SAMPLE PAPER - 6

Class 09 - Science

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 of the following factors are responsible for the change of state of solid CO_2 into vapours? **[1]**

   a) Decrease in pressure
   b) Increase in temperature
   c) Increase in pressure
   d) Both decrease in pressure and an increase in temperature

2. The major function of the Golgi apparatus is: **[1]**

   a) secretion
   b) detoxification
   c) fermentation
   d) translocation

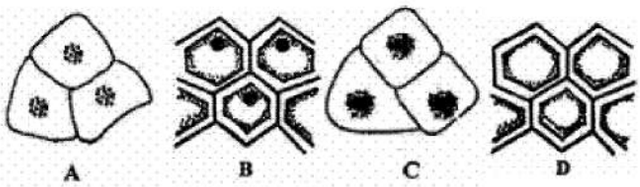
3. The maximum displacement between two points in a circular path can be _____. (Radius-r) **[1]**

   a) 2r
   b) r
   c) πr
   d) $2\pi r$

4. Internal parasites of cattle like fluke, damage **[1]**

   a) intestine
   b) liver
   c) brain
   d) stomach

5. Which one of the following diagram represent the correct observation of a human cheek cell under compound microscope? **[1]**



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

6. The cell organelle involved in forming complex sugars from simple sugars are **[1]**

a) Endoplasmic reticulum
b) Plastids
c) Golgi apparatus
d) Ribosomes

7. The atomic mass of calcium is 40. The number of moles in 60 g of Calcium are: **[1]**

a) 2.0 mol
b) 0.75 mol
c) 0.5 mol
d) 1.5 mol

8. A long tree has several branches. The tissue that helps in the side ways conduction of water in the branches is **[1]**

a) collenchyma
b) xylem vessels
c) xylem parenchyma
d) parenchyma

9. A student lowers a body in a liquid filled in a container. He finds that there is a maximum apparent loss in weight of the body when: **[1]**

a) it is partially immersed and also touches the sides of the container.
b) it is partially immersed in the liquid.
c) it just touches the surface of the liquid.
d) it is completely immersed in the liquid.

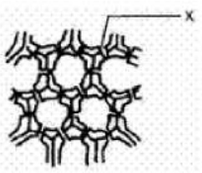
10. Starting from rest at the top of an inclined plane a body reaches the bottom of the inclined plane in 4 seconds. At what time does the body cover one fourth the distance starting from rest at the top? **[1]**

a) 3 second
b) 2 second
c) 1 second
d) 4 second

11. One mole of N_2 is equal to _____. **[1]**

a) 14 g of Nitrogen
b) 20 grams of Nitrogen
c) None of these
d) 6.022×10^{23} N_2 molecules

12. **[1]**



The part marked 'X' in the diagram is

a) vacuole
b) simple pit pair
c) narrow lumen
d) intercellular space

13. Which cell organelle plays a crucial role in detoxifying many poison and drugs in a cell? **[1]**

a) Lysosomes
b) Vacules

c) Smooth endoplasmic reticulum
d) Golgi apparatus

14. Calculate the number of Mg atoms in 0.024 g of Mg, **[1]**

a) 6.022×10^{40} Mg atoms
b) 6.022×10^{25} Mg atoms
c) 6.022×10^{20} Mg atoms
d) 6.022×10^{23} Mg atoms

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. Who is known as the 'Father of white revolution' in India? **[1]**

a) Mrs. Indira Gandhi
b) Shri Jai Prakash Narain
c) Dr.V. Kurein
d) Prof M.S. Swaminathan

17. **Assertion (A):** Motion with uniform velocity is always along a straight-line path. **[1]**
Reason (R): In uniform velocity a motion, speed is the magnitude of the velocity and is equal to the instantaneous velocity.

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 have fixed shape but rubber band being solid can change its shape. **[1]**
Reason (R): When force is applied, then the rubber band changes its shape and regain its shape.

