Class IX Session 2023-24
Subject - Science
Sample Question Paper - 1

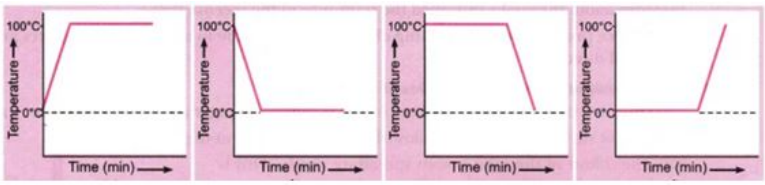
Time Allowed: 3 hours **Maximum Marks: 80**

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. Ram heats a beaker containing ice and water. He measures the temperature of the content of the beaker as a function of time. Which of the following would correctly represent the result? **[1]**



a) III b) IV

c) I d) II

2. Robert Brown is a well known scientist as he discovered _____. **[1]**

a) Lysosme b) Cell

c) Nucleus d) Vacuole

3. A car travels 10 m in 5 seconds, 20 m in the next 10 seconds, and 30 m in the last 10 seconds. The average speed of the motion is: **[1]**

a) $30\ ms^{-1}$ b) $2.2\ ms^{-1}$

c) $2.4\ ms^{-1}$ d) $2.0\ ms^{-1}$

4. Preventive and control measures adopted for the storage of grains include **[1]**

a) strict cleaning
b) fumigation
c) all of these
d) proper drying

5. While preparing a temporary mount of cheek cells, teacher asked Rohit to pick up the stain. He had four bottles A, B, C, and D containing methylene blue, glycerine, distilled water, Canada balsum. Which one should he pick? **[1]**

a) B
b) C
c) D
d) A

6. The primary function of smooth endoplasmic reticulum in liver cells is: **[1]**

a) detoxification
b) protein synthesis
c) carbohydrate metabolism
d) catabolism of proteins

7. A change in the physical state can be brought about **[1]**

a) when energy is either given to, or taken out from the system
b) without any energy change
c) only when energy is taken out from the system
d) only when energy is given to the system

8. Roshini is making a temporary mount of onion peel. What precautions should be taken to avoid the entry of air bubbles in the slide? **[1]**

a) Coverslip should be gently dropped over the peel
b) Peel should be immersed in stain for over an hour
c) Peel should be allowed to fold over itself once or twice
d) Coverslip should be dropped on to the peel from a certain height

9. In the experiment to establish the relation between loss in weight of an immersed solid with the weight of water displaced by it, the upthrust experience by the object in tap water and in salty water are U_w and U_s respectively, then : **[1]**

a) $U_w < U_s$
b) $U_w > U_s$
c) $U_w = U_s$
d) $U_s = 2U_w$

10. A car accelerates uniformly from 18 km/h to 36 km/h in 5 minutes. The acceleration is **[1]**

a) $5\ ms^{-1}$
b) $1\ ms^{-2}$
c) $1\ km/s^2$
d) $216\ ms^{-2}$

11. How many electrons are present in the species He^{2+} ion? **[1]**

a) 2
b) 0
c) 4
d) 8

12. On observing onion peel slide under low power of compound microscope which set of structures are clearly seen. **[1]**

a) Nucleus, cell membrane, vacuole, chromosomes
b) Cell Wall, vacuole, nucleus, cytoplasm

c) Cell wall, cell membrane, mitochondria, vacuole

d) Cell wall, nucleus, vacuole, chromosomes.

13. Which of the following is an incorrect pair? **[1]**

A. Lysosome - Secretory granules.

B. Nucleus - Brain of the cell

C. Mitochondria - a powerhouse of the cell

D. Chloroplast - Kitchen of the cell

a) (A)

b) (D)

c) (B)

d) (C)

14. Tyndall effect is observed in which one of the following? **[1]**

a) True solution

b) Starch + Water

c) Alum + Water

d) NaCl + Water

15. Which of the following are homogeneous in nature **[1]**

i. ice

ii. wood

iii. soil

iv. air

a) (iii) and (iv)

b) (i) and (iii)

c) (i) and (iv)

d) (ii) and (iv)

16. _____ crops are grown during the rainy season, in the months of June to October. **[1]**

a) Kharif

b) Oil

c) Cereal

d) Rabi

17. **Assertion (A):** If a particle is moving with constant velocity, then the average velocity for any time interval is equal to instantaneous velocity. **[1]**

Reason (R): If average velocity of a particle moving on a straight line is zero for a given time interval, then instantaneous velocity at some instant within this interval may be zero.

