Class IX Session 2023-24
Subject - Science
Sample Question Paper - 2

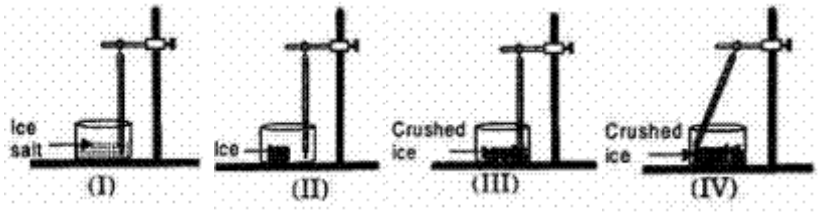
Time Allowed: 3 hours **Maximum Marks: 80**

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. Which one of the following is the correct set up to determine the melting point of ice? **[1]**



a) I b) III

c) IV d) II

2. A eukaryotic nucleus has a: **[1]**

a) non-porous, single membrane b) porous, single membrane

c) porous, double membrane d) non-porous, double membrane

3. A particle is moving in a straight line with initial velocity u and uniform acceleration a. If the sum of the distances travelled in t^{th} and $(t + 1)^{th}$ seconds is 100 cm, then its velocity after t seconds in cm s^{-1} is **[1]**

a) 50 b) 80

c) 30 d) 20

4. Manures are used in sandy soils mainly to **[1]**

a) increase the water holding capacity
b) avoid waterlogging
c) reduce soil pollution
d) provide all essential nutrients to crops

5. Those organs of the body like oral cavity, esophagus, etc., which are subjected to mechanical abrasions are lined by **[1]**

a) stratified cuboidal epithelium
b) simple squamous epithelium
c) simple columnar epithelium
d) stratified squamous epithelium

6. Lysosomes are formed by: **[1]**

a) SER
b) Golgi apparatus
c) Plasma membrane
d) RER

7. What information do we get from the molecular formula? **[1]**

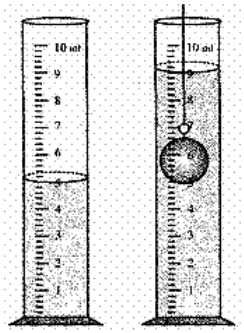
a. It represents one molecule of the substance.
b. It does not tell the name of the substance.
c. It tells about the type of atoms.
d. It represents the formula mass unit of the substance.

a) (b) and (c) are correct
b) All of these
c) (a) and (b) are correct
d) (a), (c) and (d) are correct

8. Choose the chemical compound with which the specimen is temporarily mounted. **[1]**

a) Water
b) Glycerine
c) Alcohol
d) Salt solution

9. The level of water in a measuring cylinder before and after a solid of 8 g mass is fully immersed into it as shown.The density of the given solid is: **[1]**



a) $4\ g/cm^3$
b) $3\ g/cm^3$
c) $2\ g/cm^3$
d) $5\ g/cm^3$

10. The maximum speed of a train is 90 km/h. It takes 10 hours to cover a distance of 500 km. The ratio of its average speed to maximum speed is: **[1]**

a) 9:5
b) 5:9
c) 1: 5
d) 5:1

11. Fill in the gap using given analogy **[1]**

Atomic number : Number of protons :: Mass number : _____.

a) Number of protons + Number of electrons
b) Number of neutrons + Number of protons

c) Number of electrons
d) Number of protons

12. Cambium is an example of **[1]**

a) simple permanent tissue
b) internally meristem
c) lateral meristem
d) apical meristem

13. Ribosomes are the centre for**:** **[1]**

a) Respiration
b) Fat synthesis
c) Photosynthesis
d) Proteins synthesis

14. Rusting of an article made up of iron is called **[1]**

a) corrosion and it is a physical as well as chemical change
b) dissolution and it is a physical
c) dissolution and it is a chemical change
d) corrosion and it is a chemical change

15. Which one of the following will result in the formation of a mixture? **[1]**

a) Breaking of ice cubes into small pieces
b) Adding sodium metal to water
c) Agitating a detergent with water in a washing machine
d) Crushing of a marble tile into small particles

16. Which of one of the following nutrients is not available in fertilisers. **[1]**

a) Iron
b) Potassium
c) Nitrogen
d) Phosphorous

17. **Assertion (A):** The speed or velocity of a car running on a crowded city, road changes continuously. **[1]**
Reason (R): The movement of a car on a crowded city road is an example of non-uniform acceleration.

