Class: IX
SESSION : 2022-2023
SUBJECT: Science (086)
SAMPLE QUESTION PAPER - 5
with SOLUTION

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 statements is not true? **[1]**

   A. motion is always uniform

   B. motion is a change of position

   C. motion can be described in terms of displacement

   D. motion can be uniform or non-uniform

   a) (B) b) (A)

   c) (D) d) (C)

2. Ribosomes are made up of _____. **[1]**

   a) Both RNA and Proteins b) RNA

   c) Lipoprotein d) Proteins

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

   a) intestine b) liver

   c) brain d) stomach

4. Which among the following helps to increase the diameter or girth of plant organs like stem? **[1]**

   a) Secondary meristem b) Lateral meristem

   c) Both Lateral meristem and d) Apical meristem

Secondary meristem

5. Match the following with the correct response: **[1]**

(a) Genes	(i) Gases
(b) Diffusion	(ii) Loss of water by plant cells
(c) Osmosis	(iii) Movement of water molecular
(d) Plasmolysis	(iv) Hereditary units

a) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

b) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

c) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)

d) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)

6. When the liquid starts boiling, the further heat energy which is supplied **[1]**

a) is absorbed as latent heat of vaporization by the liquid

b) is lost to the surrounding as such

c) Increases the temperature of the liquid.

d) increases the K.E of the particle in the liquid

7. Smooth muscle fibres are **[1]**

a) cylindrical, branched, multinucleate, striated and voluntary

b) cylindrical, unbranched, uninucleate, non-striated and involuntary

c) spindle-shaped, unbranched, uninucleate, non-striated and involuntary

d) cylindrical, unbranched, uninucleate, non-striated and voluntary

8. 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

9. The atmosphere is held to the earth by **[1]**

a) wind

b) clouds

c) earth's magnetic field

d) gravity

10. Which of the following is the characteristic of distance travelled by an object? **[1]**

a) It has only magnitude and no specific direction

b) It has a magnitude as well as specific direction

c) It can be zero

d) The distance travelled by an

object is less than the magnitude of the displacement of the object.

11. Which of the following statements is not true about an atom? **[1]**

a) Atoms aggregate in large numbers to form the matter that we can see, feel or touch

b) Atoms are always neutral in nature

c) Atoms are the basic units from which molecules and ions are formed

d) Atoms are not able to exist independently

12. A nail is inserted in the trunk of a tree at a height of 1 metre from the ground level. After 3 years the nail will **[1]**

a) move downloads

b) remain at the same position

c) move sideways

d) move upwards

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. What is the formula of calcium phosphide? **[1]**

a) CaP

b) $Ca_3(PO_4)_2$

c) $CaCl_2$

d) Ca_3P_2

15. A mixture of sulphur and carbon disulphide is **[1]**

a) heterogeneous and shows Tyndall effect

b) heterogeneous and does not show Tyndall effect

c) homogeneous and shows Tyndall effect

d) homogeneous and does not show Tyndall effect

16. The science of growing vegetables, fruits and ornamental plants is called- **[1]**

a) Horticulture

b) Animal Husbandry

c) Floriculture

d) Agriculture

17. **Assertion (A):** At normal pressure (1 atm) the boiling point of water is 100^oC or 373.15 K. **[1]**
Reason (R): As the pressure increases, boiling point of water also increases.

a) Both A and R are true and R is

b) Both A and R are true but R is

the correct explanation of A.

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):** The speed or velocity of a car running on a crowded city, road changes continuously. **[1]**
Reason (R): The movement of a car on a crowded city road is an example of non-uniform acceleration.

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):** A German scientist, E. Goldstein in 1886, modified the discharge tube and passed an electric current through it. **[1]**
Reason (R): He found that the positively charged rays were emitted from the cathode in the discharge tube.

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):** Ciliated epithelium helps in the movement of particles. **[1]**
Reason (R): Cilia help in movement.

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

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

c) A is true but R is false.

d) A is false but R is true.

Section B

21. A battery lights a bulb. Describe the energy changes involved in the process? **[2]**

OR

If a solid of the same density as that of a liquid is placed in it, what will happen to the solid?

