Class IX Session 2024-25
Subject - Science
Sample Question Paper - 1

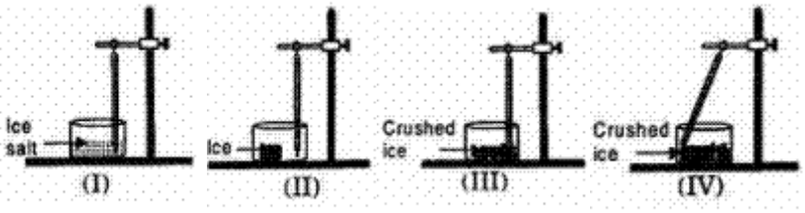
Time Allowed: 3 hours **Maximum Marks: 80**

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. 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. Engulfing of food materials or foreign bodies by cells like Amoeba is called: **[1]**

a) plasmolysis b) diffusion

c) osmosis d) endocytosis

3. Which of the following gives both direction and magnitude? **[1]**

a) Unit Scalar b) Scalar

c) Unit Vector d) Vector

4. Which of the following is the fastest growing carp? **[1]**

a) Singhara b) Rohu

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c) Mrigal

d) Catla

5. Nerve cell does not contain **[1]**

a) axon

b) nerve endings

c) dendrites

d) tendons

6. Which of the following is correct for the given figure? **[1]**

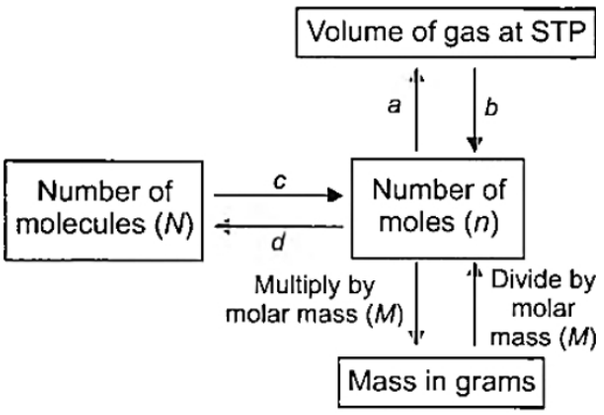
a) The parts labelled ‘a’, ‘b' and ‘c’, all possess photosynthetic pigments such as chlorophyll.

b) The part labelled ‘a’ is the site of dark reaction.

c) The part labelled ‘c’ is called granum.

d) The part labelled ‘b’ is called intergranal thylakoid.

7. What are a and b? **[1]**



a) a = divide by 22.4 L, b - multiply by 22.4 L

b) a = divide by 22.4 L, b = divide by 22.4 L

c) a = multiply by 22.4 L, b = multiply by 22.4 L

d) a = multiply by 22.4 L, b = divide by 22.4 L

8. Smooth muscle consists of _____ filaments that are not arranged into sarcomeres giving it a non-striated pattern. **[1]**

a) plain and large

b) curved and large

c) thick and thin

d) long and straight

9. The position of the water level, in a measuring cylinder, before and after immersing a solid in it, are as shown in the figure given below. The volume of the given solid (in cm^3) is : **[1]**

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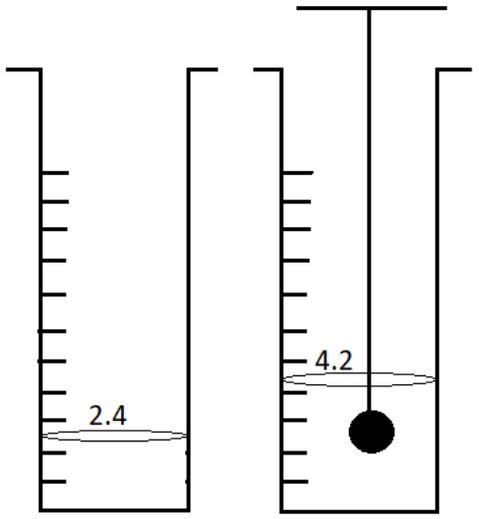

a) 2.2

b) 1.8

c) 4.2

d) 6.6

10. The speed of a train increases at a constant rate a from zero to v, and then remains constant for an interval, and finally decreases to zero at a constant rate p. If L be the total distance travelled, then the total time taken is **[1]**