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):** Naphthalene, camphor, iodine, ammonium chloride are some common examples of the substances which undergo sublimation. **[1]**

Reason (R): All solids are first converted to liquids and then gases on heating.

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):** Vascular or conductive tissue is a distinctive feature of complex plants. **[1]**

Reason (R): Vascular tissue has made survival of complex plants possible in the terrestrial environments.

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):** Rutherford's atomic model was that it could not explain the stability of atoms. **[1]**

Reason (R): Any charged particle during acceleration would radiate energy, and while revolving, it would lose its energy and eventually fall into the nucleus.

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. The kinetic energy of an object of mass m moving with a velocity of 5 ms^{-1} is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased to three times? **[2]**

OR

It is possible that an object is in the state nof accelerated motion due to external force acting on it, but no work is being done by the force? Explain with example.

22. Why are gases highly compressible? **[2]**

23. A stone is dropped in a well 44.1 m deep. The sound of splash is heard, 3.13 s after the stone is dropped. Find the velocity of the sound in air. (Take g = 9.8 ms^{-2}) **[2]**

24. Explain why should we wear cotton clothes in summer. **[2]**

25. A force of 5 N gives a mass m_1, an acceleration of 10 ms^{-2} and a mass m_2, an acceleration of 20 ms^{-2}. What acceleration would it give if both the masses were tied together? **[2]**

OR

Explain, why is it difficult for a fireman to hold a hose, which ejects large amounts of water at a high speed.

26. Write the electronic configuration of any one pair of isotopes and isobars. **[2]**

Section C

27. **[3]**

i. What is meant by frequency of sound waves?

ii. Give the range of frequencies of sound waves that an average human ear can detect.

iii. A source of wave produces 20 crests and 20 troughs in 0.2 s. The distance between a crest and next trough is 50 cm. Find the

a. wavelength

b. frequency

c. time period of the wave.

28. Study the data given below and answer the questions which follow: **[3]**

Particle	**Electrons**	**Protons**	**Neutrons**
A	2	3	4
B	10	9	8
C	8	8	8
D	8	8	10

i. Write the mass number and atomic number of particles A, B, C, D.

ii. Which particles represent a pair of isotopes? Explain.

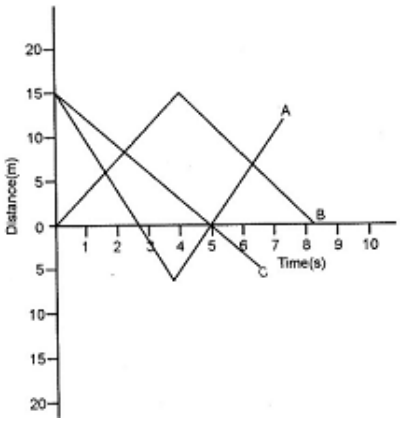
29. A ball starts from rest and rolls down 16 m down an inclined plane in 4 s. **[3]**

(a) What is the acceleration of the ball?

(b) What is the velocity of the ball at the bottom of the inclined plane?

OR

Discuss the graphs A, B and C shown in the figure. Compare the total distance travelled and the displacements. Which graph represents a motion with negative acceleration?

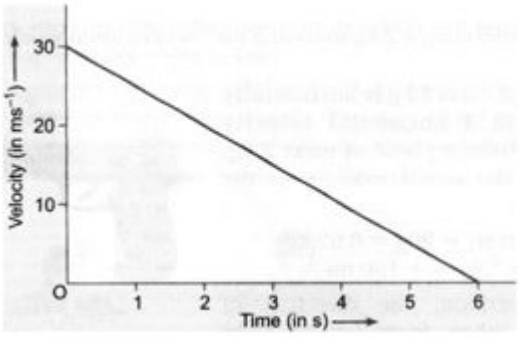


30. Prachi and Kanchi were observing a building having two different staircase. One slanting and other vertically spiral. Prachi was of the opinion that a person using slanting staircase will be doing more work against gravity but Kanchi thought otherwise. They started arguing. Sanchi, their friend, explained and gave entirely different view and pacified them. **[3]**

a. What according to you was the explanation given by Sanchi?

b. What appreciable values do you see in the Sanchi?

