CBSE Class 09 Science

Sample Paper 07 (2020-21)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
ii. Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
iii. Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.
iv. Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.
v. (v) Section–D – question no. - 34 to 36 are long answer type questions carrying 5 marks each. Answers to these questions should be in the range of 80 to 120 words.
vi. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
vii. Wherever necessary, neat and properly labeled diagrams should be drawn.

Section A

1. State law of conservation of Mass?

OR

Molecular mass of water is 18 u. What will be the number of molecules of water in 18 g water?

2. A shining thick liquid is often used in glass thermometers. Name it.
3. The organelle which is absent in kidney cells is:

a. Centrioles
b. Chloroplast
c. Plasma membrane
d. Mitochondria

4. Is the plant cell wall living or dead?
5. When a body moves on a flat surface, will its speed change?
6. Which cell organelle controls most of the activities of the cell?

OR

Why is nucleus called director of the cell?

7. What do you mean by immune system?
8. What is the valency of calcium is $CaCO_3$?
9. Name two elements which exist in liquid state at room temperature.

OR

To the already prepared solution of a 'solute A' prepared in water, a small amount of 'A' is added. However, it does not dissolve. What does it indicate?

10. Name the organelle which shows the analogy as storage sacs of the cell.
11. The reference point from which the distance of a body is measured is called?

OR

What does speedometer of a bus or a car measure?

12. Two objects of masses m_1 and m_2 are dropped in vacuum from a height above the surface of the earth (m_1 is greater than m_2). Which one will reach the ground first and why?
13. Plot a graph between force applied on a body and the acceleration produced in the given mass, assuming that the magnitude of force it constantly changing.
14. **Assertion:** The meristematic cells are compactly arranged and do not contain any intercellular space between them.
    Reason: They contain few vacuoles or no vacuoles at all.
    a. Both A and R are true and R is the correct explanation of assertion.

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

15. **Assertion:** In a cricket match, when a cricket ball is hit by a bat, then the direction of the cricket ball changes.
Reason: It shows that a force can change the shape and size of a moving body.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

OR

Assertion: If the resultant of all the forces acting on a body is zero, then the forces are called balanced forces.
Reason: The forces acting on a stationary box is an example of balanced forces.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

16. **Assertion:** Rutherford postulated that the atom must contain large empty spaces.
Reason: He concluded that the positively charged particles in an atom must be concentrated in a very small space.
a. Both A and R are true and R is the correct explanation of assertion.
b. Both A and R are true but R is not the correct explanation of assertion.
c. A is true but R is false.
d. A is false but R is true.

17. **Read the passage and answer any four questions:**
Lavoisier noted that compounds composed of two or more elements and each such compound had the same elements in the same proportions. Such as ammonia, nitrogen and hydrogen are always present in the ratio 14:3 by mass. British chemist John Dalton provided the basic theory about the nature of matter. Dalton's atomic theory provided an explanation for the law of conservation of mass and the law of definite proportions The postulates of Dalton's theory are all matter is made of very

tiny particles. Atoms are indivisible particles, Atoms of a given element are identical in mass and chemical properties, atoms of different elements have different masses and chemical properties, atoms combine in the ratio of small whole numbers to form compounds.

i. Which postulate of Dalton's atomic theory is a result of the low conservation of mass?
   a. Atoms cannot be created or destroyed in a chemical reaction.
   b. Atoms of different elements have different masses and chemical properties
   c. Atoms combine in the ratio of small whole numbers to form a compound
   d. The relative number and kinds of atoms are constant in a given compound

ii. Law of constant proportion is given by:
   a. Proust
   b. Lavoisier
   c. Dalton
   d. Berzelius

iii. All matter is made of very tiny particles called
   a. molecule
   b. atom
   c. compound
   d. none of these

iv. Which of the following reason correctly justifies that **water is the compound**?
   a. Water composed of two different elements, hydrogen and oxygen which can not be separated by physical methods
   b. In water, the physical and chemical properties of hydrogen and oxygen are

entirely different from properties of water

c. Both (a) and (b)

d. None of these

v. In water compound, the ration of the mass of hydrogen to the mass of Oxygen is always

a. 1:3

b. 1:4

c. 1:9

d. 1:8

18. **Read the passage and answer any four questions:**

Diseases, where microbes are the immediate causes, are called infectious diseases. This is because the microbes can spread in the community, and the diseases they cause will spread with them. Organisms that can cause disease are found in a wide range of such categories of classification. Some of them are viruses, some are bacteria, some are fungi, some are single-celled animals or protozoans. Some diseases are also caused by multicellular organisms, such as worms of different kinds. Members of each one of these groups – viruses, bacteria, and so on – have many biological characteristics in common. Common examples of diseases caused by viruses are the common cold, influenza, dengue fever, and AIDS. Diseases like typhoid fever, cholera, tuberculosis, and anthrax are caused by bacteria.