22. Is there any similarity in materials? **[2]**

23. Why is it not proper to regard the gaseous state of ammonia as vapours? **[2]**

24. The frequency of a source of sound is 100 Hz. How many times does it vibrate in a minute? **[2]**

25. Na^+ has completely filled K and L shells. Explain. **[2]**

26. Derive the unit of force using the second law of motion. A force of 5 N produces an acceleration of 8 ms^{-2} on a mass 'm_1' and an acceleration of 24 ms^{-2} on a mass' m_2'. What acceleration would the same force provide if both the masses are tied together? **[2]**

OR

Which would require a greater force,accelerating a 2 kg mass at 5 ms^{-2} or a 4 kg mass at 2 ms^{-2}?.

Section C

27. What is the basic difference between the isotopes of an element? **[3]**

28. Kanika carried out an experiment on determination of speed of sound in air using resonance tube apparatus and obtained absurd results. She should **[3]**

a. record the result as such.

b. manipulate the result and report the answer nearer to actual value of velocity of sound in air.

c. copy the result obtained by another student.

d. report the result as such and discuss the matter with the teacher to find out the reasons for wrong results.

Answer the following questions based on the above information:

i. Which is the most appropriate option for Kanika?

ii. What values will Kanika be promoting through preferring this option?

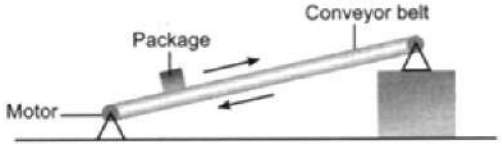
iii. Give one more example of promoting such values in real life situations.

29. A stone is thrown in a vertically upward direction with a velocity of 5 ms^{-1}. If the acceleration of the stone during its motion is 10 ms^{-2}in the downward direction, what will be the height attained by the stone and how much time will it take to reach there? **[3]**

OR

The driver of a car travelling along a straight road with a speed of 72 Km/h observes a signboard which give the speed limit to be 54 Km/h. The signboard is 70 m ahead, when the driver applies the brakes. Calculate the acceleration of the car which will cause the car to pass the signboard at the stated speed limit.

30. Figure shows a conveyor belt transporting a package to a raised platform. The belt is driven by a motor. **[3]**



i. State three types of energy, other than gravitational potential energy, into which the electrical energy supplied to the motor is converted.

ii. The mass of the package is 36 kg. Calculate the increase in the gravitational potential energy (p.e.) of the package when it is raised through a vertical height of 2.4 m.

iii. The package is raised through the vertical height of 2.4 m in 4.4 s. Calculate the power needed to raise the package.

iv. Assume that the power available to raise package is constant. A package of mass greater than 36 kg is raised through the same height. Suggest explain the effect of this increase in mass on the operation of the belt.

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

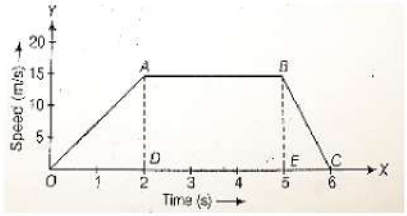
OR

Differentiate between chromatin and chromosome.

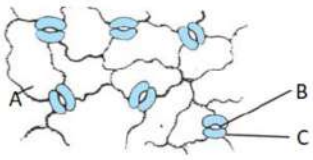
32. The speed-time graph of a car is given. The car weighs 1000 kg. **[3]**

i. What is the distance travelled by car in the first 2s?

ii. What is the braking force applied at the end of 5 s to bring the car to stop within one second?



33. Observe the given below diagram and answer the following questions: **[3]**



i. What does A represent in the given diagram? How does cell 'A' of root hairs cells help in water absorption?

ii. How does B in the given diagram help the plants?

iii. Out of A, B, and C cells in the above diagram, which cell helps in the closing and opening of the stomata? Write the name of the cell.

Section D

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

OR

Grass looks green, papaya appears yellow. Which cell organelle is responsible for this?

35. A car falls off a ledge and drops to the ground in 0.5 s. Let g = 10 ms^{-2} (for simplifying the calculations). **[5]**

i. What is its speed on striking the ground?

ii. What is its average speed during the 0.5 s?

iii. How high is the ledge from the ground?

