Class IX Session 2024-25
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. The inferences drawn by the temperature versus time graph are **[1]**
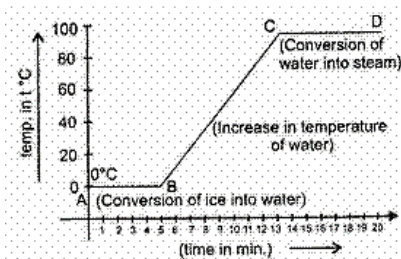
   A. During the melting, temperature of substance does not change.

   B. Temperature rises after all amount of ice melts.

   C. At a specific temperature water starts boiling and temperature remains the same during the conversion of water into steam.

   Which statement is correct regarding graph?

   a) Only (C) is correct   b) All (A), (B) and (C) are correct

   c) Only (B) is correct   d) Only (A) is correct

2. The functional units of the Golgi apparatus are: **[1]**

   a) cisternae   b) vacuoles

   c) vesicles   d) cytoplasm

3. If a moving body comes to rest, then it's acceleration is: **[1]**

   a) Negative   b) Positive

   c) Constant   d) Zero

4. Bee pasturage refers to **[1]**

   a) the flowers available for nectar collection by the bees   b) the trees where bees make the hives

   c) the hives where honeybees live and deposit honey   d) the worker bees in a hive, who collect honey

5. Which of the following is not a function of the epidermis? **[1]**

   a) Transpiration   b) Conduction of food

   c) Exchange of gases   d) Protection

6. The energy currency of the cell is**:** **[1]**

   a) AMP   b) GTP

   c) ATP   d) ADP

7. Sulphate of a divalent metal M exists in hydrated form. If 0.10 mol of metal sulphate combines with 9.0 g of water to form the hydrated salt then, the formula of metal sulphate will be **[1]**

   a) $M_2SO_4 \cdot 3H_2O$ b) $MSO_4.5H_2O$

   c) $M_2SO_4 \cdot 2H_2O$ d) $MSO_4 \cdot H_2O$

8. Observe the given figures of three different plant tissues and select the correct statement. **[1]**
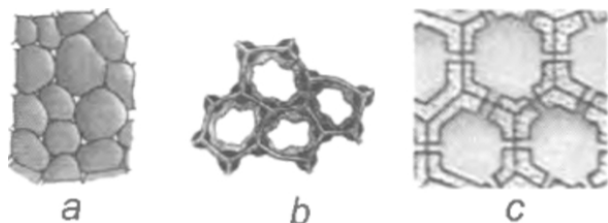
   a) Cell walls of a, b and c bear uniform thickening of suberin.   b) a provides mechanical strength to the plant while b and c serve as storage tissues.

   c) Cytoplasm is present in cells of a while it is absent in cells of b and c.   d) a and b consist of living cells while c consists of dead cells.

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 train starts from a station P and travels some distance with a uniform acceleration a_1, then it goes with uniform retardation a_2 for some more distance and come to rest at the station Q. If the distance between the stations P and Q is 4 km and the train takes 4 minutes to complete this journey, then $\frac{1}{a_1} + \frac{1}{a_2} =$ **[1]**

    a)   b)

$4 \text{ m}^{-1}\text{S}^2$ $2 \text{ m}^{-1} \text{S}^2$

c) $72 \text{ m}^{-1} \text{S}^2$ d) $7.2 \text{ m}^{-1} \text{S}^2$

11. Which of the following are isotopes and which are isobars? **[1]**

Argon (Ar), Deuterium (D), Calcium (Ca), Tritium (T), Protium (P)

a) Ar, Ca are isotopes and D, T, P are isobars	b) D, P are isotopes
c) Ar, Ca are isobars and D, T, P are isotopes	d) Ar, P, T are isobars

12. Which is the most widely distributed connective tissue? **[1]**

a) Blood	b) Lymph
c) Adipose connective tissue	d) Areolar connective tissue

13. Lysosomes arises from **[1]**

a) Nucleus	b) Golgi apparatus
c) Endoplasmic reticulum	d) Mitochondria

14. 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

15. The particles of the colloidal solution are: **[1]**

a) visible with a powerful microscope	b) not visible with a powerful microscope
c) visible with the naked eye	d) visible with a simple microscope

16. Using fertilizers in farming is an example of **[1]**

a) High cost production	b) Low cost production
c) Moderate cost production	d) No cost production

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):** An iron almirah is a solid at room temperature. **[1]**

Reason (R): Water can flow and it assumes the shape of the containing vessel.