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):** The meristematic cells are compactly arranged and do not contain any intercellular space between them. **[1]**
Reason (R): They contain few vacuoles or no vacuoles at all.

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):** Atomic mass number is the number of protons present in the nucleus of an atom. **[1]**
Reason (R): All atoms of an element have the same atomic number.

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. An engine can pump 30,000 litres of water a vertical height of 45 metres in 10 minutes. Calculate the work done by the machine and its power. [g = 9.8 m/s^2; Density of water = $10^3 kg/m^3$, 1000 litre = 1 m^3]. **[2]**

OR

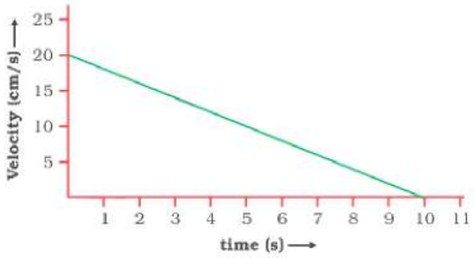
Calculate the work done in lifting 200 kg of a mass through a vertical distance of 6 m. Assume g = 10 m/s^2.

22. What produces more severe burns, boiling water or steam? **[2]**

23. Why are sound waves called mechanical waves? **[2]**

24. Water as ice has a cooling effect, whereas water as steam may cause severe burns. Explain these observations. **[2]**

25. The velocity-time graph of a ball of mass 20 g moving along a straight line on a long table is given in Fig. **[2]**



How much force does the table exert on the ball to bring it to rest?

OR

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

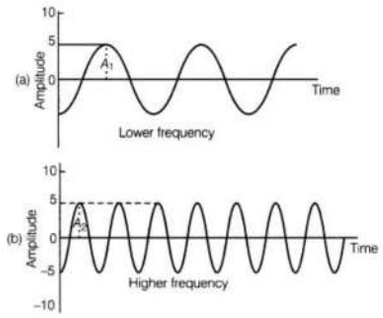
i. the resistive force exerted by the sand bag on the bullet.

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

26. How will you find the valency of chlorine, sulphur and magnesium? **[2]**

Section C

27. Observe the following graphical diagram and answer the following questions: **[3]**



i. What is represented by the graphical diagram shown above?

ii. Which wave characteristic determine the pitch of sound?

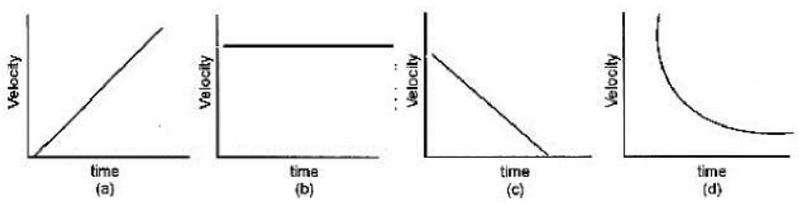
iii. What is the relationship between pitch and frequency?

28. An old man and a scientist were talking about a deserted house. The old man was sure that it was haunted by ghosts, but the scientist discarded the view saying no one had ever seen a ghost. The old man was annoyed and challenged the scientist about existence of atoms, sub-atomic particles which also could not be seen. **[3]**

i. Name the three sub-atomic particles and their discoverers.

ii. Whose viewpoint do you support and why?

29. What type of motion is represented by the following graphs. **[3]**



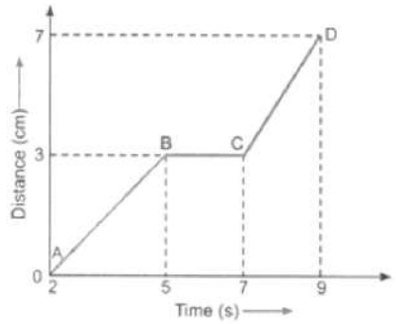
OR

The graph given below shows the positions of a body at different times. Calculate the speed of the body as it moves from

i. A to B

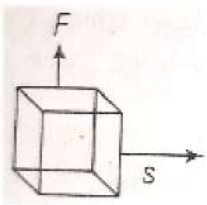
ii. B to C

iii. C to D

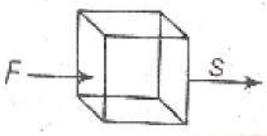


30. In each of the following, a force F is acting on an object of mass m. The direction of displacement is from West to east shown by the longer arrow. Observe the figure carefully and state whether the work done by the force is negative, positive or zero. **[3]**