OR

What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface? (Mass of the earth is 6×10^{24} kg and radius of the earth is6.4×10^{6} m).

36. i. Draw a neat and labelled diagram of the apparatus used to separate components of blue-black ink. Name the process and state the principle involved. **[5]**

ii. Identify, the physical and chemical changes from the following.

a. Burning of magnesium in air.

b. Tarnishing of silver spoon.

c. Sublimation of iodine.

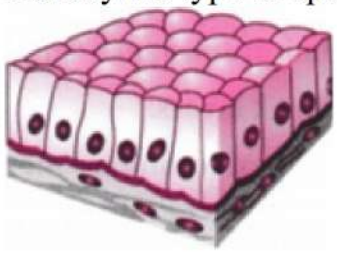
d. Electrolysis of water.

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

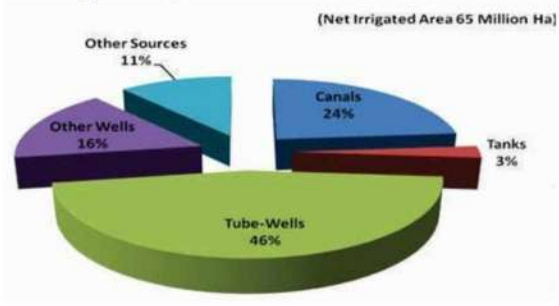
Is excretion is the main function of the cuboidal epithelium?

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

Irrigation

The process of supplying water to crop plants through human efforts by means of canals, wells, reservoirs, tube wells etc., is known as irrigation. Most agriculture in India is dependent on timely monsoons and sufficient rainfall spread through most of the growing season. However, the extra water required by crops is met

through irrigation.



(i) Which is the most common source of irrigation?

(ii) Mention the various sources of irrigation.

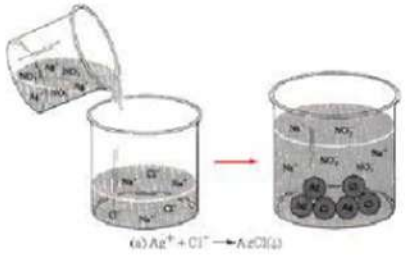
(iii) Which is the least use source of irrigation?

OR

What are the other sources of irrigation?

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

When a solution of silver nitrate is added to a solution of sodium chloride, the silver ions combine with the chloride ions to form a precipitate of silver chloride. Thus, Sodium chloride (NaCl) reacts with silver nitrate ($AgNO_3$) to produce silver chloride (AgCl) and sodium nitrate ($NaNO_3$).



(i) What mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate?

(ii) Calculate the number of oxygen atoms present in 1 gram of calcium carbonate.

(iii) Calculate the mass of 0.5 mole of nitrogen gas.

OR

Calculate the number of molecules in 50 g of NaCl.
[Atomic mass of Ca = 40 u, C = 12 u, O = 16 u, N = 14u, Na = 23u, Cl = 3 5.5u and Na = 6.022×10^{23} mol^{-1}]