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):** A gas can be easily compressed by applying pressure. **[1]**
Reason (R): Since the inter-particle spaces in the gaseous state are very small, they cannot be decreased by applying pressure.

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):** Parenchyma cells help in storage of food. **[1]**
Reason (R): Parenchyma cells are the main seats of photosynthesis.

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):** In Rutherford's gold foil experiment, very few α-particles are deflected back. **[1]**
Reason (R): Nucleus present inside the atom is heavy.

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. Explain why it is difficult to push a tin can into water keeping its mouth upwards than when its mouth is kept downwards towards the water? **[2]**

OR

Mountains roads rarely go straight up but wind up gradually. Why?

22. The mass per unit volume of a substance is known as density (density = mass/volume). Arrange the following in order of increasing density:Air, exhaust from chimneys, honey, water, chalk, cotton and iron. **[2]**

23. What are wavelength, frequency, time period and amplitude of a sound wave? **[2]**

24. Does the evaporation of a liquid occur only at a fixed temperature? **[2]**

25. Why does a cricket player move his hands backward while catching the ball? **[2]**

OR

A bullet fired against a glass window pane makes a hole in it, and the glass pane is not cracked. But on the other hand, when a stone strikes the same glass pane, it gets smashed. Why is it so?

26. Find the percentage composition of sucrose $C_{12}H_{22}O_{11}$. **[2]**

Section C

27. a. What is meant by reflection of sound? **[3]**
    b. Describe an activity to study the reflection of sound.
    c. State the laws of reflection of sound.

28. What is the basic difference between the isotopes of an element? **[3]**

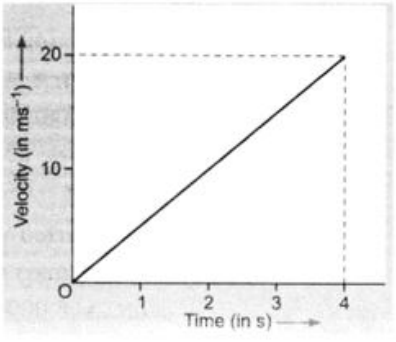
29. The average time taken by a normal person to react to an emergency is one fifteenth of a second and is called the 'reaction time'. If a bus is moving with a velocity of 60 kmh^{-1} and its driver sees a child running across the road, how much distance would the bus had moved before he could press the brakes? The reaction time of the people increases when they are intoxicated. How much distance had the bus moved if the reaction time of the driver were 1/2 s under the influence of alcohol? **[3]**

OR

Suppose you go up a tower 80 m high and throw a ball horizontally with a velocity of 20m/s. What will be the shape of the path followed by the ball? While falling, the motion of the ball will be a combination of two independent motions. Name these two motions.

30. Give reason : An iron nail sinks in water, but a ship made of iron floats. **[3]**

31. The velocity-time graph of a ball moving on the surface of floor is shown in the figure. Calculate the force acting on the ball, if the mass of the ball is 100 g. **[3]**



32. What are the differences between cell wall and cell membrane? **[3]**

OR

How do substances like CO_2 and water move into and out of the cell ? Discuss.

33. i. Which process in meristematic tissue converts it to permanent tissue? **[3]**

ii. Which feature of meristematic tissue helps aquatic plants to maintain buoyancy in water?

iii. Why epidermis of plants living in dry habitats is thicker?

iv. Identify the following.

a. Living component of xylem

b. Dead element of phloem

v. Which type of conducting tissues conduct water and minerals vertically?

Section D

34. i. A steel needle sinks in water but a steel ship floats. Explain, how? **[5]**

ii. Why do you prefer a broad and thick handle of your suitcase?

OR

From a cliff of 49 m high, a man drops a stone. One second later, he throws another stone. They both hit the ground at the same time. Find out the speed with which he threw the second stone.