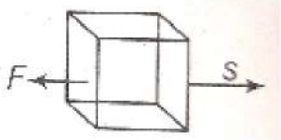
i.



ii.



iii.



31. The following is the distance-time table of an object in motion: **[3]**

Time (s)	Distance (m)
0	0
1	1
2	8
3	27
4	64
5	125
6	216
7	343

a. What conclusion can you draw about the acceleration? Is it constant, increasing, decreasing, or zero?

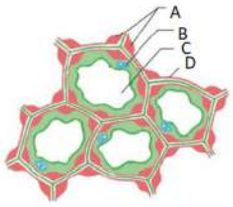
b. What do you infer about the forces acting on the object?

32. Distinguish between Plant cell and Animal cells. **[3]**

OR

What is the functional difference between a plasma membrane and cell wall?

33. Study the following figure and answer the following questions: **[3]**



i. Identify the type of tissue shown in the given figure. Write the labellings - A, B, C, D.

ii. Is the given type of tissue in the figure is flexible or not? Give a reason for your answer.

iii. What are the functions of the tissue shown in the given figure?

Section D

34. From a cliff of 49 m high, a man drops a stone. One second later, he throws another stone. They both hit the ground at the same time. Find out the speed with which he threw the second stone. **[5]**

OR

A stone is dropped from a 100 m high tower. How long does it take to fall?

a. the first 50 m and

b. the second 50 m.

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

OR

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

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

iii. Why lysosomes are known as suicidal bags?

36. Pragya tested the solubility of three different substances at different temperatures and collected the data as given below (results are given in the following table, as grams of substance dissolved in 100 grams of water to form a saturated solution). **[5]**

Temperature in K					
Substance dissolved	283	293	313	333	353
Solubility					
Potassium Nitrate	21	32	62	106	167
Sodium Chloride	36	36	36	37	37
Potassium Chloride	35	35	40	46	54
Ammonium Chloride	24	37	71	55	66

a. What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?

b. Pragya makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.

c. Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?

d. What is the effect of change of temperature on the solubility of a salt?

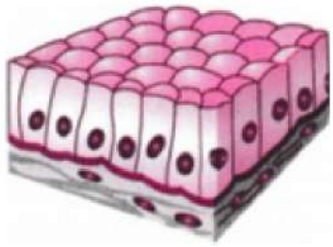
Section E

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

The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. It also forms a barrier to keep different body systems separate. Epithelial tissue cells are

tightly packed and form a continuous sheet. The skin, which protects the body, is also made of squamous epithelium. Skin epithelial cells are arranged in many layers to prevent wear and tear. This columnar epithelium facilitates movement across the epithelial barrier. In the respiratory tract, the columnar epithelial tissue also has cilia, which are hair-like projections on the outer surfaces of epithelial cells. Cuboidal epithelium forms the lining of kidney tubules.

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



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

OR

Is excretion is the main function of the cuboidal epithelium?

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

Poultry is the rearing of domesticated fowl (chicken), ducks, geese, turkey and some varieties of pigeon for their meat and eggs. Poultry birds are of two types that is broilers and layers. One is specialized meat-producing poultry birds while other is egg-laying poultry birds. The tremendous rise in the availability of poultry products is called Silver Revolution.

(i) What is the meaning of layers regarding poultry?

(ii) There are different breeds of hens, so give some information about broiler.