SOLUTION

Section A

1. **(b)** (A)
   Explanation: Motion can be non-uniform if there is a change in velocity.
2. **(a)** Both RNA and Proteins
   Explanation: Ribosomes consist of two major components: the small ribosomal subunit, which reads the RNA, and the large subunit, which joins amino acids to form a polypeptide chain. Each subunit is composed of one or more ribosomal RNA (rRNA) molecules and a variety of ribosomal proteins (r-protein).
3. **(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.
4. **(c)** Both Lateral meristem and Secondary meristem
   Explanation: Lateral meristem is responsible for increasing the girth or circumference of the root or stem in a plant. It is found parallel to the long axis in a plant body. The secondary growth in this meristem enhances the girth more than the overall length of the plant. Apical meristem is responsible for the increase of girth of the root.
5. **(a)** (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)
   Explanation:
   - Genes are functional units of heredity that determine the characters of organisms.
   - Diffusion is the process of passage of fluid from a region of high concentration to a region of low concentration. It plays an important role in the gaseous exchange between the cells as well as the cell and its external environment. Water also obeys the law of diffusion.
   - The passage of water from a region of higher water concentration to a region of lower water concentration through a semi-permeable membrane is called osmosis. The movement of water across the plasma membrane is affected by the amount of substance dissolved in water.
   - Plasmolysis is a plant cell that refers to the contraction of protoplast as a result of the loss of water from the cell. The shrinkage of cytoplasm occurs due to exo-osmosis in a hypertonic medium. A hypertonic solution is one that has a lesser concentration of water as compared to that inside the cell. During the process, there is a higher external osmotic pressure and a net flow of water from the cell.
6. **(a)** is absorbed as latent heat of vaporization by the liquid
   Explanation: The latent heat does not increase the kinetic energy of the particles of the substance. and since there is no increase in the kinetic energy of the particles, the temp. of a substance does not rise during the change of state. When the liquid starts boiling, the further heat energy which is supplied is absorbed as latent heat of vaporization by the liquid to change its state of matter.
7. **(c)** spindle-shaped, unbranched, uninucleate, non-striated and involuntary
   Explanation: Smooth muscle has spindle-shaped, non-striated, uninucleated fibers and occurs in walls of internal organs. It is involuntary in action.
8. **(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.

9. **(d)** gravity
   Explanation: Earth's atmosphere is the layer of gases around the Earth. The atmosphere is held in place by Earth's gravity.
10. **(a)** It has only magnitude and no specific direction
    Explanation: Distance is the length of path covered by a moving object in the given time irrespective of direction. Distance has only magnitude and no direction.
11. **(a)** Atoms aggregate in large numbers to form the matter that we can see, feel or touch
    Explanation: The correct statement is that the molecules and ions aggregate together in large numbers to form the matter. We cannot see the individual molecules/ions with our eyes, only we can see the various substances which are a big collection of molecules/ions.
12. **(b)** remain at the same position
    Explanation: When a nail is inserted in the trunk of a tree at a height of 1 metre from the ground, even after 3 year the nail remains at same level. It does not moves upwards as the apical meristem responsible for growth (length) is present in the apices only and lateral meristem responsible of increase in girth will lead to no change in length.
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. **(d)** Ca_3P_2

    Explanation: The valency of Calcium is 2 (Ca^{2+})and the valency of the Phosphide ion is 3 (P^{3-}). A chemical compound is always electrically neutral; so the positive and negative valencies of the ions or radicals present in calcium phosphide should add up to zero. Therefore, the chemical formula of calcium phosphide is Ca_3P_2.
15. **(d)** homogeneous and does not show Tyndall effect
    Explanation: Sulphur and carbon disulphide do not form a uniform composition and the properties of the mixture are not same throughout.
    Therefore, it forms a heterogeneous composition.
    Moreover, it shows a Tyndall effect, because in water sulphur remains suspended whereas carbon disulphide settles down as a layer at the bottom.
16. **(a)** Horticulture
    Explanation: The horticulture is the branch that deals with art, science, technology, and business of growing plants.
17. **(b)** Both A and R are true but R is not the correct explanation of A.
    Explanation: Both A and R are true but R is not the correct explanation of A.
18. **(a)** Both A and R are true and R is the correct explanation of A.
    Explanation: A body has a non-uniform acceleration if its velocity increases by unequal amounts in equal intervals of time.
19. **(c)** A is true but R is false.
    Explanation: A German scientist, E. Goldstein in 1886, modified the discharge tube and passed an electric current through it. He found that the positively charged rays were emitted from the anode in the discharge tube. These rays were called canal rays.
20. **(a)** Both A and R are true and R is the correct explanation of A.
    Explanation: The function of the cilia is to move particles, free cells, or mucus in a specific direction. It is present in the inner surfaces of some hollow organs such as

Fallopian tubes, bronchioles, and small bronchi and helps in the movement of the particles present there. Thus, the function of the ciliated epithelium (as it possesses cilia) is the movement of particles.

Section B

21. A battery has stored chemical energy. The chemical energy is converted into electrical energy during lighting of bulb. So, a battery converts chemical energy into electrical energy. The filament in the bulb becomes white hot and gives out light. Electrical energy is converted into heat and light energy.
    Thus, the energy changes involved in this process can be written as follows:
    Chemical energy → Electrical energy → Heat energy + Light energy.