35. Draw a plant cell and label the parts which **[5]**

i. determines the function and development of the cell

ii. packages materials coming from the endoplasmic reticulum

iii. provides resistance to microbes to withstand hypotonic external media without bursting

iv. is site for many biochemical reactions necessary to sustain life.

v. is a fluid contained inside the nucleus

OR

Grass looks green, papaya appears yellow. Which cell organelle is responsible for this?

36. i. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293K. Find its concentration at this temperature. **[5]**

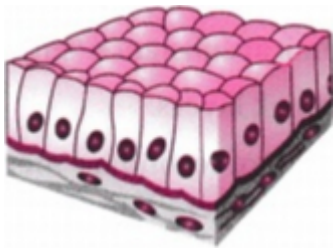
ii. Calculate the mass of glucose and mass of water required to make 200g of 25% solution of glucose.

Section E

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

The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. It also forms a barrier to keep different body systems separate. Epithelial tissue cells are tightly packed and form a continuous sheet. The skin, which protects the body, is also made of squamous epithelium. Skin epithelial cells are arranged in many layers to prevent wear and tear. This columnar epithelium facilitates movement across the epithelial barrier. In the respiratory tract, the columnar epithelial tissue also has cilia, which are hair-like projections on the outer surfaces of epithelial cells. Cuboidal epithelium forms the lining of kidney tubules.

(i) Identify the type of epithelial tissue shown in the following figure.



(ii) Which cell is present in the inner lining of the intestine?

OR

Is excretion is the main function of the cuboidal epithelium?

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

Crop Season: Different crops require different climatic conditions like temperature, moisture and photoperiods to grow well and complete their life cycle.

The Indian cropping season is classified into two main seasons- (i) Kharif and (ii) Rabi based on the monsoon. The characteristics of these two main crop seasons are:

(i) Mention the various cropping seasons in India.

(ii) Differentiate between Rabi and Kharif crops.

(iii) If there is low rainfall in a village throughout the year, what measures will you suggest to the farmers for better cropping ?

OR

What is zaid crop? Give example.

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

Homogeneous mixtures are regarded as solutions or true solutions. Heterogeneous mixtures are of two types. These are suspensions and colloidal solutions. These differ in the size of the particles responsible for the difference in their properties. In a suspension, the particle size is more than 10^{-5} cm whereas in a colloidal solution, it ranges between 10^{-5} cm to 10^{-7} cm. The two phases which constitute colloidal solutions, are dispersed phase and dispersion medium. Based upon their nature, the colloidal solutions are classified into eight types. The mixture of the non-reacting gases is always homogeneous irrespective of their nature. Therefore, it is not a colloidal solution.

(i) Scattering of light occurs when a beam of light is passed through Blood. Why?

(ii) What is Tyndall effect?

(iii) What is called colloidal solution?

OR

Give an example of colloidal solution and identified their dispersed phase and dispersion medium?

Solution

Section A

1.

(b) III

Explanation: The bulb of the thermometer should be dipped in crushed ice to determine the melting point of ice.

2.

(c) porous, double membrane

Explanation: The bounding structure of the eukaryotic nucleus. Composed of two phospholipid bilayers with the outer one connected to the endoplasmic reticulum. Double membrane structure riddled with pores that surround deoxyribonucleic acid in eukaryotes. The nuclear pores, like guards at an important government building, are very strict.

3. **(a)** 50

Explanation: Distance travelled in t^{th} second of uniformly accelerated motion is

$S_t = u + \frac{a}{2}(2t - 1)$ ...(i)

Distance travelled in $(t + 1)^{th}$ second can be written as

$S_{t+1} = u + \frac{a}{2}[2(t + 1) - 1]$

or $S_{t+1} = u + \frac{a}{2}(2t + 1)$ ...(ii)

$s_t + s_{t+1} = 100$ cm (given)

$u + \frac{a}{2}(2t -1) + u + \frac{a}{2}(2t + 1) = 100$ [Using (i) and (ii)]

or $2u + 2at = 100$ or $u + at = 50$;

$\therefore v = 50\ cms^{-1}$

4. **(a)** increase the water holding capacity

Explanation: Manure contains large quantities of organic matter and small quantities of nutrients. Manure is made by decomposition of organic waste; like animal excreta and plant waste. Manure improves water holding capacity of sandy soil. Organic matter in manure improves soil structure. Manure improves soil fertility.