31. The velocity-time graph of a ball moving on the surface of a floor is shown in the figure. Find the force acting on the ball if the mass of the ball is 50 g. **[3]**



32. Write main differences between plant cell and animal cell. **[3]**

OR

A solution of 3% glucose and a solution of 8% glucose are kept in a trough separated by a semipermeable membrane. What will you observe after 1 hour?

33. Briefly describe striated and smooth muscles with their functions. **[3]**

Section D

34. What are the differences between the mass of the object and its weight? **[5]**

OR

A stone is dropped from the edge of a roof.

i. How long does it take to fall 4.9 m?

ii. How fast does it move at the end of that fall?

iii. How fast does it move at the end of 7.9 m?

iv. What is its acceleration after 1s and after 2 s?

35. Why are mitochondria called powerhouse of the cell? Give three similarities and one difference between mitochondria and plastid. **[5]**

OR

i. State what will happen when human red blood cells are placed in a hypotonic salt/sugar solution.

ii. Why plant cell shrinks when kept in a hypertonic solution.

iii. Why lysosomes are known as suicidal bags?

36. Distinguish between compounds and mixtures. **[5]**

Section E

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

Animal tissue has various types of epithelial tissue, connective tissue, muscular tissue, and nervous tissue and of tissue one of them is the connective tissue which consists of blood, bone, cartilage. Blood is the fluid matrix called plasma in which red blood cells, white blood cells, and platelet are suspended while bone form the framework that supports the body it also anchors the muscle and supports the main organ of the body. Two bones are connected by a ligament. cartilage is a solid matrix composed of sugar and protein.

(i) Name the tissue which connects muscle to a bone.

(ii) Matrix of bone cells are composed of

OR

Two bones are connected by ligament how muscle connects to the bone?

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

Fish is a cheap source of animal protein for our food. Fish liver oil is rich in vitamin A and D. Basically fisheries are of two types:

i. **Fin fishery:** It includes capturing, management and exploitation of cartilaginous and bony fishes.

ii. **Shell fishery:** It includes capturing, management and exploitation of crustaceans (prawns, crabs) and molluscs (oysters, mussels etc.).

Depending upon the mode of obtaining fish, fisheries are of two types: **Capture fishing and Culture fishing.**

(i) Mention the two types of fisheries depending upon the mode of obtaining fish.

(ii) Which fatty acid is exclusively found in fish?

(iii) Is Rohu a bony fish or not? In which type of fisheries it is used?

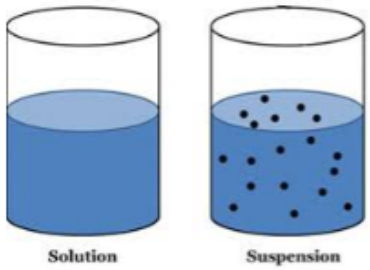
OR

What is the difference between capture fishery and culture fishery?

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

A suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Particles of a suspension are visible to the naked eye. The particles of a suspension scatter a beam of light passing through it and make its path visible. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. The scattering of a

beam of light is called the Tyndall effect. The components of a colloidal solution are the dispersed phase and the dispersion medium. The solute-like component or the dispersed particles in a colloid form the dispersed phase, and the component in which the dispersed phase is suspended is known as the dispersing medium.



(i) Differentiate between Dispersed phase and Dispersion medium?

(ii) Differentiate between Homogeneous and Heterogeneous mixture?

(iii) What is emulsion?

OR

Give an example of solid sol?

Solution

Section A

1. **(b)** IV

   Explanation: Since ice and water in equilibrium, the temperature would be zero. When we heat the mixture, energy supplied is utilised in melting the ice and the temperature does not change till all the ice melts because of the latent heat of fusion. On further heating, the temperature of the water would increase.