    OR

    In such a case when the density of solid is exactly equal to that of the liquid, it will remain in equilibrium and keep floating in it. The solid will float in such a way that the entire part of it will remain within the liquid, its upper surface coinciding with the liquid surface.
22. Yes, all materials are made up of one or other kind of matter and the matter possess mass and occupies space.
23. The gaseous state of a substance can be regarded as vapours only in case it is a liquid at room temperature. Since ammonia is a gas at room temperature, its gaseous state cannot be regarded as vapours.
24. Frequency of source of sound being 100 Hz means the sound source vibrates 100 times in one second.
    therefore vibrations made by sound source in 1 min (60 sec) = $100 \times 60 = 6000$
25. Atomic number (Z) of Na is 11; so its electronic configuration is 2, 8, 1 (2 + 8 + 1 = 11). When Na gives away the single electron from its outermost shell, it acquires a net positive charge and changes to Na^+an ion with electronic configuration 2, 8.

    The maximum number of electrons in the first orbit or K-shell can be 2 ($2n^2$; n = 1) and the maximum number of electrons in the second orbit or L-shell can be 8 ($2n^2$; n = 2). The above configuration (2, 8) in Na^+indicates completely filled K and L shells. K shell is completely filled with 2 electrons and the L shell is completely filled with 8 electrons.
26. We know, F = ma = 5N or 5kg ms^{-2}
    $\Rightarrow m_1 = \frac{F}{a_1} = \frac{5}{8} kg$
    $\Rightarrow m_2 = \frac{F}{a_2} = \frac{5}{24} kg$
    If the mass are tied together, then
    $\therefore M = \left(\frac{5}{8} + \frac{5}{24}\right) kg = \left(\frac{5}{6}\right) kg$
    Acceleration produced in M,
    $a = \frac{F}{M} = \frac{5}{\frac{5}{6}} = 6\ ms^{-2}$
    Therefore, if both the masses are tied together, the force would result in an acceleration of 6 ms^{-2}.

    OR

    Here, $m_1 = 2$ kg , $a_1 = 5\ ms^{-2}$, $m_2 = 4$ kg, $a_2 = 2\ ms^{-2}$
    $F_1 = m_1a_1 = 2 \times 5 = 10N$
    $F_2 = m_2a_2 = 4 \times 2 = 8$ N
    $F_1 > F_2$

Thus, accelerating a 2 kg mass at 5 ms^{-2} acceleration would require a greater force than accelerating a mass of 4kg at 2 ms^{-2} .

Section C

27. (i) Different atoms of the same element are called isotopes.
(ii) Each element can have several isotopes.
(iii) The atomic weight of the element differs from the isotopic mass. The abundance of each isotope determines the atomic weight of an element.
(iv) Isotopes of an element differ in the number of neutrons leading to different mass numbers.

28. i. (d)
ii. Intellectual honesty, desire to know more and improve.
iii. Submitting honest information for income tax returns, honest dealings.

29. u = 5 ms^{-1}, a = -10 ms^{-2}
v = 0 (since at maximum height its velocity will be zero)
v = u + at = 5 + (-10) × t
0 = 5 – 10t
10t = 5, or, t = 5/10 =0.5second.
$s = ut + \frac{1}{2}at^2 = 5 \times 0.5 + \frac{1}{2} \times (-10) \times 0.5^2$
= 2.5 – 1.25 = 1.25m

OR

Initial speed = u=72 km/hr
$= \frac{72 \times 5}{18} = 20 m/s$
Final speed = v = 54km/h
$= \frac{54 \times 5}{18} = 15 m/s$
Distance = s = 70 m
Now, $v^2 - u^2 = 2as$
$(15)^2 – (20)^2 = 2 \times a \times 70$
225 - 400 =140 a
- 175 =140 a
a = -1.25 m/s^2 (negative sign shows retardation)

30. i. a. Kinetic energy of belt or the package.
b. Heat energy
c. Sound energy

ii. m = 36 kg, h = 2.4 m, g = 10 m/s^2
G.P.E.= $m \times g \times h$
= 36 × 10 × 2.4
= 864J

iii. $power = \frac{W}{t}$
$power = \frac{864}{4.4}$
= 196.36 W

iv. Mass is increased and power is constant, so increase in potential energy of mass is greater. Also, as mass is increased, speed is reduced and hence time taken by the conveyor is longer.