5.

(d) stratified squamous epithelium

Explanation: A nonkeratinizing stratified squamous epithelium is found at three prominent sites in the animal body:

i. lining the esophagus,
ii. lining the sides and floor of the oral cavity, and
iii. lining the vagina.

6.

(b) Golgi apparatus

Explanation: Lysosomes are manufactured and budded into the cytoplasm by the Golgi apparatus with hydrolytic enzymes inside. The enzymes that are within the lysosome are made in the rough endoplasmic reticulum, which are then delivered to the Golgi apparatus to synthesise lysosomes.

7.

(d) (a), (c) and (d) are correct

Explanation: The molecular formula of a substance (an element or a compound) is a symbolic representation of the actual number of atoms present in one molecule of that substance. It represents the formula mass unit of the substance. It also conveys the name of the substance. Therefore, (a), (c) and (d) are correct.

8.

(b) Glycerine

Explanation: Glycerine is a good dehydrating agent. It avoids the drying of the specimen. Besides, glycerine tends to reflect

light due to its refractive nature. As a result of it, the image appears clearer under the microscope. Due to these reasons, glycerine is used while preparing a temporary mount of leaf peel.

9.

(c) 2 g/cm^3
Explanation: $Density = \frac{mass}{volume} = \frac{8}{9-5} = \frac{8}{4} = 2\ g/cm^3$

10.

(b) 5:9
Explanation: Average speed = $\frac{500}{10}$ = 50 km/hr
Ratio of average speed to maximum speed = 50 : 90 = 5:9

11.

(b) Number of neutrons + Number of protons
Explanation: Atomic number: The total number of protons in the nucleus of an atom gives us the atomic number of that atom. It is represented by the letter Z. All the atoms of a particular element have the same number of protons, and hence the same atomic number. Atoms of different elements have different atomic numbers.
Mass number: The number of protons and neutrons combined give us the mass number of an atom. It is represented using the letter 'A.' As both protons and neutrons are present in the nucleus of an atom, they are together called nucleons.

12.

(c) lateral meristem
Explanation: Lateral meristem is present along the side of the stem, vascular cambium in the gymnosperms is a good example of the lateral meristem.

13.

(d) Proteins synthesis
Explanation: Protein synthesis involves the formation of amino acid chains according to information present on the DNA. The ribosomes, which are present in all active cells, are the sites for the manufacture of proteins. The proteins manufactured by the ribosomes are sent to other organelles in the cell. Some proteins function as enzymes and hormones.

14.

(d) corrosion and it is a chemical change
Explanation: corrosion and it is a chemical change

15.

(c) Agitating a detergent with water in a washing machine
Explanation: Detergent in water will form a mixture, others will not form a mixture.

16. **(a)** Iron
Explanation: As iron is a micronutrient that is required mainly for enzyme activity and fertilisers are supplied mainly for replenishing macronutrients which help in plant growth.

17. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: A body has a non-uniform acceleration if its velocity increases by unequal amounts in equal intervals of time.

18.

(c) A is true but R is false.
Explanation: Since the inter-particle spaces in the gaseous state are very large, they can be decreased by applying pressure. Thus, a gas can be easily compressed by applying pressure.

19.

(b) Both A and R are true but R is not the correct explanation of A.
Explanation: The function of the parenchymatous tissue is to store food material in the form of starch, proteins, oils, and fats. The parenchymatous tissues in root and stem tubers are good examples. The xylem and phloem parenchyma also store starchy food. The parenchymatous cells that contain chloroplasts are the main seats of photosynthesis, e.g., palisade cells of the leaf.

20.

(b) Both A and R are true but R is not the correct explanation of A.
Explanation: The nucleus present inside the atom is heavy but small.