2. **(c)** Nucleus

   Explanation: Nucleus

3. **(c)** 2.4 ms^{-1}

   Explanation: The average distance covered in unit time by a moving object is called average speed. The average speed is the ratio of total distance covered and total time taken.

   Average speed = $\frac{Total\ distance\ covered}{Total\ time\ taken}$ = $\frac{10+20+30}{5\ +\ 10\ +10}$ = $\frac{60}{25}$ = 2.4 ms^{-1}

4. **(c)** all of these

   Explanation: Preventive and control measures adopted for the storage of grains include strict cleaning of the produce before storage, proper drying of the product first in sunlight and then in a shade, and fumigation using chemicals that can kill pests.

5. **(d)** A

   Explanation: Methylene blue is used to stain human cheek epithelial cells better. Methylene blue stains negatively charged molecules in the cell, including DNA and RNA. This dye is toxic when ingested and it causes irritation when in contact with the skin and eyes.

6. **(a)** detoxification

   Explanation: Smooth Endoplasmic Reticulum (SER) is responsible for the synthesis and repair of membranes. It also has a detoxification function.

7. **(a)** when energy is either given to, or taken out from the system

   Explanation: A change in the physical state can be brought about when energy is either given to or taken out of the system. It is because energy change helps in changing the magnitude of attraction forces between the particles, thus helps in changing the physical states (j.e., solid, liquid, gas) of matter.

8. **(a)** Coverslip should be gently dropped over the peel

   Explanation: Precautions:

   i. The staining of the peel must be appropriate. Excess stain can be removed by rinsing the peel with water taken in the watch glass.
   ii. Always hold the slide by its edges to avoid making the slide dirty.
   iii. Use a brush to transfer the peel to the slide.
   iv. The peel should never be folded.
   v. The peel should be mounted in the centre of the slide.
   vi. Always keep the coverslip gently to avoid the entry of air bubbles.

9. **(b)** $U_w > U_s$

   Explanation: The density of salty water is more as compared to tap water hence, the upthrust by salty water is more.

10. **(b)** 1 ms^{-2}

    Explanation: Given,

u = 18km/h = 18×1000 / 60×60 = 5m/s
v = 36km/h = 36×1000 / 60×60 = 10m/s
t = 5 sec
acceleration, a = ?
1st equation of motion,
v = u + at
10 = 5 + 5a
5a = 5
a = 5/5 = 1m/s

11. **(b)** 0

Explanation: Helium (He) has two electrons in its atom. The cation (He^{2+}) is formed through the loss of 2 electrons from the outer-most shell of the atom. Hence, the number of electrons in He^{2+} will be 0.

12. **(b)** Cell Wall, vacuole, nucleus, cytoplasm

Explanation:

i. There are a large number of regularly shaped cells lying side by side and each cell has a distinct cell wall.
ii. A distinct nucleus is present on the periphery of each cell.
iii. A lightly stained cytoplasm is observed in each cell.
iv. A large vacuole is present at the center of each cell and is surrounded by the cytoplasm.

13. **(a)** (A)

Explanation: Lysosomes are the suicidal bags that kill the cells which are turned off or damaged and became non-functional. They do not secrete anything rather possess some lytic enzymes membrane-bound.

14. **(b)** Starch + Water

Explanation: Starch forms a colloid in water (hot water).

15. **(c)** (i) and (iv)

Explanation: A mixture is said to be a homogeneous mixture if its constituents are distributed uniformly and are not physically distinct. Wood and soil are heterogeneous mixtures. Ice is made up of water and water is a pure compound. Air is a mixture of various gases.
Ice and air are homogeneous in nature.

16. **(a)** Kharif

Explanation: Kharif crops are the crops grown in rainy season extending from June to October hence are also called monsoon crops. These crops are totally rain-dependent crops. Kharif crops include paddy, soybean, sugarcane.

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

Explanation: Average velocity V_{av}
$= \frac{\text{Total displacement}}{\text{Total elapsed time}} = \frac{Vt}{t} = V$
= Instantaneous velocity
Hence, assertion is correct. If a particle is in a round trip on a straight line, then average velocity is zero but at the instant at which the particle reverses its direction of motion, velocity is zero. So, reason is correct. But reason is not the correct explanation of assertion.