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 tissue consists of relatively unspecialized cells with thin cell walls and is usually loosely packed. **[1]**

Reason (R): They do not have spaces between them.

    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):** Cathode rays get deflected towards the positive plate of electric field. **[1]**

    Reason (R): Cathode rays consist of negatively charged particles known as electrons.

    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. A body moves along a circular path. How much work is done in doing so? Explain. **[2]**

OR

Why will a sheet of paper fall slower than one that is crumpled into a ball?

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. Why do we see light first and hear the sound later during thunderstorm? **[2]**

24. Why is ice at 273 K more effective in cooling than water at the same temperature? **[2]**

25. Using second law of motion, derive the relation between force and acceleration. A bullet of mass 10 g strikes a sand bag with a velocity of 10^3 ms^{-1} and gets embedded after travelling 5 cm. Calculate **[2]**

    i. the resistive force exerted by the sand bag on the bullet.

    ii. the time taken by the bullet to come to rest.

OR

When a force of 40 N is applied on a body it moves with an acceleration of 5 ms^{-2}. Calculate the mass of the body.

26. List any three distinguishing features between the models of an atom proposed by J.J. Thomson and Ernest Rutherford. **[2]**

Section C

27.   i. Sound is produced when your school bell is struck with a hammer. Why? **[3]**

    ii. A powerful sound signal sent from a ship is received again after 4.8 seconds. How deep is the ocean bottom? (Speed of sound in water = 1500 m/s).

28. Compare the properties of electrons, protons and neutrons. **[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

Starting from a stationary position, Rahul paddles his bicycle to attain a velocity of 6 ms^{-1} in 30 s. Then he applies brakes such that the velocity of the bicycle comes down to 4 ms^{-1} in the next 5 s. Calculate the acceleration of the bicycle in both cases.

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. i. Explain, why is it difficult to walk on sand? **[3]**

    ii. Why is the recoil of a heavy gun, on firing, not so strong as that of a light gun using the same cartridge?

32. There would be no plant life if chloroplasts did not exist. Justify. **[3]**

<div align="center">OR</div>

Who discovered cells, and how?

33. Differentiate between various types of muscular tissues. Draw appropriate diagrams. **[3]**

<div align="center">**Section D**</div>

34. i. Suppose the mass of the earth somehow increases by 10% without any change in its size. What would happen to your weight? **[5]**

    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?

<div align="center">OR</div>

    i. Write the formula to find the magnitude of the gravitational force between the earth and an object on the earth's surface.

    ii. Derive how does the value of gravitational force F between two objects change when

        a. distance between them is reduced to half and

        b. mass of an object is increased four times.

35. Write the main functions of atleast ten cell components. **[5]**

<div align="center">OR</div>

Differentiate between

    i. Cell wall and cell membrane.

    ii. Nuclear region of a bacterial cell and nuclear region of an animal cell.

    iii. Prokaryotic cell & eukaryotic cell.

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.

<div align="center">**Section E**</div>

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

The process of taking up a permanent shape, size, and a function is called differentiation. Differentiation leads to the development of various types of permanent tissues. A few layers of cells beneath the epidermis are generally simple permanent tissue. another type of permanent tissue is complex tissue. Complex tissues are made of more than one type of cells. All these cells coordinate to perform a common function. Xylem and phloem are examples of such complex tissues. Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres. Phloem is made up of five types of cells: sieve cells, sieve tubes, companion cells, phloem fibres and the phloem parenchyma.