i. Which of the following factor is not responsible for high blood pressure.

a. Healthy lifestyle

b. Excessive weight

c. Lack of exercise

d. Stress

ii. Identify the following figure.

a. Picture of staphylococci
b. Picture of Trypanosoma
c. Picture of Leishmania
d. Picture of SARS

iii. Malaria and kala-azar are caused by
a. protozoan
b. bacteria
c. virus
d. fungi

iv. Which of the following organism is responsible for sleeping sickness
a. Staphylococci
b. Trypanosoma
c. Leishmania
d. SARS

v. Which of the following disease isn't caused by bacteria
a. Anthrax
b. Typhoid
c. Tuberculosis
d. Malaria

19. **Read the passage and answer any four question**

A more powerful vehicle would complete a journey in a shorter time than a less powerful one. The speed with which these vehicles change the energy or do work is a basis for their time to complete the journey. Power measures the speed of work done, that is, how fast or slow work is done. The power of an agent may vary with time. This means that the agent may be doing work at different rates at different intervals of time. If this machine is used continuously for one hour, it will consume 1 kW h of energy. Thus, 1 kW h is the energy used in one hour at the rate of 1000 J s^{-1}s-1. The energy used in households, industries, and commercial establishments are usually expressed in kilowatt-hour.

i. SI unit of power is
a. watt
b. joule
c. newton

d. meter

ii. Power is defined as

a. the rate of doing work

b. the rate of transfer of energy

c. both (a) and (b)

d. neither (a) nor (b)

iii. 1 watt is equal to work at the rate of

(I) 1 joule per second

(II) 1 joule per hour

(III) 1 joule per minute

(IV) 4 joule per hour

Choose the correct option among the following

a. Only (I)

b. (I) and (IV)

c. (II) and (III)

d. (II) and (IV)

iv. An electric bulb of 60 W is used for 6 h per day. Calculate the 'units' of energy consumed in one day by the bulb.

a. 0.76 unit

b. 0.36 unit

c. 0.98 unit

d. 0.76 unit

v. Which of the following statement are incorrect

(I) A bird sitting on tree possess potential energy only

(II) A stationary object may have energy

(III) A flying bird has kinetic energy only

(IV) An aero plane running on the run- way possess kinetic & potential energy both

a. III and IV

b. I and III

c. II and III

d. II and IV

20. **Read the passage and answer any four questions:**

Leeuwenhoek discovered the free-living cells in pond water for the first time. Robert Brown discovered the nucleus in the cell. A single cell may constitute a whole organism as in Amoeba. These organisms are called unicellular organisms. On the other hand, many cells group together in a single body and assume different functions in it to form various body parts in multicellular organisms. The shape and size of cells are related to the specific function they perform. Each living cell has the capacity to perform certain basic functions that are characteristic of all living forms. Each kind of cell organelle performs a special function, such as making new material in the cell, clearing up the waste material from the cell and so on.

i. Cells were first discovered by:
   a. Robert Hooke
   b. Leeuwenhoek
   c. Schleiden
   d. Virchow

ii. Which of the following is a unicellular organism?
   a. Fungi
   b. Plants
   c. Chlamydomonas
   d. Animal

iii. Who suggested that all cells arise from pre-existing cells?
   a. Robert Hooke
   b. Leeuwenhoek
   c. Schleiden
   d. Virchow

iv. Which of the following is an incorrect statement?
   I. Each living cell has the capacity to perform certain basic functions
   II. There is a division of labour in multicellular organisms
   III. Each kind of cell organelle performs a special function
   IV. All activities inside the cell do not interact with the environment.
   a. (I) and (II)
   b. (II) and (III)
   c. (III) and (IV)
   d. Only (IV)

v. Identify the given cell.

a. Blood cell
b. Nerve cell
c. Ovum
d. Fat cell

Section B

21. A solution has been prepared by dissolving 5g of urea in 95 g of water. What is the mass percent of urea in the solution?