18. **(d)** A is false but R is true.

Explanation: Certain solids directly change to the gaseous state upon heating without passing through the liquid state. The process is called sublimation.

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

Explanation: Xylem and phloem are vascular tissues that conduct water, minerals and food to various parts of plants. Vascular tissue is a distinctive feature of complex plants, one that has made their survival in terrestrial environments possible.

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

Explanation: Rutherford's atomic model could not explain how moving electrons could remain in their orbits. Any charged particle during acceleration would radiate energy, and while revolving, it would lose its energy and eventually fall into the nucleus. This means that the atom would be highly unstable. But, the matter is composed of stable atoms. Thus, the major drawback of Rutherford's atomic model was that it could not explain the stability of atoms.

Section B

21. $K.E. = \frac{1}{2}\left(m \times v^2\right)$

Given initial kinetic energy = 25 J

given velocity

$v = 5m/s$

$25 = \frac{1}{2} \times m \times 25$

$m = 2$

When velocity is doubled, new velocity,

$v = 10m/s$

K.E.=$\frac{1}{2} \times \ 2 \times \left(10^2\right)$

$K.E. = 100J$

When velocity is made three times,

$v = 15m/s$

K.E.=$\frac{1}{2} \times \ 2 \times \left(15^2\right)$

$= 225$

OR

Yes, it is possible, if an object is moving in a circular path because force is always acting perpendicular to the direction of displacement.

22. Because the inter-particle empty spaces are very large. When a gas is compressed, these spaces decrease. The particles or molecules of gas come closer.

23. Given: Depth of the well (d) = 44.1 m

Initial velocity of stone (u) = 0

Acceleration due to gravity (g) = 9.8 ms^{-2}

Time taken by stone to reach water level (t) = ?

Total time taken = 3.13 s

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

44.1 = 0× t + $\frac{1}{2}$ × 9.8 ×t^2

or $t^2 = \frac{44.1}{4.9} = 9$

⇒ t = 3.5

Since total time taken is 3.13 s, therefore sound takes time t_s = 3.13 - 3 = 0.13 s to reach the top of the well.

Using V = $\frac{S}{t}$=$\frac{44.1}{0.13}$ = 339.2 ms^{-1}

24. During summer, we perspire more because of the mechanism of our body which keeps us cool. When evaporation takes place then sweat particles gain energy from body surface and change into vapour. The heat energy equal to the latent heat of vaporisation is absorbed from the body leaving the body cool. Cotton, being a good absorber of water helps in absorbing the sweat and exposing it to the atmosphere for easy evaporation. On the other hand, synthetic clothes (made of nylon, polyester, etc.) do not absorb much of sweat and therefore, they cannot keep our body cool in summer.

25. We have $m_1 = \frac{F}{a_1}$, and $m_2 = \frac{F}{a_2}$.

Here we have given that, a = 1 = 10 ms^{-2}, a_2 = 20 ms^{-2} and F = 5 N

Thus $m_1 = \frac{5N}{10}$ ms^{-2} = 0.50 kg; and $m_2 = \frac{5N}{20}$ ms^{-2} = 0.25 kg

If the two masses were tied together, the total mass, m would be m = 0.50 kg + 0.25 kg = 0.75 kg

The acceleration, a produced in the combined mass by the 5 N force would be, a = $\frac{F}{m} = \frac{5N}{0.75kg}$ = 6.67 ms^{-2}.

OR

It is based on the law of conservation of momentum. When water comes out of the hose, with certain momentum in the forward direction, the hose, in order to converse momentum moves backward. This makes it difficult for the fireman to hold the hose.

26. **Isotopes** are atoms with the same number of protons but different number of neutrons. Since the atomic number is equal to the number of protons and the atomic mass is the sum of the number of protons and neutrons, it can also be said that **isotopes** are atoms of the same element with the same atomic number but different mass number.

Isotopes of carbon:

${}_6C^{12}$ and ${}_6C^{14}$ both have same number of electrons and protons but different number of neutrons. Their electronic configuration is the same viz. **2, 4**.