a) $\frac{L}{v}+\frac{1}{v}\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$

b) $\frac{L}{v}+\frac{v}{2}\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$

c) $\frac{L}{v}+\frac{2}{v}\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$

d) $\frac{L}{v}+2v\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)$

11. If K, L, M, N, shells of an atom are full. The total number of electrons in that atom are: **[1]**

a) 26

b) 36

c) 60

d) 42

12. To prepare a mount of human cheek cell, the sample is collected from: **[1]**

a) outer side of cheek with a blade

b) inner side of cheek with a toothpick

c) inner side of cheek with a blade

d) outer side of cheek with a toothpick

13. Plasmolysis in a plant cell is defined as **[1]**

a) shrinkage of nucleoplasm

b) shrinkage of cytoplasm in hypertonic medium

c) break down (lysis) of plasma membrane in hypotonic medium

d) shrinkage of nucleolus

14. A change is said to be a physical change when **[1]**

a) No energy change occurs

b) All statements are correct

c) The change can be easily reversed

d) No new substances are formed

15. Select the correct statement(s). **[1]**

i. A solution in which size of the solute particles is about 10^{-10} m, is called true solution.

ii. A solution which contains maximum possible amount of solute at any given temperature is called a saturated solution.

iii. In suspension, the size of particles is of the order of 10^{-7} m or larger.

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iv. A colloid is a heterogeneous system.

a) I, II, III and IV
b) I and II only
c) III and IV only
d) I, III and IV only

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

a) Ammonification
b) Nitrification
c) Eutrophication
d) Phyto-enrichment.

17. **Assertion (A):** A boy is enjoying a ride on a merry-go-round which is moving at a constant speed of 10 m/s. The boy is in uniform accelerated motion. **[1]**

Reason (R): A body has a uniform acceleration if it travels in a straight line and its velocity first decreases then increases by equal amounts in equal intervals of time.

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

18. **Assertion (A):** Solids do not diffuse in air. **[1]**

Reason (R): The particles are closely packed in solids.

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):** Vessel and sieve tubes both are meant for transport purposes. **[1]**

Reason (R): Vessels are lignified.

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):** Atom is electrically neutral. **[1]**

Reason (R): A neutral particle, neutron is present in the nucleus of atom.

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. What is the work done by the force of gravity on a satellite moving round the earth? Justify your answer. **[2]**

OR

A boy of mass 40 kg runs up flight of 50 steps each 10 cm high in 5 second. Find

i) the work done by the boy ii) the power developed. ($g = 9.8\ ms^{-2}$)

22. Why do substance undergo change in physical state? **[2]**

23. When vertically jerk is given to a string, transerve waves are formed. Give three features of these waves. **[2]**

24. For any substance, why does the temperature remain constant during the change of state? **[2]**

25. Why do the driver and the person seated in front seat need a seat belt? **[2]**

OR

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A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of the lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice?

26. Helium atom has atomic mass of 4u and has two protons in its nucleus. How many neutrons does it have? **[2]**

Section C

27. Draw a curve showing density or pressure variations with respect to distance for a disturbance produced by sound. Mark the position of compression and rarefaction on this curve. Also, define wavelengths and time period using this curve. **[3]**

28. Composition of the nuclei of two atomic species X and Y are given as under**:** **[3]**

	X	Y
Protons	6	6
Neutrons	6	8

Give the mass numbers of X and Y. What is the relation between the two species?

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

a. position - time graph

b. velocity - time graph

c. Acceleration- time graph

OR

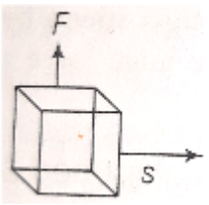
A particle moves in a circle with O as centre and AO = OB = 5 cm, radius, as shown in the figure. It starts from A. Calculate.

a. the distance covered, and

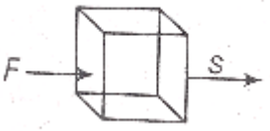
b. the displacement, when it reaches B.

30. In each of the following, a force F is acting on an object of mass m. The direction of displacement is from West to east shown by the longer arrow. Observe the figure carefully and state whether the work done by the force is negative, positive or zero. **[3]**

i.



ii.



