SAMPLE PAPER - 8

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 is not a chemical change? **[1]**

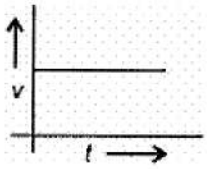
A. Changing of milk into curd
B. Freezing of water
C. Burning of paper
D. Mixing of iron filling & sand

a) (B) and (D) are correct
b) All of these
c) (A) and (B) are correct
d) (A), (B) and (C) are correct

2. Amoeba acquires its food through a process, termed **[1]**

a) plasmolysis
b) endocytosis
c) both exocytosis and endocytosis
d) exocytosis

3. From the given v-t graph, it can be inferred that the object is: **[1]**



a) in non-uniform motion
b) at rest
c) Non of these
d) in uniform motion

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

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

5. If the tip of sugarcane plant is removed from the field, even then it keeps on growing in length. It is due to the presence of **[1]**

a) lateral meristem
b) intercalary meristem
c) cambium
d) apical meristem

6. Amoeba acquires its food through**:** **[1]**

a) Exocytosis & Endocytosis
b) Exocytosis
c) Plasmolysis
d) Endocytosis

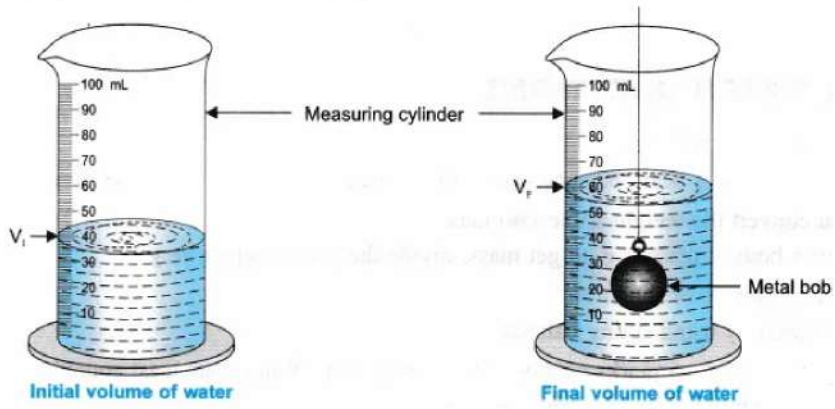
7. Which of the following statements is not true about an atom? **[1]**

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

8. Parenchyma which contains chlorophyll and helps in photosynthesis is called _____. **[1]**

a) Collenchyma
b) Aerenchyma
c) Sclerenchyma
d) Chlorenchyma

9. The water level in a measuring cylinder, before and after immersing a metal cube in it, is shown in the figure. The volume of the metal cube is: **[1]**



a) 18 cm^3
b) 24 cm^3
c) 20 cm^3
d) 22 cm^3

10. The displacement of a body is proportional to the cube of the time lapsed. The magnitude of the acceleration is: **[1]**

a) decreasing with time
b) increasing with time
c) constant
d) zero

11. What is the name given to 6.022×10^{23}? **[1]**

a) Atomic mass
b) Mass number
c) None of these
d) Avogadro constant

12. 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 Secondary meristem
d) Apical meristem

13. Membrane-bound cell organelles are not found in _____ cells. **[1]**

a) Fungal
b) Eukaryotic
c) Prokaryotic
d) Amoeba

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

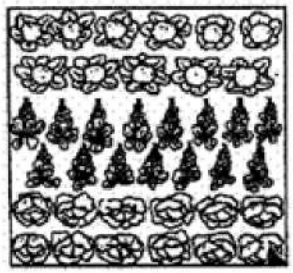
(1) 1 mole of O_2	(A) 6.022×10^{23} molecules
(2) 1 mole of N	(B) 12 g
(3) 1 mole of C	(C) 6.022×10^{23} atoms
(4) 1 mole of H_2O	(D) 18 g

a) 1-C, 2-B, 3-D, 4-A
b) 1-D, 2-A, 3-C, 4-B
c) 1-A, 2-C, 3-B, 4-D
d) 1-B, 2-D, 3-A, 4-C

15. Arun has prepared 0.01% (by mass) solution of sodium chloride in water. Which of the following correctly represents the composition of the solutions? **[1]**

a) 1.00g of NaCl + 100g of water
b) 0.10 g of NaCl + 99.90g of water
c) 0.01g of NaCl + 99.99g of water
d) 0.11g of NaCl + 100g of water

16. **[1]**



The figure given above represents :

a) intercropping
b) organic farming
c) mixed cropping
d) crop rotation

17. **Assertion (A):** The speedometer of an automobile measure the average speed of the automobile. **[1]**
Reason (R): Average velocity is equal to total displacement per total time-taken.