Isobars: Isobars are atoms (nuclides) of different chemical elements that have the same number of nucleons. They have the same atomic mass but different atomic number.

${}_{20}Ca^{40}$ (Electronic configuration of calcium is **2,8,8,2**) and ${}_{18}Ar^{40}$ (Electronic configuration of argon is **2,8,8**) are isobars.

Section C

27. i. The number of waves produced per second is called the frequency of the wave.

ii. Sound waves range from 20 Hz to 20 kHz

iii. a. Since the distance between a crest and next trough is $\frac{\lambda}{2}$.

Therefore, $\frac{\lambda}{2}$ = 50 cm (given)

λ = 100 cm or 1 m

b. One vibration or oscillation consists of one trough and one crest.

In 0.2s number of vibrations are 20

So, in 1s number of vibrations = $\frac{20}{0.2}$ = 100

$\therefore$ Frequency = 100 Hz

c. Time period, T = $\frac{1}{frequency}$ = $\frac{1}{100}$ = 0.01 sec

28. i.

Particle	**Atomic number**	**Mass number**
A	3	3 + 4 = 7
B	9	9 + 8 = 17
C	8	8 + 8 = 16
D	8	8 + 10 = 18

ii. Particles C and D as they have same number of protons, i.e. same atomic number but different mass number.

29. u= initial velocity =0 (body starts from rest)

S= distance = 16m

T= time = 4s

(i) From, s= ut+at^2

16 = $0 \times t + \frac{1}{2} \times a \times (4)^2$

16 = $\frac{1}{2} \times a \times 16$

$\frac{16 \times 2}{16}$

a = 2m/s^2

(ii) From, v = u +at

v = $0 + 2 \times 4$

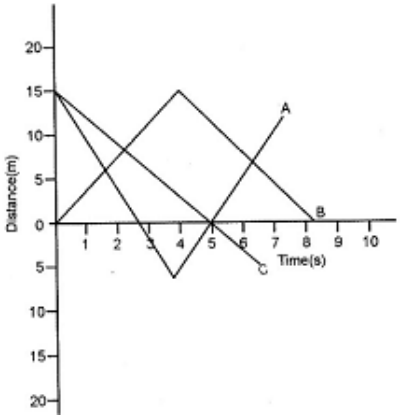
v= 8m/s

OR

i. GRAPH A: The displacement of the body is 12 m and the distance travelled is 37 m

ii. GRAPH B: Displacement is zero and the distance travelled is 15 + 15 = 30 m

iii. GRAPH C: Displacement is about 5 m and distance travelled is about 20 m.



Graph C represents a motion with negative acceleration.

30. a. Sanchi explained that the energy required in both the cases is equal because whenever the work is done against gravity, the amount of work is equal to the product of weight of the body and the vertical distance through which the body is lifted. (Work done in lifting a body = Weight of body $\times$ Vertical height).

b. Sanchi has problem solving values and conceptually strong .

31. The velocity-time graph shows that velocity of the ball at t = 0 is 30 ms^{-1}

Initial velocity of the ball, u = 30 ms^{-1}

The velocity of the ball at t = 6 s is zero.

Final velocity of the ball, v = 0

Time, t = 6s

∴ Acceleration of the ball,

$a = \frac{v-u}{t} = \frac{0-30\ ms^{-1}}{6\ s}$

= -5 ms^{-2}

Negative sign shows that the ball is retarded or decelerated.

Also, mass of ball, $M = 50\ g = \frac{50}{1000} = \frac{1}{20}\ kg$

Therefore, Force acting on the ball, F = ma

$= \left(\frac{1}{20} kg\right)(-5\ ms^{-2})$

= - 0.25 kg ms^{-2}

= 0.25 N [1 kg ms^{-2}= 1 N]

Here -ve sign indicates that the force is retarding or stopping force.

32.

Plant cells	Animal cell
1.They are larger in size.	1.They are smaller in size.
2.Cell wall is present.	2. Cell wall is absent.
3. Lysosomes are absent or very few in number	3. Lysosomes are larger in number.
4. Plastids are present.	4. Plastids are absent.
5. Subunits of Golgi bodies known as dictyosomes are present.	5. Prominent Golgi bodies are present.
6. Vacuoles are larger in size.	6. Vacuoles are smaller in size.