i. Identify the type of cell in the given figure (1)
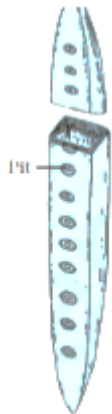
ii. Which part of desert plants reduces the loss of water? (1)

iii. What is the dead element present in the phloem? (2)

OR

Is cardiac muscle A involuntary muscle? (2)

38. **Read the following text carefully and answer the questions that follow:**   **[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? (1)

ii. When and how are drones produced? (1)

iii. What is bee bread? (2)

OR

Why worker bees are females but they do not lay eggs? (2)

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

Mixtures are constituted by more than one kind of pure form of matter. Sodium chloride is itself a pure substance matter. The solution is a homogeneous mixture of two or more substances. Lemonade, soda water etc. are all examples of solutions. Alloys are mixtures of two or more metals or a metal and a non-metal and cannot be separated into their components by physical methods. A solution has a solvent and a solute as its components. The component of the solution that dissolves the other component in it (usually the component present in a larger amount) is called the solvent. The component of the solution that is dissolved in the solvent (usually present in lesser quantity) is called the solute.
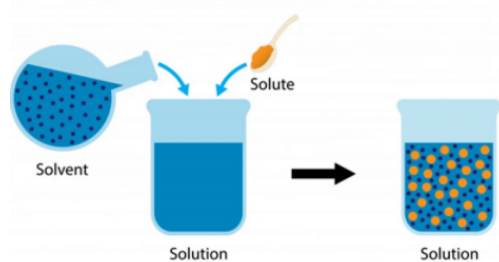
i. In a water-sugar solution: Identify solute and solvent? (1)

ii. What is the size of the particles of a solution? (1)

iii. What is pure substance? (2)

OR

What do you mean by Alloy? (2)

Solution

Section A

1.

(b) All (A), (B) and (C) are correct

Explanation:

A. During the change of state, given heat is used to change the state. So temperature remains same. AB and CD parts show constant temperature

B. BC part represents increase in temperature.

C. CD is water starts boiling and temperature remains the same during the conversion of water into steam.

2. **(a)** cisternae

Explanation: Golgi apparatus is a membrane-bound organelle of eukaryotic cells (cells with clearly defined nuclei) that is made up of a series of flattened, stacked pouches called cisternae. The Golgi apparatus is responsible for transporting, modifying, and packaging proteins and lipids into vesicles for delivery to targeted destinations.

3. **(a)** Negative

Explanation: If a moving body comes to rest, then its acceleration is negative, as it's velocity becomes zero. therefore the acceleration is also zero.

4. **(a)** the flowers available for nectar collection by the bees

Explanation: Pasturage is the availability of flowers to the bees for nectar and pollen collection. Pasturage is related to honey production because it determines the taste of honey and the quantity of honey.

5.

(b) Conduction of food

Explanation: The epidermis does not conduct the food to the various parts of the plant. Conduction of food is carried by phloem tissue.

6.

(c) ATP

Explanation: Adenosine triphosphate (ATP) is called as the energy currency of the cell. The energy produced by a cell during internal respiration is stored in the form of ATP molecules. ATP breaks into ADP and phosphate to produce energy during cellular processes.

7.

(b) $MSO_4.5H_2O$

Explanation: As the metal is divalent, the formula of hydrated sulphate will be $MSO_4 \cdot xH_2O$

To find the value of x:

0.10 mol of MSO_4 combines with 9 g of H_2O (i.e., 0.5 mol of water).

[$\because$ moles of $H_2O = \frac{9}{18}$ = 0.5]

$\therefore$ 1 mol of MSO_4 will combine with $\frac{0.5}{0.10}$ = 5 mol of water.

So, formula of sulphate is $MSO_4 \cdot 5H_2O$.

8.

(d) a and b consist of living cells while c consists of dead cells.

Explanation: In the given figure of plant tissues 'a' and 'b' represent parenchymatous and collenchymatous tissues respectively that are living tissues whereas figure 'c' represents sclerenchymatous tissue which comprises of dead cells.

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.