Section B

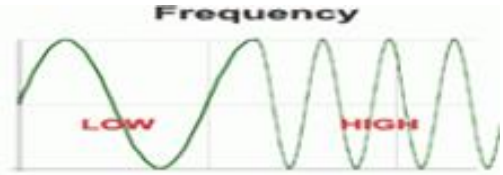
21. When the tin can is pushed into the water keeping its mouth upwards, it displaces more volume of water, and therefore it experiences more upthrust. But when it is pushed into the water with its mouth towards water, it displaces less volume of water (as water enters it). As a result the upthrust is also less. Thus it is comparatively easier to push a tin can into water with its mouth towards water than away from it.

OR

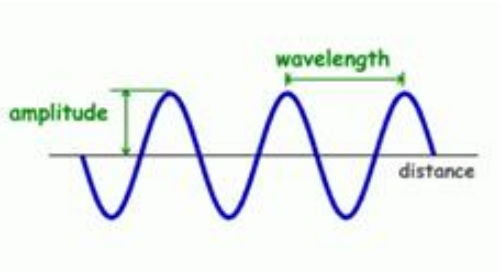
In the straight up situation, the angle of inclination is more than the wind up situation. When mountain roads go wind up, the slope will be less than when the roads go straight up. So the frictional force is very large when the road winds up. So the tire of the vehicle will not slip easily when the roads go wind up. Another thing is that, in the straight up situation due to the large angle of inclination you have to work more to go up against your gravity, but when the roads are wind up due to the small angle of inclination you have to work less to go up against your gravity. That is why mountain roads rarely go straight up the slope but wind up gradually.

22. The increasing order of density for the given substances is:
Air, exhaust from chimneys, cotton, water, honey, chalk, iron. Actually, the density of a substance depends upon the number of particles per unit volume as well as upon their mass. The number of the particles is related to their size as well as the attractive forces among them.

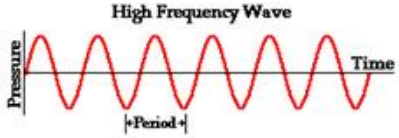
23. wavelength: For a sound wave, the combined length of compression and an adjacent rarefaction is called its wavelength even the distance between centres of two consecutive compressions or two consecutive rarefactions is also equal to its wavelength.

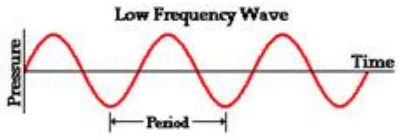


frequency: The number of vibrations or oscillations per second is called frequency i.e. it is the number of complete waves or cycles produced in one second.



time period: The time taken to complete one vibration/oscillation/complete wave is called time period. It is measured in seconds.
amplitude: It is the maximum displacement of the particles of the medium from their mean/original position at rest.





24. No, the evaporation of a liquid occurs at all temperatures.

25. The player does so as to decrease the rate of change of momentum by increasing the time.In doing so,the entire momentum of the ball is reduced to zero in a long time interval.In other words,the rate of change of momentum is small.As a result,according to Newton's second law of motion,the player has to apply a small force on the ball.In reaction,the ball also applies less force and the palms of the player are not injured.If the ball is stopped suddenly,then the entire momentum of the ball will be reduced to zero in a very short time which will cause a larger rate of change of momentum resulting in greater action and reaction forces.Thus the palms of the player will be hurt.

OR

When a bullet fired against the glass pane, the bullet strikes the glass pane with very high velocity. The part of the glass pane which comes in contact with the bullet immediately shares the large velocity of the bullet and makes a hole in the glass pane, while the remaining part of the glass remains at rest due to inertia of rest and is therefore not cracked.

But, on the other hand, when a slow-moving stone strikes the same glass pane, the various parts of the glass pane gets enough time to share the velocity of the stone. Therefore, the glass is smashed.