OR

After 1 hour the solutions on both the sides of the semipermeable membrane will become isotonic because of the process of osmosis.

33. The cells of striated muscle fibres are long or elongated, non-tapering and cylindrical and unbranched. These cells have a number of nuclei. These muscle fibres show alternate dark and light bands or striations (under the microscope) and hence, they are called striated muscles. Striated muscles occur in muscles of limbs, body wall, face, neck, etc.

Functions of striated muscles are as follows:

(i) Striated muscles are powerful and undergo rapid contraction. They are also called skeletal muscles.

(ii) Striated muscles provide the force for locomotion and all other voluntary movements of the body. Hence, they are also called voluntary muscles.

On the other hand, some muscles do not bear any bands, stripes or striations across them (under the microscope) and hence, they are called smooth or unstriated muscles. The cells of these muscle fibres are uninucleate. Smooth muscles occur as bundles or sheets of elongated fusiform or spindle-shaped cells or fibre. They are held together by loose connective tissues. These muscles are found in the walls of internal organs such as the alimentary canal, stomach, intestine, ureters, bronchi, iris of the eye, ducts of glands and blood vessels.

Functions of unstriated or smooth muscles are as follows:

(i) Smooth muscles do not work according to our will, so they are also called involuntary muscles. Movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements.

(ii) Smooth muscles contract slowly but can remain contracted for a long period of time. The ingested food passes to the next step of digestion in the alimentary canal due to this characteristic.

Section D

34.

Mass	Weight
Mass is a property of matter. The mass of an object is the same everywhere,	Weight depends on the effect of gravity. Weight varies according to location.
Mass can never be zero.	Weight can be zero if no gravity acts upon an object, as in space.
Mass does not change according to location.	Weight increases or decreases with higher or lower gravity.
Mass is a scalar quantity. It has magnitude.	Weight is a vector quantity. It has magnitude and is directed toward the center of the Earth or other gravity well.
Mass may be measured using an ordinary balance.	Weight is measured using a spring balance.
Mass usually is measured in grams and kilograms.	Weight often is measured in newtons, a unit of force.

OR

A stone is dropped from the edge of a roof.

Given, initial velocity $u = 0$

Acceleration $g = 9.8$ m/s^2

i. Displacement =$s = 4.9$ m

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

4.9 = 0 $\times$ t + $\frac{1}{2}$ $\times$ 9.8 $\times$ t^2

t^2 = $\frac{9.8}{9.8}$ = 1

$\Rightarrow t = 1$ s

The stone takes 1 s to fall 4.9 m

ii. We have, $v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 9.8 \times 4.9$

$v^2 = 96.04$

$\Rightarrow$ v = $\sqrt{96.04} = 9.8$ m/s

At the end of 4.9 m, stone will be moving at a speed of 9.8 m/s

iii. We have, $v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 9.8 \times 7.9$

v^2 = 154.84

$\Rightarrow v = 12.44$ m/s

The stone will be moving with a speed of 12.44 m/s at the end of 7.9 m.

iv. During the free fall the acceleration produced in a body remains constant.

So, acceleration after 1 s = 9.8 m/s^2

Acceleration after 2 s = 9.8 m/s^2

35. Mitochondria are often associated with cellular respiration and energy generation of the cell. The energy required for various chemical activities is released by the mitochondria in the form of ATP molecules. For this reason, mitochondria are known as the

powerhouse of the cell.

Three similarities between mitochondria and plastids are as follows:

i. Both have their own DNA and ribosomes.
ii. External structures of mitochondria and plastids are similar.
iii. Both have more than one membrane layer.

One major difference between mitochondria and plastids is that mitochondria are present in both plant and animal cells, whereas plastids are present only in plant cells.

OR

i. When human red blood cells are placed in hypotonic salt/sugar solution they swell due to endosmosis.
ii. Plant cell shrinks when kept in hypertonic solution because the concentration of the solvent is more inside the cell. It shrinks due to exosmosis.
iii. Lysosomes are known as suicidal bags because, during the breakdown of cell structure, lysosome bursts and enzymes eat up their own cells.

36.