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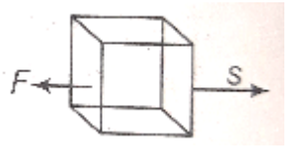
iii. 

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

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

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

32. Differentiate between active and passive transport. **[3]**

OR

How can you calculate the magnification of a microscope?

33. Draw well-labeled diagrams of various types of muscles found in the human body. **[3]**

Section D

34. i. At some moment, two giant planets Jupiter and Saturn of the solar system are in the same line as seen from the earth. Find the total gravitational force due to them on a person of mass 50 kg on the earth. Could the force due to the planets be important? **[5]**

Mass of the Jupiter = 2×10^{27} kg

Mass of the Saturn = 6×10^{26} kg

The distance of Jupiter from the earth = 6.3×10^{11} m

The distance of Saturn from the earth = 1.28×10^{12} m

ii. A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then will it weigh the same or more or less. Give a reason for your answer.

OR

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

a. g on the moon

b. mass of person on the moon

c. weight of person on the earth

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

35. What are cell organelles? Write the names of different cell organelles. **[5]**

OR

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

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

36. i. Distinguish among the true solution, suspension and colloid in a tabular form under the following heads: **[5]**

a. Stability

b. Filterability

c. Type of mixture

ii. Give the expression for the concentration of a solution. How will you prepare a 10% solution of glucose by mass in the water?

Section E

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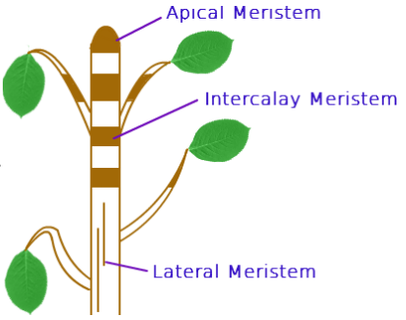
37. **Read the following text carefully and answer the questions that follow:** **[4]**

The tissue is a group of cells having similar origin, structure& function. Study of tissues is called Histology. In unicellular organism (Amoeba) single cell performs all basic functions, whereas in multi-cellular organisms (Plants and Animals) shows division of labour as Plant tissue & Animal tissues. Plant tissues are two types: Meristematic & Permanent tissue.



Meristematic tissue: The meristems are the tissues having the power of cell division. It is found on that region of the plant which grows.

Following are the types of Meristems:

The Apical meristems- It is present at the growing tip of the stem and roots and increases the length.

The lateral meristems- It present at the lateral side of stem and root (cambium) and increases the girth.

The intercalary meristems- It present at internodes or base of the leaves and increases the length between the nodes.

i. Which tissue help in the secondary growth of the plant? (1)

ii. In what region of the plant does intercalary meristematic growth occur? (1)

iii. Where does meristematic tissue mostly found in a plant? (2)

OR

Why cambium is called lateral meristem? (2)

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

The practice of keeping or rearing, caring, and management of honey bee on a large scale for obtaining honey and wax is called apiculture. The place where bees are raised is called an apiary. Bee-keeping requires low investment and generates additional income, hence it is done by farmers along with agriculture.

Following are the Honey bee varieties that are used for bee-keeping as follows:

Indigenous varieties	**Exotic varieties**
Apis cerana indica (Indian bee)	Apis mellifera (Italian bee)
Apis dorsata (Rock bee), Apis florae (Little bee)	Apis adamsoni (South African bee)

i. Why bee keeping should be done in good pasturage? (1)

ii. Does honey bee help in pollination? Which type of flowers attracts the honey bee? (1)

iii. Mention the products obtained from the honey bee. (2)

OR

What is the best season to start beehive? (2)

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

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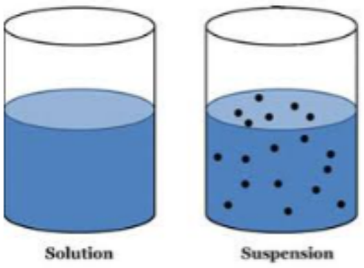
A suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Particles of a suspension are visible to the naked eye. The particles of a suspension scatter a beam of light passing through it and make its path visible. Due 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? (1)

ii. Differentiate between Homogeneous and Heterogeneous mixture? (1)

iii. What is emulsion? (2)

OR

Give an example of solid sol? (2)

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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.