(iii) We know that different types of revolution regarding animal husbandry. So, what is the silver revolution explain?

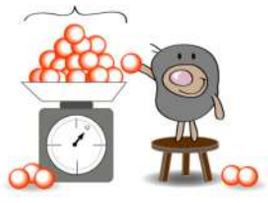
OR

There are different breeds of poultry birds, mention two examples of indigenous and exotic breeds of poultry birds.

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

A mole corresponds to the mass of a substance that contains 6.023×10^{23} particles of the substance. The mole is the SI unit for the amount of a substance. Its symbol is mol. By definition: 1 mol of carbon-12 has a mass of 12 grams and contains $6.022140857 \times 10^{23}$ of carbon atoms (to 10 significant figures).

6.02×10^{23} carbon atoms = 12 grams



(i) One mole of carbon atoms weighs 12 g. Find the mass of 1 atom of carbon in grams [Avogadro's number = 6.022×10^{23} per mole]

(ii) Calculate the mass of 0.5 mole of N_2 gas

(iii) Calculate the mass of 0.2 mole of O -atoms

OR

Calculate the mass of 4 moles of aluminium atom [Given, N = 14 u, O = 16 u, Al = 27 u, Avogadro's number = 6.022×10^{23} per mole]

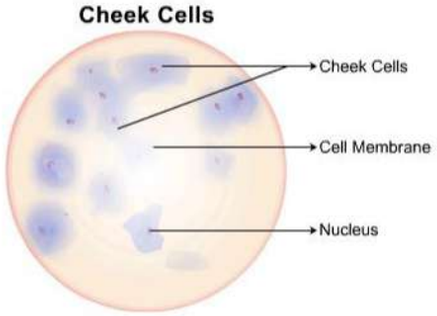
Solution

SAMPLE PAPER - 6

Class 09 - Science

Section A

1. **(d)** Both decrease in pressure and an increase in temperature
   Explanation: Solid carbon dioxide can be changed into vapours or gaseous state by decreasing the pressure and/or increasing the temperature. Both processes increase the spaces between the constituent particles. They also increase the kinetic energy of the particles.
2. **(a)** secretion
   Explanation: The Golgi apparatus is the organelle in which proteins are prepared for secretion and undergo terminal glycosylation.
3. **(a)** 2r
   Explanation: Distance is the actual length of the path covered.
   hence, distance in this case = $\frac{2\pi r}{2} = \pi r$
   and displacement is the shortest length of path covered which in this case is the diameter = 2r
4. **(b)** liver
   Explanation: Cattle eat the vegetation and become infected. The fluke migrates to the liver, infects the bile duct and matures into an adult.
5. **(d)** C
   Explanation: As in all animal cells, the cells of the human cheek do not possess a cell wall. A cell membrane that is semi-permeable surrounds the cytoplasm. Unlike plant cells, the cytoplasm in an animal cell is denser, granular and occupies a larger space. The vacuole in an animal cell is smaller in size, or absent. The nucleus is present at the centre of the cytoplasm. The absence of a cell wall and a prominent vacuole are indicators that help identify animal cells, such as cells seen in the human cheek.



6. **(c)** Golgi apparatus
   Explanation: Golgi bodies consist of a system of membrane-bound vesicles arranged in stacks parallel to each other called cisterns. These membranes have connections with the membrane of endoplasmic reticulum (ER). Functions:
   1. It also stores, modifies and helps in the packaging of products in vesicles.
   2. In some cases, complex sugars may be made from simple sugars in it.
   3. It also helps in the formation of lysosomes.
7. **(d)** 1.5 mol
   Explanation: Number of moles in 60 g of Calcium = $\frac{Given\ mass\ of\ Calcium}{Atomic\ mass\ of\ Calcium} = \frac{60}{40}$ = 1.5 mol
8. **(b)** xylem vessels
   Explanation: Xylem vessels are very long tube-like structures formed by a row of cells placed end to end. The transverse walls between these cells are partially or completely dissolved to form continuous water channels.
9. **(d)** it is completely immersed in the liquid.
   Explanation: When a solid is completely immersed in the liquid, there is a maximum apparent loss in its weight due to the maximum volume of liquid displaced.