OR

What is the difference between aqueous solution and non-aqueous solution? Give one example of each.

22. A solution of urea in water contains 16 grams of it in 120 grams of solution. Find out the mass percentage of urea in solution.
23. How do cardiac muscles differ from both voluntary and involuntary muscles in both structure and function?

OR

How are simple tissues different from complex tissues in plants?

24. (a) What is the lining of blood vessels made up of?
    (b) What is the lining of small intestine made up of?
    (c) What is the lining of kidney tubules made up of?
    (d) Where are the epithelial cells with cilia found?
25. A train travels the first 15 km at a uniform speed of 30 kmh^{-1}, the next 75 km at a uniform speed of 50 kmh^{-1}, and the last 10 km at a uniform speed of 20 kmh^{-1}.

Calculate the average speed for the entire train journey.

26. Prove the formula KE = $\frac{1}{2}mv^2$

Section C

27. What happens to the magnitude of the force of gravitation between two objects, if
    i. distance between the objects is tripled?
    ii. mass of both objects is doubled?
    iii. mass of both objects as well as the distance between them is doubled?

OR

A boy on a cliff 49m high, drops a stone to the ground.One second later, he throws another stone vertically downwards. The two stones hit the ground at the same time. What was the velocity with which the second stone was thrown?

28. If a 100 J of work was done, when a force of 12.5 N acts, what was the distance moved by the force?
29. Which of the following materials fall in the category of a "pure substance"?
    (a) Ice
    (b) Milk
    (c) Iron
    (d) Hydrochloric acid
    (e) Calcium oxide
    (f) Mercury
    (g) Brick
    (h) Wood
    (i) Air
30. What are the conditions favoring for air-bone diseases?
31. Compare the three major particles in atoms with respect to their mass and charge.
32. Calculate the number of moles of iron in a sample containing 10^{22} atoms of iron.
33. Two cars A and B are moving along a straight line. Car A is moving at a speed of 80 Km/h while car B is moving at a speed 50 Km/h in the same direction. Find the magnitude and direction of:
    (a) the relative velocity of car A with respect to B
    (b) The relative velocity of car B with respect to A.

Section D

34. State and explain along with example Newton's laws of motion.

OR

Give a reason for the following questions:

i. It is difficult to balance our body when we accidentally step on a peel of a banana.
ii. Pieces of bursting crackers fall in all possible directions.
iii. A glass pane of a window is shattered when a flying pebble hits it.
iv. It is easier to stop a tennis ball than a cricket ball moving at the same speed.
v. A javelin thrower is marked foul if an athlete crosses over the line marked for the throw. Athletes often fail to stop themselves before the line.

35. Classify meristematic tissues according to their position in the plant. Also, mention their characteristics.
36. Compare all the proposed models of an atom given in this chapter. (Structure of the Atoms)

OR

i. From Rutherford's α-particle scattering experiment, give the experimental evidence for deriving the conclusion that
   a. most of the space inside the atom is empty.
   b. the nucleus of an atom is positively charged.
ii. An element has mass number = 32 and atomic number = 16, find
   a. the number of neutrons in the atom of the element.
   b. the number of electrons in the outermost shell of the atom.
iii. On the basis of Rutherford's model of an atom, which subatomic particle is present in the nucleus of an atom?

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Solution

Section A

1. According to the law of conservation of Mass, mass can neither be created nor be destroyed in a chemical reaction.The law of conservation of mass means that in a chemical reaction, the total mass of products is equal to the total mass of reactants. There is no change in mass during a chemical reaction.

   OR

   Since the molecular mass of water is 18 u, therefore the mass of 1 mole of water is 18 g which consist of number of molecules equal to Avogadro's number (N_A), i.e. 6.022×10^{23}.