26. The molecular mass of sucrose $C_{12}H_{22}O_{11}$ is**:**

= 12(12) + 22(1) + 11(16)
= 144 + 22 + 176
= 342 g/mol

342g of sucrose contains	C	H	O
	144g	22g	176g
100g of sucrose contains	$\frac{100\times144}{342}$	$\frac{22\times100}{342}$	$\frac{176\times100}{342}$
	42.11g	6.43g	51.46g

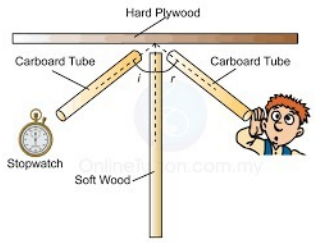
The composition by mass of sucrose is Carbon = 42.11 percent, Hydrogen = 6.43 percent and Oxygen = 51.46 percent.

Section C

27. 1) The phenomenon of bouncing back of a sound wave from a surface (i.e. going from one medium to the same medium after striking the second medium) is known as reflection of sound.

2) **Activity:**

a. Take two identical pipes, as shown in figure.
b. The length of the pipes should be sufficiently long.
c. Arrange them on a table near a wall.
d. Put a clock near the open end of the one pipe as shown in figure.
e. Now, try to hear the sound through the other pipe.
f. Adjust the position of the pipe to hear best sound of clock.
g. Now,measure the angles of incidence and reflection and see the relationship between the angles.
h. The angle of incidence and the angle of reflection of sound are found to be equal.
i. Also , Tubes are placed normal to the vertical reflector, and the reflected wave lie on the same plane.Hence law of reflection are verified.



3) Laws of reflection:

i. The angle of incidence of sound wave is always equal to the angle of reflection of sound wave.
ii. The incident sound wave, reflected sound wave and the normal to the reflecting surface at the point of incidence, all lie in the same plane.

28. (i) Different atoms of the same element are called isotopes.
(ii) Each element can have several isotopes.
(iii) The atomic weight of the element differs from the isotopic mass. The abundance of each isotope determines the atomic weight of an element.
(iv) Isotopes of an element differ in the number of neutrons leading to different mass numbers.

29. Given speed of the bus = 60 kmh^{-1} = $\frac{5}{18} \times 60$ = 16.7 ms^{-1}
Time of reaction = $\frac{1}{15}$ s
Time of reaction under the influence of alcohol = $\frac{1}{2}$ s
i) Distance travelled by the bus in the first case distance = Speed × time = 16.7 × $\frac{1}{15}$ = 1.11m
ii) Distance travelled by the bus in the second case distance = Speed × time = 16.7 × $\frac{1}{2}$ = 8.35m

OR

The shape of the path followed by the ball is parabolic.
Vertically downward motion is due to gravitational acceleration. Horizontal motion is due to zero acceleration.

30. If we place an iron nail on the surface of water, it sinks. This is because the density of iron is greater than that of water, so the weight of the nail is more than the upthrust of water on it. On the other hand a ship made of iron does not sink. This is because the

ship is hollow and the empty space contains air which makes the average density of the ship less than that of water. Therefore, even with a small part of it submerged into water, the weight of the water displaced becomes equal to the total weight of the ship and hence the ship floats.

31. The velocity-time graph shows that the velocity of the ball at t = 0, is zero. Initial velocity of ball, u = 0
Velocity of ball at t = 4s is $20ms^{-1}$
That is, final velocity, v = 20 ms^{-1}
Time, t = 4 s.
Acceleration of the ball, $a = \frac{v-u}{t}$
$\implies a = \frac{20\,ms^{-1} - 0\,ms^{-1}}{4\,s} \Rightarrow a = 5\,ms^{-2}$
Also, mass of ball,
$m = 100\,g = \frac{100}{1000}\,kg = \frac{1}{10}\,kg$
∴ Force acting on the ball, F = ma
$\implies F = \frac{1}{10}\,kg \times 5\,ms^{-2}$
$= 0.5kgms^{-2} = 0.5N\,[1kgms^{-2} = 1N]$
Therefore,the force acting on the ball is $0.5N$.

32.