10. **(b)** 2 second

Explanation: u = 0m/s, t = 4sec, a = 9m/s^2 (acceleration due to gravity)

$s = ut + \frac{1}{2}at^2 = 0 \times 4 + \frac{1}{2} \times 9 \times 4 \times 4 = 72m$, $\frac{1}{4}$ of 72 = 18m

Now, s = 18m, u = 0m/s, a = 9m/s^2

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

$18 = 0 \times t + \frac{1}{2} \times 9 \times t^2$

$18 = \frac{1}{2} \times 9t^2$

$t^2 = 2 \times 2$

Hence t = 2

11. **(d)** 6.022×10^{23} N_2 molecules

Explanation: One mole of N_2 is equal to 28 g of nitrogen or 6.022×10^{23} molecules.

12. **(b)** simple pit pair

Explanation: The part marked 'X' in the diagram is simple pit pair. In the pair of simple pits of two adjacent cells, each simple pit is more or less uniform-diameter void in the walls. Cell wall contains simple pits. In simple pits the width of the pit chamber is uniform. There is no secondary wall in the simple pit.

13. **(c)** Smooth endoplasmic reticulum

Explanation: Smooth Endoplasmic Reticulumis not only plays a role in detoxification but also regulates and releases calcium ions. These are the network of tubular membranes within the cytoplasm of the cell. They are involved in the transport of materials.

14. **(c)** 6.022×10^{20} Mg atoms

Explanation: Atomic mass of Mg is 24. Number of atoms in 24 g of Mg = $N_A = 6.022 \times 10^{23}$

Therefore, number of atoms in 0.024 g of Mg = $\frac{0.024}{24} \times 6.022 \times 10^{23} = 6.022 \times 10^{20}$

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. **(c)** Dr.V. Kurein

Explanation: Dr.V. Kurein is called as the 'Father of white revolution' in India because of his initiatives and immense contribution to the dairy sector.

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

Explanation: Uniform velocity means that speed and direction remain unchanged.

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

Explanation: The rubber band can not change its shape by itself. When force is applied it changes its shape (due to elasticity) and regain its shape when force is removed.

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

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.

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

Explanation: Atomic number is the number of protons present in the nucleus of an atom is the atomic number of that atom. It is represented by the symbol Z. All atoms of an element have the same atomic number. The number of protons and electrons in an atom is equal. Thus, the atom of an element is electrically neutral.

Section B

21. Volume of water raised = 30,000 litres $\frac{30,000}{1000} m^3$ = 30 m^3.

Mass of water raised, M = Volume× Density

= (30 m^3) ×(10^3kg/m^3)

M = 3000 kg

Height, h = 45 metre

Work done by machine,

W = Weight of water raised × Height

= (Mg) × h=(30 × 10^3 × 9.8) ×45

W =1.323 ×10^7joule.

Time taken, t = 10 minutes = 10 ×60 = 600 seconds.

Power, P = $\frac{W}{t}$

$\frac{1.323\times10^7 J}{600s}$

= 22 ×10^3 W = 22 kW.

OR

Given, Mass, m = 200 kg, g = 10 m/s^2 and Distance, h = 6 m

Work in lifting the mass is done against gravity.

Therefore, the work done is W = Force ×Displacement = mg × h = mgh

W = mgh= 200 × 10 × 6 = 12000 J.