2. The shining liquid is mercury (metal). It is used in glass thermometers as it is the onlyetal which is liquid at room temperature. Besides it does not stick to glass and it has high coefficient of expansion due to which a slight change in temperature can be easily recorded.
3. (b) Chloroplast

   Explanation: Since kidney is a part of an animal cell so chloroplast is absent .
4. Cell wall is dead but plasma membrane is always living even in plant and animal cell, plasma membrane is made up of lipids and proteins where as cell wall is made up of cellulose.
5. Yes,the body will gradually slow down due to the opposing force of friction.
6. Nucleus

   OR

   The nucleus is called director of the cell, because it is the most important part of the cell that direct and control all the cellular functions. Nucleus controls and coordinates all the metabolic functions of the cell. It is a specialized, double membrane bound largest part of the cell.

7. The system in our body which protects us from the various disease-causing agents is called immune system.
8. The valency of Ca in $CaCO_3$ is 2+(i.e. Ca^{2+}).
9. Elements **mercury** and **bromine** exist in liquid state at room temperature.

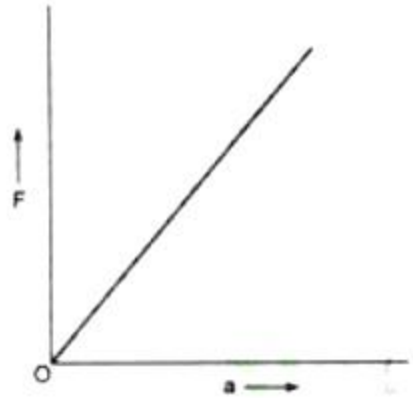
OR

This indicates that the solution of the substance 'A' in water is of saturated nature. The solution is known as saturated solution.

10. The organelle that shows the analogy as storage sacs of the cell is vacuole.
11. The reference point from which the distance of a body is measured is called origin.

OR

Speedometer of a vehicle measures its instantaneous speed.

12. Both will reach the ground at the same time because acceleration due to gravity is independent of the masses of freely falling bodies.
13. 

14. (b) Both A and R are true but R is not the correct explanation of assertion.
Explanation: The characteristics of meristematic tissues include that the meristematic cells are compactly arranged and do not contain any intercellular space between them. They contain few vacuoles or no vacuoles at all. Hence, both the statements are true but the reason is not correct statement for the assertion.
15. (a) Both A and R are true and R is the correct explanation of assertion.
Explanation: A force can change the direction of a moving body. For example - in a cricket match, when a cricket ball is hit by a bat, then the direction of the cricket ball changes and it goes in another direction.

OR

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

Explanation: If the resultant of all the forces acting on a body is zero, then the forces are called balanced forces. Suppose a heavy box is lying on the ground. Let us push this box with our hands but it does not move. Though the box is at rest, four forces are acting on it – the force of the push, the force of friction, the force of gravity, and force of reaction. The forces acting on a stationary box is an example of balanced forces. Thus balanced forces cannot produce motion in a stationary body or stop a moving body.

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

    Explanation: Rutherford postulated that the atom must contain large empty spaces as most of the α-particles passed through it without getting deflected. Some α-particles were deflected by the foil through small angles, while some were deflected through very large angles. Thus, Rutherford concluded that the positively charged particles in an atom must be concentrated in a very small space.

17. i. (a) Atom cannot be created nor destroyed in a chemical reaction
    ii. (a) Proust
    iii. (b) atom
    iv. (c) Both (a) and (b)
    v. (d) 1:8

18. i. (a) Healthy lifestyle
    ii. (b) Picture of Trypanosoma
    iii. (a) protozoan
    iv. (b) Trypanosoma
    v. (d) malaria

19. i. (a) watt
    ii. (c) both (a) and (b)
    iii. (a) Only (I)
    iv. (b) 0.36 unit
    v. (a) III and IV

20. i. (a) Robert Hooke
    ii. (c) Chlamydomonas

iii. (d) Virchow

iv. (d) Only (IV)

v. (d) Fat cell

Section B

21. Mass percent (Mass %) $= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$

Mass of urea = 5g, Mass of water = 95g

Mass percent of urea $= \frac{(5g)}{(5g+95g)} \times 100$ = 5%

OR

Sr.No	Aqueous solution	Non-aqueous solution
1.	Solutions prepared in water are called aqueous solution.	The solutions formed by dissolving substances in liquids like-alcohol, acetone and carbon disulphide are called non-aqueous solutions.
2	These solutions ionize easily and hence can conduct electricity. eg. solution of sodium chloride, solution of sugar.	These solutions do not ionize and therefore, do not conduct electricity. e.g. solution of sulphur dissolved in carbon disulphide, solution of Iodine dissolves in alcohol.