31. Chloroplasts contain the pigment chlorophyll which is responsible for food preparation in plants by the process of photosynthesis. Hence, if there were no chloroplasts then

there would not have been any plant life.

OR

Chromatin	Chromosome
1.It is the nucleoprotein of chromosomes which stains strongly with basis dyes and is present inside the nucleus.	1.Thread - like, stainable, condensed chromatin, visible at cell division and containing hereditary information in the form of genes.
2. Chromatin Fibers are Long and thin. They are uncoiled structures found inside the nucleus.	2. Chromosomes are compact, thick and ribbon-like. These are coiled structures seen prominently during cell division.
3. Chromatin is unpaired.	3. Chromosome is paired.
4. Found throughout the cell cycle.	4. Distinctly visible during cell division (metaphase, anaphase) as highly condensed structures upto several thousand nm.

32. i. Distance travelled by car in first 2 s = Area of $\Delta OAD = \frac{1}{2} \times 2 \times 15 = 15\ m$

ii. Braking force, F = m × a

Given, mass of the car, m = 1000 kg, initial velocity, u = 15 m/s, final velocity, v = 0, time, t = 1 s

On appliying, $a = \frac{v-u}{t} \Rightarrow a = \frac{0-15}{1} = -15\ m/s^2$

∴ F = m a = 1000 × (-15) = - 15000 N

33. i. In the given diagram of the epidermis, A represents the epidermal cells of the roots bear long hair-like parts called root hairs. With the help of these cells, root hairs greatly increase the total absorptive surface area and help in water absorption.

ii. B represents the stomata. Stomata are the pores present in the epidermis of the leaves. Stomata help in the exchange of gases with the atmosphere during photosynthesis and respiration. Also, the process of transpiration (loss of water in the form of water vapour) takes place through stomata.

iii. C cell that represents the guard cells. These cells are kidney-shaped that enclose the stomata and thus help in the opening and closing of stomata.

Section D

34. 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

Plastids are responsible. These are found in plant cells only. Plastids are the major cell organelles in plants. On the basis of pigments present in plastids, they are divided into two types;

i. the colourless leucoplasts and

ii. the pigmented chromoplasts.

The colourless leucoplasts store starch, oil and protein granules whereas the pigmented chromoplasts have different colours and can be of several types. The most important ones are those containing the pigment chlorophyll, known as chloroplasts, which is responsible for the preparation of food by photosynthesis. Other chromoplasts contain non-green pigments, which are responsible for the characteristic colours of fruits and flowers.

35. We have given that,

Time taken , t = $\frac{1}{2}$ second

Initial velocity, u = 0 ms^{-1}

Acceleration due to gravity, g = 10 ms^{-2}

Acceleration of the car, a = + 10 ms^{-2} (downward)

i. speed v = at

v = 10 ms^{-2} × 0.5 s

= 5 ms^{-1}

Thus,

Its speed on striking the ground = 5 ms^{-1}

ii. Average spped = $\frac{u+v}{2}$

= $\frac{(0ms^{-1}+5ms^{-1})}{2}$

= 2.5 ms^{-1}

Thus,

Its average speed during the 0.5 s = 2.5 ms^{-1}

iii. Distance travelled, s = $\frac{1}{2}at^2$

= $\frac{1}{2} \times 10ms^{-2} \times (0.5s)^2$

= $\frac{1}{2} \times 10ms^{-2} \times 0.25s^2$

= 1.25m

Thus,

Height of the ledge from the ground = 1.25 m

OR

$F_{gravitation} = \frac{G \times M_e \times m_o}{r^2}$

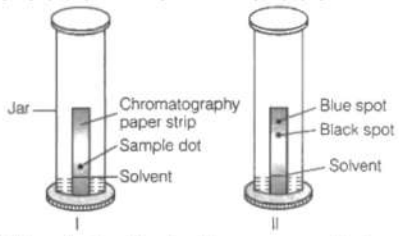
$= \frac{6.67 \times 10^{-11} \times 6 \times 10^{24} \times 1}{(6.4 \times 10^6)^2}$

$= \frac{6.67 \times 6 \times 10^{-11+24}}{6.4 \times 6.4 \times 10^{12}}$

$= \frac{6.67 \times 6}{6.4 \times 6.4} \times 10^{-11+24-12}$

$= 0.9770 \times 10N = 9.770N$

36. i.