22. As compared to boiling water it is observed that steam produces more severe burns since as the steam changes into boiling water it releases heat of condensation which is equivalent to latent heat of water that's why the result is more severe burning.
23. Mechanical waves are an oscillation of matter that requires a medium for their propagation via the mechanism of particle-to-particle interaction. Since, sound also requires a medium for its Propagation, hence it is also a mechanical wave.
24. In the case of ice, the water molecules have low energy while in the case of steam the water molecules have high energy. When water as ice melts, it absorbs a certain amount of heat from the surface (skin) in contact and thus produces a cooling effect on the surface. Whereas when water as steam touches the skin, it condenses on the skin, and releases the heat (The heat which the boiling water absorbs to get converted into steam is known as latent heat of vaporization). Therefore, it may cause severe burns.
25. The initial velocity of the ball is 20 cm s^{-1}.

    Due to the frictional force exerted by the table, the velocity of the ball decreases down to zero in 10 s.

    Thus, u = 20 cm s^{-1}; v = 0 cm s^{-1} and t = 10 s. Since the velocity-time graph is a straight line, it is clear that the ball moves with a constant acceleration. The acceleration 'a' is given by

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

    $= \frac{(0\text{cms}^{-1} - 20\text{cms}^{-1})}{10s}$

    = -2 cm s^{-2} = -0.02 m s^{-2}

    The force exerted on the ball F is obtained from Newton's 2nd law of motion

    F = ma = $(\frac{20}{1000})$ × (-0.02 m s^{-2})

    = - 0.0004 N

    The negative sign implies that the frictional force exerted by the table is opposite to the direction of motion of the ball.

    OR

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

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

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

    $\Rightarrow a = \frac{-1000\times1000}{2\times5} \times 100$

    = -10^7 ms^{-2}

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

    ii. $v = u + at$

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

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

    $\Rightarrow t = \frac{10^3}{10^7} = 10^{-4}\ s$
26. The electrons present in the outermost shell of an atom are known as the valence electrons. Valence electrons determine the valency (combining capacity) of that atom.

    The atomic number of chlorine is 17. The electronic configuration is 2, 8, 7.

    So the number of valence electrons for chlorine is 7 and it needs 1 more electron to complete its octet (8 electrons in its outermost shell).

    Therefore, its valency is one (8 - 7).

The atomic number of sulphur is 16. The electronic configuration is 2, 8, 6.

So the number of valence electrons for sulphur is 6 and it needs 2 more electrons to complete its octet (8 electrons in its outermost shell).

Therefore, its valency is two (8 - 6).

The atomic number of magnesium is 12. The electronic configuration is 2, 8, 2.

It is easier for magnesium to give away its two valence electrons rather than try to acquire 6 more electrons to complete its octet.

Therefore its valency is two.

Section C

27. i. The two graphical figure represents the same amplitude but different frequency.

ii. The pitch of the sound is determined by the frequency wave.

iii. Lower pitch indicates low frequency and higher pitch indicates the higher frequency that is $Pitch \propto Frequency$.

28. i.

Particles	Discoverer
Electrons	J.J. Thomson
Protons	Rutherford
Neutrons	Chadwick

ii. View point in support of scientist as he discourages superstition.

29. i. Velocity-time graph is a straight line. Therefore, it represents uniformly accelerated motion.

ii. Velocity-time graph is a straight line parallel to the time axis. It represents uniform motion.

iii. Velocity-time graph is a straight line having a negative slope. It represents uniformly retarded motion.

iv. Velocity-time graph is a curve having a negative slope. It represents non-uniformly retarded motion.

OR

i. The distance-time graph represents the line AB which shows the speed of the body. So,

speed = $\frac{Distance}{Time}$

= $\frac{3cm}{(5-2)s}$

= 1 cm/s

ii. The distance-time graph shows that the body is at rest between graph line B to C, it means no movement. So speed is zero i.e.,

speed = $\frac{Distance}{Time} = \frac{0cm}{(7-5)s}$

iii. The distance-time graph represents the line CD which shows the speed of the body. So,

speed = $\frac{Distance}{Time}$

= $\frac{(7-3)cm}{(9-7)s} = \frac{4cm}{2s}$

= 2 cm/s

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.