22. Given, Mass of urea present in solution = 16 g

Mass of solution =120 g

Mass percentage of urea = $\frac{\text{Mass of urea}}{\text{Mass of solution}} \times 100 = \frac{16g}{120g} \times 100$ = 13.33 %

Therefore, Mass percentage of urea in solution =13.33%.

23. 1) Cardiac muscles are involuntary muscles.

2) They are cylindrical and branched; composed of branching network of fibres.

3) They are uninucleate; the fibres have one or two nuclei which are centrally located.

4) Intercalated discs are present at intervals in the fibres.

5) They function (i.e. show rhythmic contraction and relaxation) throughout life.

OR

Simple tissue	Complex tissue
i) Simple tissue is made up of only one type of cells.	i) Complex tissue is made up of more than one type of cells. E.g. Xylem tissue is made up of 4 types of cells - Tracheids, Vessels, Fibres and Xylem parenchyma.
ii) All cells of this tissue work as individual units to perform a particular function. The cells of Scelerenchyma provide strength to the plant.	ii) Cells of this tissue work together as one single unit to bring about a particular function. E.g. Xylem and Phloem are conducting tissues.
E.g. Parenchyma, Collenchyma and Scelerenchyma tissues.	Xylem and Phloem are examples of such complex tissues.

24. (a) The lining of blood vessels is made up of simple squamous epithelium.
(b) The lining of small intestine is made up of columnar epithelium. Columnar means "pillar-like".
(c) The lining of kidney tubules is made up of cuboidal epithelium (with cube-shaped cells).
(d) Epithelial cells with cilia (ciliated columnar epithelium) are found in the respiratory tract.

25. Given total distance travelled = 15 + 75 + 10 = 100 km
Time taken in the first part of motion $t_1 = \frac{S}{V_1} = \frac{15}{30}$
Time taken in the second part of motion $t_2 = \frac{S}{V_2} = \frac{75}{50}$
Time taken in the third part of motion $t_3 = \frac{S}{V_3} = \frac{10}{20}$
Total time taken $t = t_1 + t_2 + t_3 = \frac{15}{30} + \frac{75}{50} + \frac{10}{20} = 2.5h$
Therefore, $V_{av} = \frac{Total\ distance\ travelled}{Total\ time\ taken} = \frac{100}{2.5} = 40\ kmh^{-1}$

26. Suppose a body of mass m is moving with velocity v. It is brought to rest by applying a retarding force F. Suppose it traverses a distance s before coming to rest.
Kinetic energy of body, KE = Work done by retarding force to stop it.
i.e., kinetic energy = F .s ..... (i)
But retarding force, F =ma .....(ii)
Initial velocity = v, final velocity =0

From the equation $v^2 - u^2 = 2as$

$v^2 = u^2 + 2as$, we have

0 = $v^2 - 2as$ (because here a is retardation)

Distance, s = $\frac{v^2}{2a}$ ..... (iii)

Substituting values of F and s from (ii) and (iii) in (i), we get

Kinetic energy, KE = $ma \times \frac{v^2}{2a} = \frac{1}{2}mv^2$

Section C

27. As we know,

$F = \frac{Gm_1m_2}{r^2}$ [symbols have their usual meanings]

i. $r' = 3r \Rightarrow F' = \frac{Gm_1m_2}{9r^2} = \frac{F}{9}$ [force decreases by 9 times]

ii. $m_1' = 2m_1$ and $m_2' = 2m_2 \Rightarrow \quad F' = \frac{4Gm_1m_2}{r^2} = 4F$ [force increases by 4 times]

iii. $m_1' = 2m_1$ and $m_2' = 2m_2$ r' $\Rightarrow F' = \frac{4Gm_1m_2}{4r^2} = F$ [force remains unchanged]