(d) $7.2 \text{ m}^{-1} \text{ S}^2$

Explanation: For motion with uniform acceleration a_1:

From $v = u + at$

$v = a_1 t_1$ ($\because u = 0$), $\therefore t_1 = \frac{v}{a_1}$ ...(i)

and from $s = ut + \frac{1}{2}at^2$,

Using eqn. (i)

$s_1 = \frac{1}{2} a_1 \left(\frac{v}{a_1} \right)^2 = \frac{v^2}{2a_1}$ ...(ii)

For motion with uniform retardation a_2:

From $v = u + at$

$v = a_2 t_2$ ($\because v = 0, u = v, a = -a_2$)

$t_2 = \left(\frac{v}{a_2} \right)$ ...(iii)

and from $s = ut + \frac{1}{2}at^2$

$s_2 = v\frac{v}{a_2} + \frac{1}{2}(-a_2) \cdot \frac{v^2}{a_2^2}$

$s_2 = \frac{v^2}{a_2} - \frac{v^2}{2a_2} = \frac{v^2}{2a_2}$ ...(iv)

Given, $s_1 + s_2 = 4$ km and $t_1 + t_2 = 4$ min, so using (ii) and (iv),

$\frac{v^2}{2} \left(\frac{1}{a_1} + \frac{1}{a_2} \right) = 4$ ...(v)

and $v \left(\frac{1}{a_1} + \frac{1}{a_2} \right) = 4$ ...(vi)

Dividing eqn. (v) by eqn. (vi), we get $v = 2$

Putting this in eqn. (vi),

$\frac{1}{a_1} + \frac{1}{a_2} = 2\frac{\min^2}{\text{km}} = \frac{2 \times 3600}{1000} \frac{s^2}{m}$

$= 7.2 \text{ m}^{-1} \text{ s}^2$

11.

(c) Ar, Ca are isobars and D, T, P are isotopes

Explanation: Elements having the same atomic number but different atomic masses are known as Isotopes.

Protium(Hydrogen) -1, Deuterium – 2, Tritium -3 are three isotopes of hydrogen.

Atoms having the same atomic mass and different atomic numbers are known as Isobars. Example Argon, Calcium.

12.

(d) Areolar connective tissue

Explanation: Areolar connective tissue is the simplest and most widely distributed connective tissue. Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves, and in the bone marrow.

13.

(b) Golgi apparatus

Explanation: Lysosomes are membrane bound vesicles that arise from the Golgi apparatus.

14.

(c) Agitating a detergent with water in a washing machine

Explanation: Detergent in water will form a mixture, others will not form a mixture.

15. **(a)** visible with a powerful microscope

Explanation: The size of particles of the colloidal solution lies between 10^{-7} cm to 10^{-4} cm in diameter. So, The particles of colloidal solutions are visible with a powerful microscope.

16. **(a)** High cost production
Explanation: High cost production

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.

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

Explanation: Almirah is rigid and has fixed shape. So, it is a solid at room temperature.

19.

(c) A is true but R is false.

Explanation: Parenchyma tissue consists of relatively unspecialized cells with thin cell walls. They are live cells. They are usually loosely packed so that large spaces between them.

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

Explanation: Both A and R are true and R is the correct explanation of A.

Section B

21. In case of a body moving along a circular path, the force (centripetal) is always along the radius while displacement is tangential.

Hence work done W = Fs cos 90° = 0 as angle between F and s is 90°.

OR

Sheet crumpled into a ball has small surface area as compared to the similar unfolded sheet. Therefore unfolded sheet will experience more friction due to air as compared to the sheet crumpled into a ball in spite of same force of gravity acts upon them. It is larger friction of air which slows down the unfolded sheet and therefore it falls slower as compared to sheet crumpled into a ball.

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. We see the lightning before we hear the thunder because light travels faster thansound. The light from the lightning travels to our eyes much quicker than the soundfrom the lightning. so we hear it later than we see it.

24. While melting ice absorbs latent heat of melting from the surroundings and gets changed into water that makes the cooling effect more intense as compared to water at same temperature.