Time t (s)	Distance s (m)	Velocity u = $\frac{s}{t}$ (ms^{-1})	Acceleration a = $\frac{v-u}{t}$ (ms^{-2})
0	0	0	-
1	1	1	$a_1 = \frac{1-0}{1-0} = 1$
2	8	4	$a_2 = \frac{4-1}{2-1} = 3$
3	27	9	$a_3 = \frac{9-4}{3-2} = 5$
4	64	16	$a_4 = \frac{16-9}{4-3} = 7$
5	125	25	$a_5 = \frac{25-16}{5-4} = 9$
6	216	36	$a_6 = \frac{36-25}{6-5} = 11$
7	343	49	$a_7 = \frac{49-36}{7-6} = 13$

i. There is an unequal change of distance in equal interval of time. Thus, the given object is having a non-uniform motion. From the above table, it is clear that the acceleration is not constant and increase with time.

ii. The object is in accelerated condition. According to Newton's second law of motion, the force acting on an object is directly proportional to the acceleration produced in the object. So, we can say that an unbalanced force is acting on the object.

32.

Sr. No.	Plant Cell	Animal Cell
1.	Cell wall is present.	Cell wall is absent.
2.	Plastids are present.	Plastids are absent.
3.	Plant cell are larger in size.	Animal cell are smaller in size.
4.	Plant cells cannot change shape.	Animal cells can change their shape.
5.	Nucleus lies on one side in the peripheral cytoplasm.	Nucleus usually lies in the centre.
6.	Food is stored in the form of starch .	Food is stored in the form of glycogen .
7.	Produce own food through photosynthesis.	Cannot photosynthesize.

OR

Cell wall	Cell membrane
It is a rigid, thick structure (4-20 uM) and visible in light microscope.	It is delicate, thin structure (5-10 nm wide) visible only in electron microscope.
It is the outermost layer in plant cell and occurs as a protective covering surrounding the plasma membrane.	It is the outermost layer in animal cell and occurs as a semi permeable covering surrounding the protoplasm.
Cell wall is made up of cellulose in plant cell wall. Cell wall is made up of peptidoglycan in bacterium. Cell wall is made up of chitin in fungi.	Plasma membrane is made up of lipids proteins and small amount of carbohydrates.
It is completely permeable to ordinary macromolecules.	It is selectively permeable or semi- permeable allowing only certain molecules to pass through.
It occurs in plant cell, bacterium and fungus.	It occurs in all cells.
It is metabolically inactive and non living.	It is metabolically active and living.
It determines the cell shape and offers protection.	It protects the protoplasm and maintains a constant internal environment to the protoplasm.

33. i. The tissue shown is collenchyma tissue.

The labelling of the collenchyma tissue is as follows:

A. - Wall thickenings

B. - Nucleus

C. - Vacuole

D. - Cell wall

ii. Yes, the collenchyma tissue is flexible. This is so because collenchyma cells don't have lignin in their cell wall.

iii. The function of collenchyma tissue are as follows:

a. Collenchyma tissue provides flexibility to the plant.

b. It also provides mechanical support to plants.

Section D

34. **For the first stone :**

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

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

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

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

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

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

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

For the second stone:

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

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

$\therefore$For the second stone,

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

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

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

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

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

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

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

OR

Initial velocity ,u=0

Total height, h = 100 m

a. Let, for the first 50 m the time taken by the stone be 't' sec.