The labelled diagram of the apparatus used to separate components of blue-black ink is shown above.

Name of the process: Paper chromatography.

Principle of paper chromatography: Different components of a mixture move with different speeds in a solvent, so they separate at different heights. Here blue ink and black ink rise with the help of solvent at different speeds to form two spots at different heights.

ii. The physical and chemical changes are as follows:
- Burning of magnesium in the air: Chemical change
- Tarnishing of silver spoon: Chemical change
- Sublimation of iodine: Physical change
- Electrolysis of water: Chemical change

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.

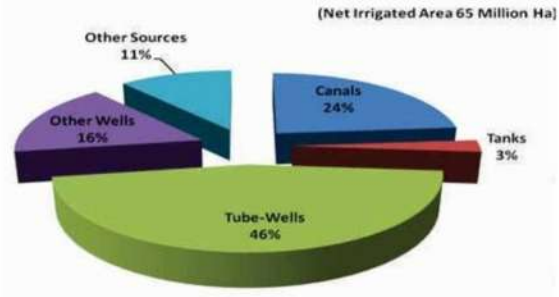
OR

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

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

Irrigation

The process of supplying water to crop plants through human efforts by means of canals, wells, reservoirs, tube wells etc., is known as irrigation. Most agriculture in India is dependent on timely monsoons and sufficient rainfall spread through most of the growing season. However, the extra water required by crops is met through irrigation.



(i) The most common source of irrigation is tube wells. Irrigation is the artificial process of applying controlled amounts of water to land to assist in the production of crops.
(ii) The various sources of irrigation are canals, tanks, tube wells, other wells, and other sources like rainwater harvesting.
(iii)The last source of irrigation tanks.

OR

The other sources include rainwater harvesting and watershed management.

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

When a solution of silver nitrate is added to a solution of sodium chloride, the silver ions combine with the chloride ions to form a precipitate of silver chloride. Thus, Sodium chloride (NaCl) reacts with silver nitrate ($AgNO_3$) to produce silver chloride (AgCl) and sodium nitrate ($NaNO_3$).

(i) Silver nitrate + $\underset{5.85g}{Sodium\ chloride} \rightarrow \underset{14.35g}{Silver\ chloride} + \underset{8.5g}{Sodium\ nitrate}$

Let mass of silver nitrate be x grams.

Total mass of reactants = Total mass of products

$x + 5.85 = 14.35 + 8.5 \Rightarrow x + 5.85 = 22.85$

$\Rightarrow x = 22.85 - 5.85 \Rightarrow x = 17$ g

Therefore, silver nitrate is 17 g.

(ii) The molecular weight of calcium carbonate is 100 g per mole.

1 g of calcium carbonate corresponds to 0.01 mole.

1 mole of calcium carbonate contains three oxygen atoms.

Thus, 0.01 mole of calcium carbonate will contain 0.03 moles of oxygen atoms which is equal to $0.03 \times 6.02 \times 10^{23} = 1.8 \times 10^{22}$ oxygen atoms

(iii) Mass of 1 mole of N_2 gas $= 2 \times 14 = 28$ g

$\therefore$ Mass of 0.5 mole of N_2 gas $= 28 \times 0.5 = 14$ g

OR

Molar mass of 1 mole of NaCl = 23 + 35.5 = 58.5 g

$\because$ 58.5 g of NaCl contains 6.022×10^{23} molecules

$\therefore$ 50 g of NaCl will contains $\frac{6.022 \times 10^{23}}{58.5} \times 50 = 5.147 \times 10^{23}$ molecules