25.   i. $m = 10g = \frac{10}{1000}kg$, $u = 10^3\,m/s$, $v = 0, s = \frac{5}{100}m$

$v^2 - u^2 = 2as$

$\Rightarrow 0 - (10^3)^2 = 2.a.\frac{5}{100}$

$\Rightarrow a = \frac{-1000 \times 1000}{2 \times 5} \times 100$

= -10^7 ms^{-2}

$\Rightarrow$ F = m.a = -10^5 N

  ii. $v = u + at$

$\Rightarrow 0 = (10^3)$ - 10^7t

$\Rightarrow 10^7$t = 10^3

$\Rightarrow t = \frac{10^3}{10^7} = 10^{-4}\,s$

OR

Let m be the mass of the body

Given : F = 40 N, a = 5 ms^{-2}

From the relation : F = ma we have 40 = m $\times$ 5

or m = $\frac{40}{5} = 8$kg

26.

J. J.Thomson Model of Atom	Rutherford's Model of Atom
1. Positive charge forms a kernel.	1. Nucleus (dense positive charge) is in the centre of the atom.
2. Electrons are present (embedded in positive charge) throughout the atom.	2. Electrons revolve around the nucleus in orbits.
3. No space inside the atom is empty. Thomson likened an atom to a	3. According to Rutherford, most of the space inside

pudding or a watermelon.	the atom is empty.

Section C

27. i. Sound is produced when a material body is made to vibrate with some mechanical energy. So, school bell is struck with a hammer to make it vibrate and thus the sound is produced.

    ii. The time taken by the signal to reach the bottom and come back is 4.8 s

    Speed of sound in water = 1500 m/s

    Depth of the ocean h

    $h = \frac{v \times t}{2}$

    $h = \frac{1500 \times 4.8}{2}$

    $h = 1500 \times 2.4$

    $h = 3600$ m

28.

Proton	Neutron	Electron
(i) It is positively-charged sub-atomic particle.	(i) It is neutral sub-atomic particle.	(i) It is negatively-charged sub-atomic particle.
(ii) Its mass is equivalent to a hydrogen atom i.e. 1 a.m.u	(ii) It mass is equal to the mass of a proton.	(ii) Its mass is 1/1838 of the mass of a proton.
(iii) It is present inside the nucleus of an atom.	(iii) It is also found inside the atomic nucleus.	(iii) It is found outside the nucleus of an atom.

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

    In the first case:

    Since body starts from stationary position,

    ∴ Initial velocity, u = 0

    final velocity, v = 6 ms^{-1}

    time, t = 30 s

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

    Substituting the given values of u, v, and t in the above equation. we get

    $a = \frac{(6ms^{-1} - 0ms^{-3})}{30s}$

    = 0.2 ms^2

    In the second case:

    initial velocity, u = 6 ms^{-1}

    time, t = 5 s

    Then. $a = \frac{(4ms^{-2} - 6ms^{-2})}{5s}$

    = -0.4 ms^{-2}

    The acceleration of the bicycle in the first case is 0.2 ms^{-2} and in the second case, it is –0.4 ms^{-2}

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. While walking on sand, the sand gets pressed down, impacting less reaction force on the person.

    ii. The mass of the heavy gun is higher. So, its recoil velocity is less.

32. Chloroplasts contain the pigment chlorophyll which is responsible for food preparation in plants by the process of photosynthesis. Hence, if there were no chloroplasts then there would not have been any plant life.

    OR

In 1665, an English scientist named Robert Hooke discovered cells. He saw honey comb like structure while observing thin slice of cork under his self-designed microscope.