OR

For the first stone, Initial velocity u = 0

Let the stone take t s to reach the ground

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

$-49 = \frac{1}{2}(-9.8)\,t^2$

$t^2 = 10$

$t = 3.162s$

For the second stone, the initial velocity = u_0

Time of flight = 3.162-1 s

= 2.162s

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

$-49 = -u_0\,(2.162) + \frac{1}{2}(-9.8)\,\left(2.16^2\right)^2$

$-49 = -2.16u_0 - 22.9$

$u_0 = \frac{26.1}{2.162} = 12.1m/s$

The second stone was thrown downward with a velocity of 12.1 m/s

28. W = Work = 100 J

Force = F = 12.5 N

Distance Moved

S = Displacement

Since, work done = Force × Distance moved

W = FS

$100 = 12.5 \times s$

$\frac{100 \times 10}{125} = S$

$\frac{1000}{125} = S$

S = 8 m

29. Ice, iron, hydrochloric acid, calcium oxide and mercury are **pure substances.**

Pure substances are homogeneous material which contain particles of one kind and have a definite set of properties.

30. Conditions favoring for air-borne infections -

a) Close proximity to the infected person.

b) Over – crowding

c) Poor – Ventilation

31.

	Particle	Symbol	Mass	Charge	Relative Charge
1.	Proton	p^+	1.673×10^{-27} kg	$+ 1.6 \times 10^{-19}$ C	+ 1
2.	Neutron	n^0	1.675×10^{-27} kg	0	0
3.	Electron	e^-	9.109×10^{-31} kg	$- 1.6 \times 10^{-19}$ C	- 1

Inside an atom, protons and neutrons are concentrated in the centre in a nucleus. The electrons revolve around the nucleus in definite circular orbits.

32. Number of moles

$= \frac{\text{No. of atoms of iron } N)}{\text{Avogadro's na of a toms } \mathbb{N}_0)} = \frac{N}{N_0}$

$= \frac{(1.0 \times 10^{22} \text{atoms})}{(6.022 \times 10^{23} \text{atoms})} = 0.0166$ mol

33. On taking the formula when both bodies are moving along same direction, we have

(a) Relative velocity of A with respect to B is -

$V_{AB} = V_A - V_A = 80 - 50 = 30$ km/h

Hence, the velocity of car A with respect to car B is 30 km/h in same direction.

(b) Relative velocity of B with respect to A is -

$V_{BA} = V_B - V_A = 50 - 80 = -30$ km/h

Hence, the velocity of car B with respect to car A is 30 km/h in opposite direction.

Section D

34. **Newton's First Law of Motion:** Any object remains in the state of rest or in uniform motion along a straight line until it is compelled to change the state by applying an external force.

Explanation: If an object is in the state of rest, then it will remain in rest until an external force is applied to change its state. Similarly, an object will remain in motion until an external force is applied over it to change its state. This means all objects resist changing their state. The state of any object can be changed by applying external forces only.

A person standing on a bus falls backward when the bus starts moving suddenly. This happens because the person and bus both are in rest while the bus is not moving, but as the bus starts moving the legs of the person start moving along with the bus but the rest portion of his body has a tendency to remain in rest. Because of this person falls backward; if he is not alert.

Newton's Second Law of Motion: The rate of change of momentum is directly proportional to the force applied in the direction of the force.

Explanation: Newton's Second Law of Motion gives the relation between force, mass and acceleration of an object.

For example, when acceleration is applied on a moving vehicle, the momentum of the vehicle increases and the increase is in the direction of motion because the force is being applied in the direction of motion. On the other hand, when the brake is applied on the moving vehicle, the momentum of the vehicle decreases and the decrease is in the opposite direction of motion because the force is being applied in the opposite direction of motion.

Newton's Third Law of Motion: There is an equal and opposite reaction for every action

Explanation: Whenever a force is applied over a body, that body also applies the same force of equal magnitude and in the opposite direction.

Example: Walking of a person: A person is able to walk because of Newton's Third Law of Motion. During walking, a person pushes the ground in the backward direction and in the reaction the ground also pushes the person with an equal magnitude of force but in the opposite direction. This enables him to move in the

forward direction against the push.

OR

i. The reason is that one cannot exert an action force effect on the slippery peel of banana in the backward direction. Hence, in response the ground does not exert sufficient reaction force in forward direction and hence we lose our balance.
ii. This can be explained on the basis of the law of conservation of momentum. When due to the explosion some pieces move in the same particular direction, then in order to conserve momentum the remaining pieces move in the opposite direction.
iii. The reason is that the glass pane of the window is a hard solid. The flying pebble suffers a change in momentum in a very short time, so the force exerted by the glass window on the pebble will be large. Consequently, the glass pane of the window will shatter.
iv. The reason is that the mass of the cricket ball is more than that of a tennis ball. Thus, momentum is more in the case of the cricket ball due to the larger mass as compared to the tennis ball. So, less force has to be applied in the case of the tennis ball to stop.
v. The reason is that when athletes are running for the throw, then due to the inertia of motion they often fail to stop themselves before the line.