S.No.	**Compounds**		**Mixtures**
1.	Compounds are formed as a result of chemical reactions between two or more elements or compounds.	1.	Mixture is formed by simply mixing two or more constituents. There are no chemical reactions between the constituents.
2.	The components of a compound are always present in a definite ratio by mass.	2.	The components of a mixture may be present in any ratio.
3.	The properties of a compound are entirely different from its constituents.	3.	The properties of a mixture are the same as those of its constituents.
4.	Compounds are always homogeneous in nature.	4.	Mixtures are usually heterogeneous (except in solutions).
5.	Compound formation is accompanied by absorption or evolution of light, heat or electrical energy.	5.	Heat, light or electrical energy may not be evolved or absorbed during the formation of a mixture.
6.	Melting and boiling points of a compound are usually sharp and fixed.	6.	Melting and boiling points of a mixture are usually not sharp and fixed.
7.	The constituent elements of a compound can not be separated by any physical method. Special chemical methods or electrochemical methods are employed to separate them.	7.	The constituent elements of the mixture can be easily separated by physical means.
8.	For example, Water, Carbon dioxide.	8.	For example, A mixture of iron filings and sulphur.

Section E

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

Animal tissue has various types of epithelial tissue, connective tissue, muscular tissue, and nervous tissue and of tissue one of them is the connective tissue which consists of blood, bone, cartilage. Blood is the fluid matrix called plasma in which red blood cells, white blood cells, and platelet are suspended while bone form the framework that supports the body it also anchors the muscle and supports the main organ of the body. Two bones are connected by a ligament. cartilage is a solid matrix composed of sugar and protein.

(i) Tendon.
(ii) Matrix of a bone cell composed of calcium and phosphorus compound.

OR

Muscles are connected to the bone by the structure called tendon.

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

Fish is a cheap source of animal protein for our food. Fish liver oil is rich in vitamin A and D. Basically fisheries are of two types:

i. **Fin fishery:** It includes capturing, management and exploitation of cartilaginous and bony fishes.
ii. **Shell fishery:** It includes capturing, management and exploitation of crustaceans (prawns, crabs) and molluscs (oysters, mussels etc.).

Depending upon the mode of obtaining fish, fisheries are of two types: **Capture fishing and Culture fishing.**

(i) The two types of fisheries depending upon the mode of obtaining fish are capture and culture fisheries.

(ii) Omega 3 fatty acid is exclusively found in the fishes.

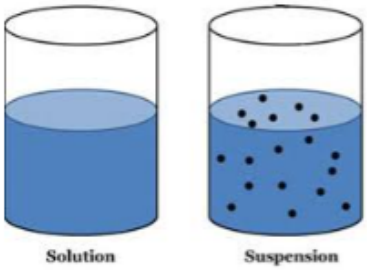
(iii) Yes, Rohu is a bony fish. It can be used in fin fishery.

OR

Capture fishery is traditional fishing where a fisherman catches the fish from natural resources like the sea and rivers. A cultural fishery is one where the fish are obtained and reared for commercial purposes.

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

A suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Particles of a suspension are visible to the naked eye. The particles of a suspension scatter a beam of light passing through it and make its path visible. Due to the relatively smaller size of particles, as compared to that of a suspension, the mixture appears to be homogeneous. The scattering of a beam of light is called the Tyndall effect. The components of a colloidal solution are the dispersed phase and the dispersion medium. The solute-like component or the dispersed particles in a colloid form the dispersed phase, and the component in which the dispersed phase is suspended is known as the dispersing medium.



(i) Dispersion medium is a continuous medium in which the dispersed phase is distributed throughout. Dispersed phase is the phase that is composed of particles that are distributed through another phase.

(ii) Homogenous mixtures generally have a uniform composition throughout the mixture whereas Heterogeneous mixtures have composition which may vary from point to point. In Homogenous mixtures, the whole mixture is in the same phase whereas in Heterogeneous mixture, substances can be of two phases and layers may separate.

(iii) An emulsion is a mixture of two or more liquids that are usually immiscible but under specific transforming processes will adopt a macroscopic homogeneous aspect and a microscopic heterogeneous one.

OR

Coloured gemstone.