(d) endocytosis

Explanation: The cell membranes flexibility allows the cell engulf in food and other material from its external environment. This process is known as endocytosis.

3.

(d) Vector

Explanation: Any quantity that needs to be fully described by identifying its magnitude and direction is referred to as a vector quantity. By magnitude, we mean the size of the quantity, such as length or strength. By direction, we mean where the vector is pointing or where it is being directed, such as left or right, north, south, east, or west, or even up or down.

4.

(d) Catla

Explanation: Catla is the fastest growing Indian major carp species and widely distributed throughout India, Nepal, Pakistan, Burma, and Bangladesh.

5.

(d) tendons

Explanation: Each nerve cell or neuron Is composed of three parts

i. Cyton or cell body It contains central nucleus and cytoplasm with characteristic deeply stained particles called Nissl's granules (i.e., clumps of ribosome).

ii. Dendron These are short processes arising from cyton and further branching into dendrites.

iii. Axon It is a single long cylindrical process of uniform diameter which forms fine branches terminally. The dendrites receives impulses and the axon takes impulses away from the cell body.

6.

(b) The part labelled 'a' is the site of dark reaction.

Explanation: The given figure is of chloroplast. The part labelled 'a' is stroma. The part labelled 'b' is called grana where light reaction of photosynthesis takes place. The part labelled 'c' is intergranal thylakoid. Photosynthetic pigments such as chlorophyll are present only in thylakoid membranes (grana + intergranal thylakoids) and not in stroma or nongranal thylakoids.

7.

(d) a = multiply by 22.4 L, b = divide by 22.4 L

Explanation: Volume of gas at STP = No. of moles $\underbrace{\times 22.4\ \text{L}}_{a}$

No. of moles = Volume of gas at STP $\underbrace{\div 22.4\ \text{L}}_{b}$

8.

(c) thick and thin

Explanation: Smooth muscle consists of thick and thin filaments that are not arranged into sarcomeres giving it a non-striated pattern.

9.

(b)

1.8

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Explanation: Volume of block = change in level by volume = (4.2 – 2.4) = 1.8 cm^3

10.

(b) $\frac{L}{v} + \frac{v}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

Explanation: Velocity increases from 0 to v:

We know that v = u + at

Here, u = 0, v = v, a = α $\therefore$ t = $\frac{v}{\alpha}$

and s = ut + $\frac{1}{2}$ at^2; $s_1 = \frac{v^2}{2\alpha}$

Velocity decreases from v to 0:

Here, u = v, v = 0, a = -β

Using v = u + at

$\Rightarrow$ t = $\frac{v}{\beta}$

and s = ut + $\frac{1}{2}at^2$; $s_2 = \frac{v^2}{2\beta}$

So, distance travelled during acceleration and retardation,

d = $s_1 + s_2 = \frac{v^2}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

Thus, distance travelled during constant velocity

$S_3 = L - \frac{v^2}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

So, time taken to travel this distance

$t = \frac{L - \frac{v^2}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)}{v} = \frac{L}{v} - \frac{v}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

Hence, total time taken to cover distance L

$= \left(\frac{v}{\alpha}\right) + \left[\frac{L}{v} - \frac{v}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)\right] + \left(\frac{v}{\beta}\right)$

$= \frac{L}{v} + \frac{2}{v}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

11.

(c) 60

Explanation: Maximum number of electrons in K-shell i.e. 1st shell = 2

Maximum number of electrons in L-shell = 8

Maximum number of electrons in M-shell = 18

Maximum number of electrons in N-shell = 32

2 + 8 + 18 + 32 = 60

12.

(b) inner side of cheek with a toothpick

Explanation: While preparing a mount of human cheek cell, the sample is collected from the inner side of the cheek using a toothpick, which will collect some cheek cells.

13.

(b) shrinkage of cytoplasm in hypertonic medium

Explanation: Plasmolysis is mainly known as shrinking of cell membrane in hypertonic solution and great pressure.

14.

(b) All statements are correct

Explanation: Some of the characteristics of a physical change are:

i. Temporary in nature.
ii. No energy change occur.
iii. Does not affect the internal structure of a substance, only the molecules are rearranged.
iv. No new substance is formed.

So all statements are correct.

15. **(a)** I, II, III and IV

Explanation: I, II, III and IV

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16.