33.

| Types	Striated Muscles	Unstriated Muscles	Cardiac Muscles
Structure	These are made up of long, cylindrical, unbranched and multinucleate cells. These show alternate light and dark striations.	These muscles are made up of long uninucleate cells with pointed ends.	These are made up of cells, which are cylindrical, branched and uninucleate.
Striations	They show alternate light and dark bands or striations.	These do not show striations.	These muscles show faint striations.
Site/Location	These are located in limbs and are mostly attached to bones to help in body movement.	These are mostly present in the walls of the alimentary canal. blood vessels, ureters, bronchi of the lungs and in the iris of eyes.	These are present only in the walls of the heart.

i. Striated muscle
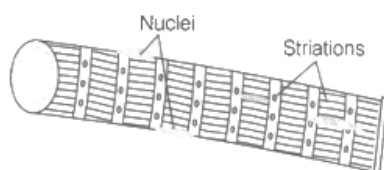
ii. Smooth muscle
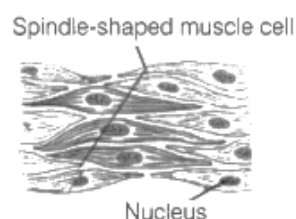
iii. Cardiac muscle
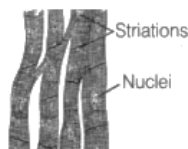
Section D

34. 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

∴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

OR

i. Formula to find the magnitude of gravitational force:

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

where, M = mass of the earth

m = mass of the object

R = distance between centres of the earth and an object.

and universal gravitational constant, $G = 6.67 \times 10^{-11}$ N-m^2/kg^2

   ii.   a. Let gravitational force be F when the distance between them is R,

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

Now, when the distance reduces to half,

$F' = \frac{GMm}{\left(\frac{R}{2}\right)^2} = \frac{4GMm}{R^2} = 4F$

i.e. the force of gravitation becomes 4 times the original value.

   b. When the mass becomes 4 times,

$F' = \frac{GM(4m)}{R^2} = 4F$

i.e. the force of gravitation becomes 4 times the original value.

35. The ten cell components are:

  i. **Plasma membrane:** It acts as a semipermeable membrane and allows only selective substances to pass through it.

  ii. **Chromosomes:** To carry hereditary characters of an organism from one generation to another.

  iii. **Lysosomes:** Breakdown of unwanted macromolecules is the main function of these organelles.

  iv. **Ribosomes:** These help in protein synthesis.

  v. **Nucleus:** Control centre of the cell. It contains cellular DNA (genetic information) in the form of genes.

  vi. **Mitochondria:** The main function of mitochondria in aerobic cells is the production of energy by the synthesis of ATP.

  vii. **Nucleolus:** Biosynthesis of ribosomal RNA (rRNA) and acts as a platform for protein synthesis.

  viii. **Cell wall:** It provides protection and rigidity to the plant cell.

  ix. **Chloroplasts:** These are the sites of photosynthesis within plant cells.

  x. **Endoplasmic reticulum:** Serves as channels for transport of materials.

OR

i.

Cell wall	Cell membrane
It is present in bacteria, fungi, and plant cells. It is absent in animal cells and protozoans.	It is present in all cells.
There is no other name of the cell wall.	The cell membrane is also known as the plasma membrane or plasmalemma.
The cell wall is completely permeable.	The cell membrane is semi-permeable.
The cell wall is made up of cellulose.	The cell membrane is made up of lipids and proteins.

ii.

Nuclear region of bacterial cell	Nuclear region of an animal cell
Smaller in size.	Larger in size.
The nuclear membrane is absent, the nucleolus is absent. The nucleus is regarded as the nucleoid.	Nuclear membrane with nucleolus present.

iii.

Prokaryotic cell	Eukaryotic cell
The size of a cell is generally small.	The size of a cell is generally large.
The true nucleus is absent.	The true nucleus is present.
It contains a single chromosome.	Contains more than one chromosome.
Membrane-bound cell organelles absent.	Membrane-bound cell organelles present.

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. i. Tracheids

    ii. Cuticles reduce the loss of water.

    iii. Phloem fibres

    OR

    Yes, the muscles whose functioning cannot be controlled are called involuntary muscles.

38. 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. i. Water is solvent and sugar is solute.

    ii. 1 nm in diameter

    iii. Pure substances are substances that are made up of only one kind of particle and have a fixed or constant structure.

    OR

    The meaning of the term 'alloy' is a substance formed from the combination of two or more metals. Alloys can also be formed from combinations of metals and other elements. ex- steel.