S=-50 m (- ve sign shows the stone falls in downward direction)

g = -10 m/s^2

$h = s = ut + \frac{1}{2}gt_1^2$

$\implies -50 = 0 + \frac{1}{2}(-10)t_1^2$

$\implies -50 = -5t_1^2$

$\implies \frac{50}{5} = t_1^2$

$\implies t_1^2 = 10$

$\implies t_1 = \sqrt{10}$

$\therefore t_1 = 3.16$ sec

b. For the entire journey,let the time taken be T

u = 0

S = -100 m

$a = -10 m/s^2$

$S = ut + \frac{1}{2}aT^2$

$\Rightarrow -100 = 0 + \frac{1}{2} \times (-10)T^2$

$\Rightarrow T_2 = 20$

$\Rightarrow T = \sqrt{20}$

$\Rightarrow$ T = 4.47 sec

$\therefore$ Time taken to fall through the next 50 m = T - t_1 = 4.47 - 3.16 = 1.31 sec

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. When human red blood cells are placed in hypotonic salt/sugar solution they swell due to endosmosis.

ii. Plant cell shrinks when kept in hypertonic solution because the concentration of the solvent is more inside the cell. It shrinks due to exosmosis.

iii. Lysosomes are known as suicidal bags because, during the breakdown of cell structure, lysosome bursts and enzymes eat up their own cells.

36. a. The amount of potassium nitrate required to produce a saturated solution at 313 K in 100 g of water = 62 g
The amount of potassium nitrate that would be required to produce a saturated solution at 313 K in 50 g of water = (62 x 50) / 100 g
Therefore, 31 g of potassium nitrate would be required to produce a saturated solution at 313 K in 50 g of water.

b. At 373 K, preparation of a saturated solution will need 54 g of potassium nitrate. At a room temperature of 293 K, a saturated solution of potassium nitrate requires just 35 g potassium nitrate. As the solution cools, excess potassium nitrate (54 g – 35 g = 19 g) will precipitate out as insoluble salt.

c. Solubility of potassium nitrate, sodium chloride, potassium chloride and ammonium chloride in 100 g of water at 293 K are 32 g, 36 g, 35 g and 37 g respectively.
Ammonium chloride has the highest solubility (37 g) at this temperature.

d. Effect of change of temperature on the solubility of a salt: As a general rule, the solubility of the salts is directly proportional to the temperature. If the temperature is increased, the solubility of the salt generally increases.

Section E

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

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

(i) Columnar.

(ii) columnar epithelial.

OR

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

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

Poultry is the rearing of domesticated fowl (chicken), ducks, geese, turkey and some varieties of pigeon for their meat and eggs. Poultry birds are of two types that is broilers and layers. One is specialized meat-producing poultry birds while other is egg-laying poultry birds. The tremendous rise in the availability of poultry products is called Silver Revolution.

(i) Egg-laying poultry birds are called **layers.**

(ii) The specialized meat-producing poultry birds are called **broilers.** Broilers are quick growing birds which are raised for 6-8 weeks. Their food is rich in vitamin A and K.

(iii) The tremendous rise in the availability of poultry products is called Silver Revolution.

OR

Following are the example of poultry birds

Indigenous breed: Assel and Kadaknath.

Exotic breed: Rhode island red and Light Sussex.

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

A mole corresponds to the mass of a substance that contains 6.023×10^{23} particles of the substance. The mole is the SI unit for the amount of a substance. Its symbol is mol. By definition: 1 mol of carbon-12 has a mass of 12 grams and contains 6.022140857 $\times 10^{23}$ of carbon atoms (to 10 significant figures).

6.02×10^{23} carbon atoms = 12 grams

(i) 1 mole of carbon atom = 6.022×10^{23} atoms

6.022×10^{23} atoms of carbon weigh = 12g

1 atom of carbon weigh = $\frac{12}{6.022 \times 10^{23}}$

$= 1.99 \times 10^{-23}$ g

(ii) n = 0.5 mol; M = 14 × 2 = 28 g; m = ?

mass of N_2 = n × M = 0.5 × 28 = 14.0 g

(iii) n = 0.2 mol; M = 16 g; m = ?

mass of O atom = n × M = 0.2 × 16 = 3.2 g

OR

n = 4 mol; M = 27 g; m = ?

mass of aluminium atom = n × M = 4 × 27 = 108 g