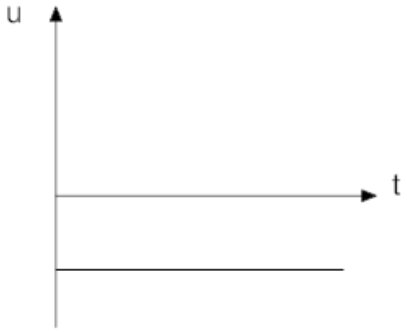
29. i. Position – time



ii. Velocity – time



iii. Acceleration- time



OR

i. Consider the linear motion of a body with initial velocity 'u'. Let the body accelerate uniformly and acquire a final velocity 'v' after time 't'.

Then, Average velocity of body = $\frac{\text{Initial velocity} + \text{Final velocity}}{2} = \frac{u+v}{2}$

$\therefore$ The distance covered by the body in time 't' = S = Average velocity $\times$ Time taken $\Rightarrow S = \frac{u+v}{2} \times t$

We know that, v =u +at

$\Rightarrow S = \frac{u+(u+at)}{2} \times t$

or, S = $\frac{2ut+at^2}{2}$

$\Rightarrow$ S = $ut + \frac{1}{2}at^2$ Which is required equation.

ii. We know that, S = $ut + \frac{1}{2}at^2$ ..... (1)

Also, a = $\frac{v-u}{t}$

$\Rightarrow$ t = $\frac{v-u}{a}$

Putting the value of t in (1), we have

S = $u\left(\frac{v-u}{a}\right) + \frac{1}{2}a\left(\frac{v-u}{a}\right)^2$

or S = $\frac{uv-u^2}{a} + \frac{v^2+u^2-2uv}{2a}$

or 2aS = 2uv - $2u^2$ + v^2 + u^2 - 2uv

or v^2 - u^2 = 2aS. Which is required equation.

30. Weight of water displaced = 50 gf

Weight of alcohol displaced = (50 -10) gf = 40 gf

As volume of water displaced = Volume of alcohol displaced

RD of alcohol = $\frac{weight\ of\ alcohol\ displaced}{weight\ of\ equal\ volume\ of\ water\ displaced} = \frac{40}{50}$

31. i. Road accidents occurring due to high speeds are much worse than accidents due to low speeds of vehicles. This is because the momentum of high-speed vehicles is more than that of the low speeds of vehicles.

ii. When a motorcar makes a sharp turn left or right at a high-speed. The lower portion of their passenger turns suddenly along with the motorcar but your upper portion does not change its direction due to inertia.

So, this portion of a passenger moves forward and the passenger tends to get thrown to one side or another side.

32.

OSMOSIS	**DIFFUSION**
It involves the movement of solvent molecules	It involves the movement of solute molecules
Molecules move from a lower concentration of solute to a higher concentration of solute	Molecules move from higher concentration of lute to a lower concentration of solute

It occurs only across a semi-permeable membrane	It does not require semi-permeable membrane
Example: Shrinking of Potato slice when kept in concentrated sucrose solution	Example: Spreading of ink when a drop of it is put in a glass of water.

Importance – diffusion and osmosis are important for the transport of substances across the cell membrane.

OR

Rough Endoplasmic Reticulum	Smooth Endoplasmic Reticulum
Ribosomes are present on the surface.	Ribosomes are absent.
Involved in the synthesis of protein.	Involved in the synthesis of fat and lipid.

ER makes lipid and protein which are the two important constituents of the plasma membrane. The biogenesis of the plasma membrane is dependent on the endoplasmic reticulum.

33. Yes, we can control some of the actions of our body, but some are not under our control. The actions which we can control are known as voluntary actions like the movement of hand and limbs. We can move these parts of our body whenever we want to, but some actions of our body like contraction and relaxation of heart, blinking of an eye, etc., are not under our will, i.e. we cannot stop functioning of heart if we want to do so. The actions, which can be manipulated by our wishes are known as voluntary actions. The muscles, which can perform voluntary actions are voluntary muscles.
These muscles are also called skeletal muscles or striated muscles. These muscles are mostly attached to bones and help in body movement. Their cells are long, cylindrical, unbranched and multinucleate (having many nuclei).
The actions, which are not under our control are known as involuntary actions. These actions are performed by smooth muscles or involuntary muscles. Their cells are long with pointed ends (spindle-shaped) and uninucleate (single nucleus).

Section D

34. The value of g on the earth is 9.8 m/s^2

i. a. g on the moon is given by

g' = $\frac{g}{6} = \frac{9.8}{6} = 1.63$ m/s^2

b. Mass of the person on the moon = $\frac{110.84}{1.63} = 68$ kg

c. Mass will be constant and does not change from place to place. Hence the mass of the person on the earth is the same that on the moon.

Weight of person on the earth $= mg = 68 \times 9.8$ = 666.4 N

ii. According to the Newton's law of gravitation, the force of attraction between earth and the body is given by

F = $\frac{GMm}{R^2}$ ...(i)

where, M = mass of the earth, R = radius of the earth, m = mass of person and G = 6.67 $\times$ 10^{-11} N-m^2/kg^2

Force produces an acceleration 'g'. So from Newton's second law, F = mg ....(ii)

Equating (i) and (ii) we get,

mg = $\frac{GMm}{R^2}$

$\therefore$ g = $\frac{GM}{R^2}$

OR

i. We know that, Original weight,W$_o$ = mg = $\frac{GMm}{R^2}$, where M is the mass of the earth, m= mass of body.