(c) Eutrophication

Explanation: The enrichment of water bodies with nutrients leading to excessive growth of phytoplankton is called **Eutrophication**. **Eutrophication** or more precisely **hypertrophication**, is the enrichment of a water body with nutrients, usually with an excess amount of nutrients. This process induces the growth of plants and algae and due to the biomass load, may result in oxygen depletion of the water body.

Eutrophication is an enrichment of water by nutrient salts that causes structural changes to the ecosystem such as increased production of algae and aquatic plants, depletion of fish species, general deterioration of water quality, and other effects that reduce and preclude use. Eutrophication is almost always induced by the discharge of phosphate-containing detergents, fertilizers, or sewage into an aquatic system.

17.

(c) A is true but R is false.

Explanation: A body has a uniform acceleration if it travels in a straight line and its velocity increases by equal amounts in equal intervals of time.

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

Explanation: As the particles of solids are closely packed, there exist strong forces of attraction between the particles. Hence, solids do not diffuse in air.

19.

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

Explanation: The vessel is a long-distance channel for water transport. A Sieve tube is a long-distance channel for the transport of organic nutrients. The wall of the vessel is lignified. Lignification is absent in sieve tubes.

20.

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

Explanation: Atom is electrically neutral because the number of protons (positively charged particle) is equal to the number of electrons (negatively charged particle).

Section B

21. When a satellite moves around the Earth in a circular path, then the force of gravity acts on it directed towards the centre. The motion of the satellite is in the horizontal plane. Therefore, the force of gravity of Earth on the satellite and the direction of motion of satellite are perpendicular to each other. Therefore, net work done = Fs cos 900 = 0. That is, the work done by the force of gravity on a satellite moving around the Earth is zero.

OR

The boy has to overcome the force of gravity. Hence force of gravity on the boy

F = mg = 40 × 9.8 = 392 N

Total distance covered s = 50 × 10 = 500 cm = 5 m

i) Work done by the body in climbing = force × distance = W = 392 × 5 = 1960 J

ii) Power developed = $\frac{W}{t} = \frac{1960}{5}$ = 392 W

22. Substance undergo change in physical state because both inter-particle spaces and inter-particle forces can be changed by changing the conditions of temperature and pressure.

23. Three features of transverse waves are:

i. The particles of the medium vibrate at right angles to the direction of propagation of the wave.

ii. Transverse waves travel in the form of crests and troughs.

iii. They cannot travel through a vacuum.

24. Once the change of state of a substance begins or starts, the energy which is now supplied is being used up as latent heat. It means that it does not increase the kinetic energy of the particles and is used up only to bring about a change in state. Therefore the temperature becomes constant. Once the state is changed, the kinetic energy starts increasing.

25. In a car accident, a fast running car stops suddenly. Due to this the car's large momentum is reduced to zero in a very short time. The stretchable seat belts tightened by the passengers of the car increases the time taken by the passengers to fall forward. Due to long time, the rate change of momentum of passengers is reduced and hence less stopping force acts on them. So, the passengers may either not get injured at all or may get less injuries. It is obvious that seat belts reduce the passengers' momentum more gently and hence prevent injuries.

OR

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Mass of stone (m) = 1 kg

Initial velocity of stone (u) = 20 ms^{-1}

Final velocity of stone (v) = 0

Distance covered by the stone (s) = 50 m

Acceleration of stone (a) = ?

Force acting on the stone due to friction (F) =?

We know;

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

$(0)^2 - (20)^2 = 2a \times 50$

$- 400 = 100\ a$

$a = \frac{-400}{100} = -4$

$a = -4\ ms^{-2}$

Force of friction (F) = ma

$= 1 \times (-4)$

$= -4\ N$

Negative sign signifies that force of friction is acting in the direction opposite to the direction of motion of the stone.

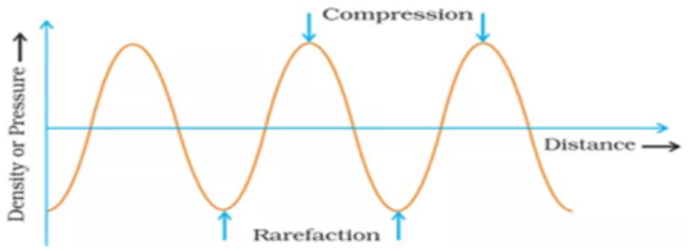
26. Mass number of helium is equal to its atomic mass but has no units.