35. Meristematic tissues are growth tissues and found in the growing regions of the plant. According to their position in plant, meristems are apical, lateral, and intercalary. These types of meristematic tissue can be explained as follows:
    i. **Apical meristem** - Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root.
    ii. **Lateral meristem** - Lateral meristems are found beneath the bark. The girth of the stem or root increases due to lateral meristem (cambium).
    iii. **Intercalary meristem** - Intercalary meristem is the meristem at the base of the leaves or internodes (on either side of the node) on twigs. It increases the length of the organs such as leaves and internodes.

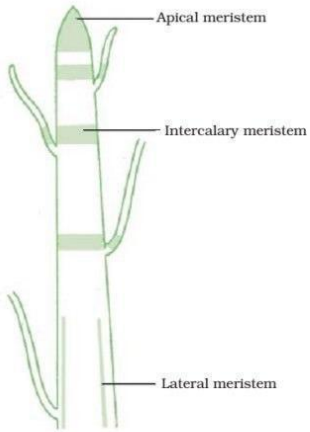


Figure: Meristematic tissues in plants.

Characteristics of meristematic tissues are as follows:

i. Their cells are similar in structure and have thin cellulose cell walls.
ii. The cells are active and have dense cytoplasm.
iii. They contain few vacuoles or no vacuoles at all.
iv. The meristematic cells are compactly arranged and do not contain any intercellular space between them.

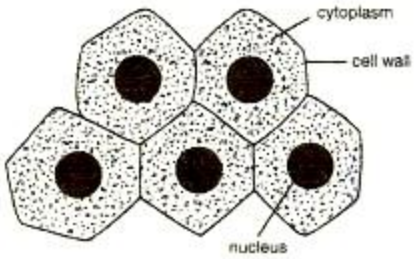
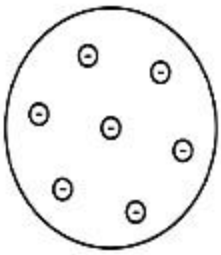
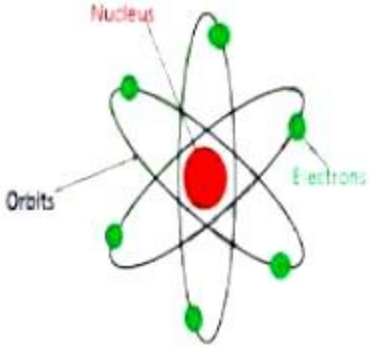
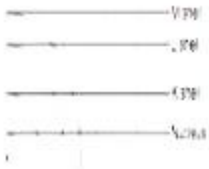


Figure: Meristematic tissue

36. The Comparison of different proposed Model given in this chapter is shown below in the table as follows:

Feature	**Thomson's Model**	**Rutherford's Model**	**Bohr's Model**
Positive Charge	The Positive charge is distributed in Sphere	The positive charge is concentrated at the core of the atom, which is called the nucleus	The positive charge is present in the core of the atom, called the nucleus.
Negative	The electrons are embedded in the positively charged	The nucleus is surrounded by electrons, and the electrons and	The electrons move in discrete orbits, and each

Charge	sphere of an atom, like the seeds in a watermelon.	the nucleus are held together by the electrostatic force of attraction	orbit is associated with a definite amount of energy.
Limitation	This model could not explain the results of an alpha particle scattering experiment	This model could not explain the stability of the atom.	This model perfectly explains the stability of an atom
Diagrammatic representation			

OR

i. a. As most of the α-particles passed straight through the gold foil.
   b. A few of the α-particles which are positively charged get deflected due to the positive charge of the nucleus.

ii. a. Number of neutrons = mass number - atomic number = 32 - 16 = 16
   b. The electronic configuration of the element will be as follows:

K	L	M
2,	8,	6

   Hence, the number of electrons in the outermost shell is 6.

iii. According to Rutherford's model of an atom, positively charged protons are present in the nucleus of an atom.