S.No	Cell Wall	Cell Membrane
1	Cell wall is found in plant cell	Cell membrane is found in animal cells
2	Cell wall is completely permeable	Cell membrane is semi-permeable.
3	The function of the cell membrane is the same as that of the skin.	The function of the cell wall is to provide strength and rigidity to the cell.
4	It is non – living	It is living
5	It is made up of cellulose	It is made up of lipids and proteins

OR

The cell membrane is selectively permeable and regulates the movement of substances in and out of the cell. Movement of CO_2: CO_2 is produced during cellular respiration. Therefore, it is present in high concentrations inside the cell. This CO_2 must be excreted out of the cell. In the cell's external environment, the concentration of CO_2 is low as compared to that inside the cell. Therefore, according to the principle of diffusion, CO_2 moves from a region of higher concentration (inside the cell) towards a region of lower concentration (outside the cell). Similarly, O_2 enters the cell by the process of diffusion when the concentration of O_2 inside the cell is low as compared to its surroundings.

Movement of water: Water moves from a region of high concentration to a region of low concentration through the plasma membrane. The plasma membrane acts as a semi-permeable membrane, and this movement of water is known as osmosis. However, the movement of water across the plasma membrane of the cell is affected by the amount of substance dissolved in water.

33. i. Differentiation is the process by which meristematic tissue takes up a permanent shape, size and function.
ii. Large air cavities present in parenchyma (aerenchyma) of aquatic plants help the plant to maintain buoyancy in water.
iii. Epidermis of plants living in dry habitats are thicker in order to prevent loss of water.
iv. a. Xylem parenchyma consists of living cells having thin cell walls.
b. Phloem fibres are the dead element of phloem.
v. Tracheids and vessels of xylem are the two conducting tissues, which conduct water and minerals vertically.

Section D

34. i. Ship displaces more water than needle as the volume of the ship is more than that of the needle. Since upthrust depends on the volume of the object (U= Vdg), so more the volume of the object, more upthrust act on it and object floats.
ii. Since, pressure act on the body is inversely proportional to the surface area of contact, i.e.
P $\propto \frac{1}{A}$
It means that more the area of contact, less pressure will act on the body. As the broad and the thick handle of our suitcase has a large area, due to which less pressure acts on our hand and it is very easy to take from one place to another.

OR

For the first stone :

Initial velocity, u = 0 ms^{-1}, Height of cliff, h = 49 m, g= 9.8m/s^2

As we know, S = ut +$\frac{1}{2}at^2$.

We, have, h = ut + $\frac{1}{2}gt^2$

$\therefore 49 = 0 \times t + \frac{1}{2} \times 9.8 \times t^2$

$\Rightarrow t^2 = \frac{9.8}{9.8} = 10$

$\Rightarrow t = \sqrt{10} = 3.16$ s

i.e., first stone would take 3.16 s to reach the ground.

For the second stone:

The time taken by the second stone to reach the ground is one second less than that taken by the first stone as both the stones reach the ground from the same height, h= 49m.

That is, for the second stone, time, t = (3.16 - 1) s = 2.16 s

$\therefore$For the second stone,

g = 9.8 ms^{-2}, h = 49 m, t = 2.16 s, u = ?

Using, S = ut +$\frac{1}{2}at^2$.

We have, h = ut + $\frac{1}{2}$ gt^2

$\Rightarrow 49 = u \times 2.16 + \frac{1}{2} \times 9.8 \times (2.16)^2$

$\Rightarrow$ 49 - 22.86 = 2.16u or 26.14 = 2.16u

$\Rightarrow u = \frac{26.14}{2.16} = 12.1\ ms^{-1}$

Therefore, the speed with which he threw the second stone = 12.1 ms^{-1}

35. i. Nucleus
    ii. Golgi apparatus
    iii. Cell wall
    iv. Cytoplasm
    v. Nucleoplasm.