$\therefore$ Mass number (A) of helium = 4

No. of protons in the nucleus = 2

Number of neutron = Mass number – number of proton = 4– 2 = 2

Section C

27. 

Wavelength is the distance between two consecutive compressions or two consecutive rarefactions of a wave sound. Wavelength is represented by the Greek letter λ (lambda). The SI unit of wavelength is metre (m).

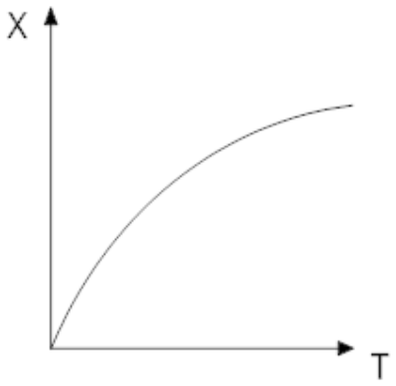
Time period is the time taken to travel the distance between any two consecutive compression or rarefaction from a fixed point. The time period of a sound wave is represented by letter 'T'. The SI unit of time period is second (s).

28. The mass number of X = Number of protons + Number of neutrons = 6 + 6 = 12

The mass number of Y = Number of protons + Number of neutrons = 6 + 8 = 14

Since the number of protons (6) in the two species is the same and the atomic mass of the two species is different (12 and 14), the given atomic species are isotopes of the same element (with atomic number Z = 6).

29. i. Position – time



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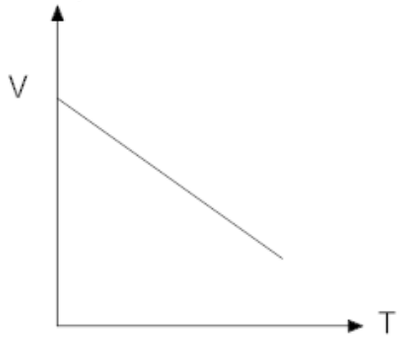
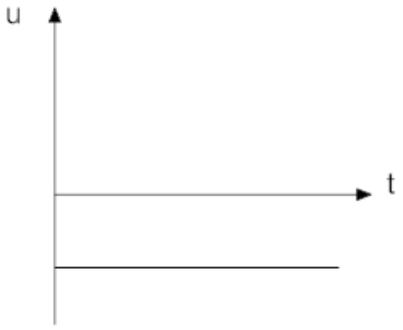
ii. Velocity – time



iii. Acceleration- time



OR

a. Distance covered $= \pi \times OA = \pi \times 5 = 5\pi cm$

b. Displacement $= 2 \times OB$

$= 2 \times 5 = 10cm$ along AB

30. In Fig. (i), the angle between F and S is 90°, so work done is zero.

In Fig. (ii), the angle between F and S is 0°, so work done is positive.

In Fig. (iii), the angle between F and S is 180°, so work done is negative.

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

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

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

32.

Active transport	Passive transport
1. It involves movement of molecules against the concentration gradient. 2. It requires energy in the form of ATP molecules. 3. It is a rapid movement. 4. Movement of large molecules occur by active transport.	1. It involves movement of molecules along the concentration gradient. 2. No energy is required 3. It is a slow movement. 4. Small molecules or water molecules only are transported passively.

OR

Mangnification of a microscope is calculated by multiplying the powers of eyepiece and objective lenses.

Mathematically, $M = P_1 \times P_2$, where P_1 is the power of eyepiece and P_2 is the power of objective.

33. The three main types of muscular tissues found in the human body are:

i. Skeletal (striated) muscle tissue

ii. Smooth (Non-striated) muscle tissue

iii. Cardiac muscle tissue.