Let the new mass of earth = M'

According to question, New mass, M' = M + 10% of M = M + $\frac{10}{100}$M = M + $\frac{M}{10}$ = $\frac{11M}{10}$ = 1.1M

$\therefore$New weight, W$_n$= $\frac{GM'm}{R^2} = \frac{G \times 1.1Mm}{R^2}$

Now, Ratio of new weight to original weight = $\frac{New\ weight}{Original\ weight} = \frac{1.1GMm/R^2}{GMm/R^2}$ = 1.1

New weight becomes 1.1 times the original weight of body.

i.e., weight of body will increase by 10%.

ii. Again, Original Weight, W$_o$ = $\frac{GMm}{R^2}$, where R is the radius of the earth.

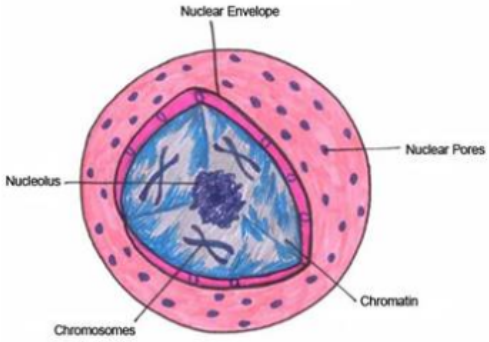
According to question, when R changes to 2R, the new weight is given by,

New weight,W$_n$ = $\frac{GMm}{4R^2}$

Now, Ratio of new weight to original weight = $\frac{New\ weight}{Original\ weight} = \frac{GMm/4R^2}{GMm/R^2} = \frac{1}{4}$

Therefore, New weight becomes $\frac{1}{4}$ times of original weight

35. Figure: An eukaryotic nucleus



Nucleus	Nucleoid
Nuclear membrane is present.	Nuclear membrane absent.
Nucleolus present.	Nucleolus absent.
Genetic materials are enclosed in nucleus.	Genetic materials are not contained in any closed structure.
Found in eukaryotes.	Found in prokaryotes.

OR

i.
- Lysosomes are membrane-bound sacs filled with digestive enzymes. These enzymes are made by the rough endoplasmic reticulum.
- Lysosomes are a kind of waste disposal system of the cell. During the disturbance in cellular metabolism, e.g. when a cell gets damaged, lysosomes present in the cell may burst and the enzymes digest the damaged cell. Hence, lysosomes are called as 'suicidal bags' of a cell.
- Lysosomes break up the foreign materials entering into the cell, such as bacteria or food into small pieces.

ii. The dry raisins, when placed in plain water for some time will swell up due to endosmosis. If these raisins are again placed in a concentrated salt solution, they will shrink, due to exosmosis.

36. i. It is a physical change because moisture in the shirt is converted from its liquid state to gaseous state because of the heat of the Sun.

ii. It is a physical change because water in the radiator is converted from a liquid state to gaseous state.

iii. It is a chemical change because combustion of kerosene occurs and new products are formed.

iv. It is a chemical change because there is a reaction between citric acid present in lemon and the compounds of the tea resulting in the formation of new products.

v. It is a physical change because the cream suspended in milk is separated by churning (centrifugation).

Section E

37. **Read the text carefully and answer the questions:**

A few layers of cells beneath the epidermis are generally simple permanent tissue. Parenchyma is the most common simple permanent tissue. It consists of relatively unspecialized cells with thin cell walls. They are living cells. Collenchyma allows bending of various parts of the plant-like tendrils and stems of climbers without breaking. Sclerenchyma tissue makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. They are long and narrow as the walls are thickened due to lignin. The tissue is present in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.

(i) Collenchyma.

(ii) No, aerenchyma helps aquatic plants to float.

OR

No, apical and intercalary meristems are not permanent tissue.

38. **Read the text carefully and answer the questions:**

A bee colony consists of a single queen and a large number of worker bees. Drones are present in the early stages but do not occur later on. All the functions of the colony are performed by worker bees. They build the hive, collect food, feed themselves as well as the queen, store food and protect the hive. Genetically, a worker bee does not differ from a queen bee and can even become a laying worker bee, but in most species will produce only male (drone) offspring.

(i) They take part in nuptial flight after which they but not allowed to enter the colony.

(ii) During new colony formation and from unfertilized eggs.

(iii) Bees produce food substances for worker bees and larvae in the form of bee bread.

OR

Colony behavior, egg laying and ovary development in worker honey bees is prevented by queen pheromones and open brood pheromone. However, in the absence of these regulating pheromones, workers may develop ovaries which will enable them to lay their own eggs.

39. **Read the text carefully and answer the questions:**

A solution of a solid in a liquid such as water can be prepared by adding it slowly to water with constant stirring at a certain temperature (room temperature). If the addition process is continued, a stage is ultimately reached in the dissolution process when no more of the solid dissolves. Rather it starts setlling at the bottom of the container such as a glass beaker. The solution at this stage is said to be saturated. The solubility of a solute is always expressed with respect to the saturated solution. It may be defined as the maximum amount of the solute that can be dissolved in 100 g of the solvent to form a saturated solution at a given temperature. Please remember that the role of temperature is very important. If temperature is increased, the solution becomes unsaturated. In case the temperature is decreased, the solution becomes supersaturated. As a result, crust of the solute gets deposited on the surface.

(i) The maximum amount of solute that can dissolve in a given amount of solvent.

(ii) Given, Mass of solute = 20g

Mass of solvent = 500g

Mass-Volume percentage = $\frac{20}{500} \times 100$

= 4%

Solubility of 500 g of solute = $\frac{4}{100} \times 500$

= 20g

Hence, the solubility of 20g of solute in 500g of solvent is 20g.

(iii) A saturated solution becomes unsaturated by either heating it or by adding more of the solvent.

OR

Concentration of a solution is defined as the amount of solute that is present in a given amount of solution. It can be expressed in terms of: Mass by the mass percentage of a solution = $\frac{\text{mass of solute}}{\text{mass of solution}} \times 100$..