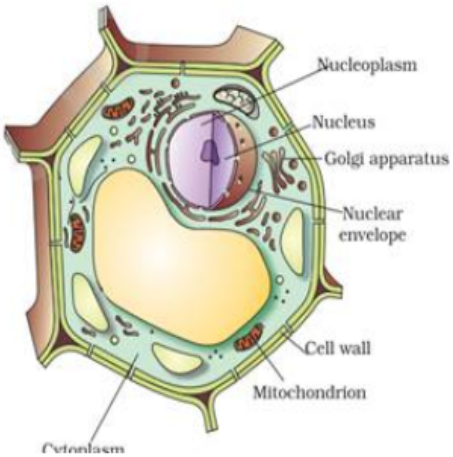


Figure: A plant cell

OR

Plastids are responsible. These are found in plant cells only. Plastids are the major cell organelles in plants. On the basis of pigments present in plastids, they are divided into two types;

i. the colourless leucoplasts and
ii. the pigmented chromoplasts.

The colourless leucoplasts store starch, oil and protein granules whereas the pigmented chromoplasts have different colours and can be of several types. The most important ones are those containing the pigment chlorophyll, known as chloroplasts, which is responsible for the preparation of food by photosynthesis. Other chromoplasts contain non-green pigments, which are responsible for the characteristic colours of fruits and flowers.

36. i. Concentration of sol = $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$
    = $\frac{36}{136} \times 100$

= 26.4% (by mass)

ii. Given mass of solution(M) = 200g

Concentration of solution = 25%

Since, Mass by Mass percentage of solution = $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$

$\Rightarrow 25 = m \times \frac{100}{200} g$

$\Rightarrow m = 25 \times \frac{200}{100} = 50g$

$\therefore$ mass of solute = 50g

mass of solvent (water) = M - m = 200g - 50g = 150g

Section E

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

The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. It also forms a barrier to keep different body systems separate. Epithelial tissue cells are tightly packed and form a continuous sheet. The skin, which protects the body, is also made of squamous epithelium. Skin epithelial cells are arranged in many layers to prevent wear and tear. This columnar epithelium facilitates movement across the epithelial barrier. In the respiratory tract, the columnar epithelial tissue also has cilia, which are hair-like projections on the outer surfaces of epithelial cells. Cuboidal epithelium forms the lining of kidney tubules.

(i) Columnar.

(ii) columnar epithelial.

OR

No, providing mechanical support is the main function of the cuboidal epithelium.

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

Crop Season: Different crops require different climatic conditions like temperature, moisture and photoperiods to grow well and complete their life cycle.

The Indian cropping season is classified into two main seasons- (i) Kharif and (ii) Rabi based on the monsoon. The characteristics of these two main crop seasons are:

(i) The various cropping seasons in India are Rabi crop, Kharif crop and Zaid crop.

(ii) Rabi crops are sown during the winter season which requires less water.
Kharif crop is sown during the summer/rainy season which requires abundant water.

(iii) Farmers are suggested to grow drought-resistant crops that can mature early. Along with this farmers are advised to use manure for their fields as it increases the water-holding capacity of the soil.

OR

There is a short season between Kharif and Rabi season in the months of March to July. The crops that grow in this season are **Zaid crops**. These crops are grown on irrigated lands and do not have to wait for monsoons. Some examples of Zaid types of crops are pumpkin, cucumber, and bitter gourd.

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

Homogeneous mixtures are regarded as solutions or true solutions. Heterogeneous mixtures are of two types. These are suspensions and colloidal solutions. These differ in the size of the particles responsible for the difference in their properties. In a suspension, the particle size is more than 10^{-5} cm whereas in a colloidal solution, it ranges between 10^{-5} cm to 10^{-7} cm. The two phases which constitute colloidal solutions, are dispersed phase and dispersion medium. Based upon their nature, the colloidal solutions are classified into eight types. The mixture of the non-reacting gases is always homogeneous irrespective of their nature. Therefore, it is not a colloidal solution.

(i) Since blood is a colloid, so tyndall effect is observed when a beam of light is passed through it since the dispersed particles of a colloid are large, deflect light.

(ii) The phenomenon by which the colloidal particles scatter light is called Tyndall effect.If light is passed through a colloid the light is scattered by the larger colloidal particles and the, beam becomes visible.

(iii) Colloidal solutions area mixture in which the substances are regularly suspended in a fluid. A colloid is a very tiny and small material that is spread out uniformly all through another substance.

OR

Fog : Liquid (water drops) acts as dispersed phase and gas (air) as the dispersion medium.