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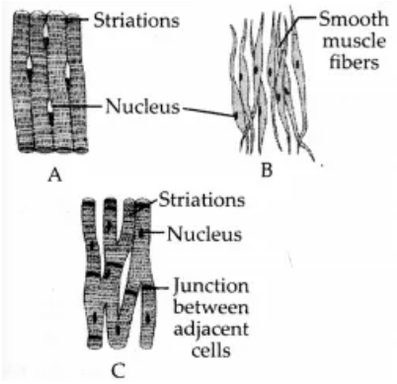
The well-labelled diagrams of these tissues are as follows:



A. Skeletal muscle tissue.

B. Smooth muscle tissue

C. Cardiac muscle tissue

Section D

34. i. a. Gravitational force acting on the 50 kg,

$F = mg = 50 \times 9.8 = 490$ N

b. Gravitational force acting on the 50 kg mass due to jupiter,

$$F_{Jupiter} = \frac{G \times M_{jupiter} \times M_{person}}{(\text{distance of jupiter from the earth})^2}$$

$$F_{Jupiter} = \frac{6.67 \times 10^{-11} \times 2 \times 10^{27} \times 50}{6.3 \times 10^{11} \times 6.3 \times 10^{11}}$$

$F_{Jupiter} = 1.68 \times 10^{-5}$ N

c. Gravitational force acting on the 50 kg mass due to saturn

$$F_{saturn} = \frac{G \times M_{saturn} \times M_{person}}{(\text{distance of saturn from the earth})^2}$$

$$F_{saturn} = \frac{6.67 \times 10^{-11} \times 6 \times 10^{26} \times 50}{1.28 \times 10^{12} \times 1.28 \times 10^{12}}$$

$F_{saturn} = 1.12 \times 10^{-6}$ N

$\therefore$ Total gravitational force due to the Jupiter and the Saturn = $(1.68 \times 10^{-5} + 1.12 \times 10^{-6}) = 1.8 \times 10^{-5}$ N

Thus, the combined force due to the planets Jupiter and Saturn (1.8×10^{-5}) N is negligible as compared to the gravitational force i.e. 490 N due to the earth.

ii. We know that g at the equator is less than g at poles (Antarctica). Thus, weight at the equator is less than weight at the pole (Antarctica). A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then it will weigh more due to the greater value of g.

OR

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

i. a. g on the moon is given by

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

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

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

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

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

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

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

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

Equating (i) and (ii) we get,

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

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

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35. Cell organelles are the intracellular structures present in the cytoplasm. Various cell organelles are –
    1. Mitochondrion – It produces energy
    2. Endoplasmic reticular – synthesize lipids and proteins
    3. Golgi apparatus - Storage, packaging and dispatch various substances.
    4. Lysosomes – Digest intracellular substances
    5. Ribosomes – Synthesize proteins
    6. Vacuoles – Provide turgidity and store house of various organic substances

OR

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

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

36. i. Distinctions between true solution, suspension and colloid are:

Property	Solution	Suspension	Colloid
Stability	It is stable. Constituting particles do not settle down on keeping undisturbed.	It is unstable. Constituting particles settle down on keeping undisturbed.	It is quite stable. Constituting particles do not settle down on keeping undisturbed.
Filterability	Particles cannot be separated by filtration. Means passes through filter paper.	Particles are large, so they can be easily separated by ordinary filtration. Means do not pass through filter paper.	It cannot be separated by ordinary filter paper but can be separated by ultrafiltration. Means passes through filter paper.
Type of mixture	Homogeneous	Heterogeneous	Heterogeneous but appears to be homogeneous.

ii. Concentration is defined as the number of moles (amount of substance) per unit volume (often liters/ dm^3)

The methods by which the concentration of a solution can be expressed are:

a) Mass by mass% of solution = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

b) Mass by volume % of solution = $\frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100$

Thus, a 10 percent solution of glucose can be prepared by dissolving 10 g of glucose in 90 g of water.

Section E

37. i. Cambium tissue help in the secondary growth of the plant.

ii. Between mature tissue segments, intercalary meristematic growth occurs.

iii. Meristematic tissues are mostly found at the apices of root and shoot.

OR

The cambium is called the lateral meristem because it increases the girth of the axis.

38. i. Bees need quality nectar to produce honey. A good pasturage consists of plenty of flowers that can be used by bees to get quality nectar. This increase the quality as well as the quantity of the bees. If bees are confined to only a single variety of flowers for nectar honey quality will have a similar taste and consistency. Most farmers make honey obtained from single nectar.

ii. Yes, honey bee helps in pollination. The bright-coloured flowers attract the honey bee.

iii. Besides honey, other products of bee-keeping are bee wax, bee venom, propolis, and royal jelly.

OR

Spring season is best to start a beehive.

39. 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.

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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.

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