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):** Liquids diffuse easily as compared to gases. **[1]**
Reason (R): Intermolecular forces are greater in gas.

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):** Animals of colder regions and fishes of cold water have a thicker layer of subcutaneous fat. **[1]**
Reason (R): The thick layer of subcutaneous fat acts as an insulator and prevents the heat of the body to escape out. The layer of fat acts as subcutaneous insulation of body for thermoregulation.

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):** Bohr's orbits are called stationary orbits. **[1]**
Reason (R): Electrons remain stationary in these orbits for sometime.

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. Define average power. **[2]**

OR

Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 kmh^{-1}.

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

23. A Sonar emits pulses on the surface of water which are detected after reflection from the bottom. If the time interval between the emission and detection of the pulse is 2 s find the depth of water. Take velocity of sound in water as 1531 ms^{-1}. **[2]**

24. Why do solids generally lack the property of diffusion? **[2]**

25. A bullet of mass 10 g is fired with a rifle. The bullet takes 0.003 s to move through its barrel and leaves with a velocity of 300 ms^{-1}. What is the force exerted on the bullet by the rifle? **[2]**

OR

A truck starts from rest and rolls down a hill with constant acceleration. It travels a distance of 400 metres in 20 s. Find its acceleration. Find the force acting on it, if its mass is 7 metric tons.

26. Write the electronic configuration of any one pair of isotopes and isobars. **[2]**

Section C

27. 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.

28. Rutherford's atomic model was a reasonably good model of structure of atom based on the famous particle scattering experiment. However, it was subsequently modified by Neils Bohr and later on, by others. The resulting improvements in the understanding of atomic structure have greatly contributed to further scientific **[3]**

advancement. There are many other similar examples in scientific field when original contributors happily accept modifications in their ideas.

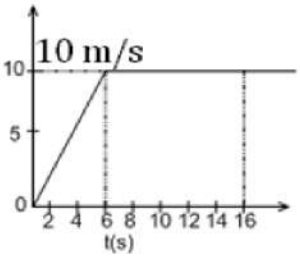
Answer the following questions based on the above information:

i. Name the scientific values associated with above anecdotes.

ii. Give any example from your life experiences so far which reflects display of such a value by you as an individual.

iii. In what way such a personal attribute is likely to help you?

29. The velocity time graph of runner is given in the graph. **[3]**

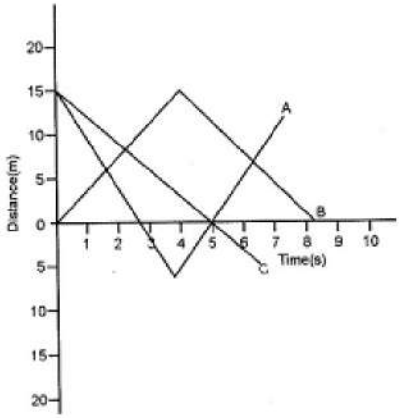


a. What is the total distance covered by the runner in 16s?

b. What is the acceleration of the runner at t = 11s?

OR

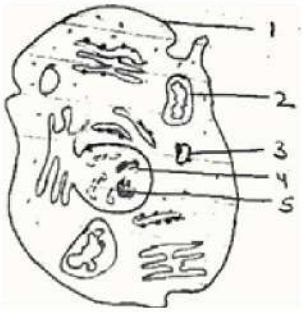
Discuss the graphs A, B and C shown in the figure. Compare the total distance travelled and the displacements. Which graph represents a motion with negative acceleration?



30. Amit buys few grams of gold at the poles as per the instruction of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why? **[3]**

31. Akhtar, Kiran and Rahul were riding in a motor car that was moving with a high velocity on an express way when an insect hit the windshield and got stuck on the windscreen. Akhtar and Kiran started pondering over the situation. Kiran suggested that the insect suffered a greater change in momentum as compared to the change in momentum of the motor car (because the change in the velocity of the insect was much more than that of the motor car). Akhtar said that since the motor car was moving with a larger velocity, it exerted a larger force on the insect and as a result ,the insect died. Rahul while putting an entirely new explanation said that both the motor car and the insect experienced the same force and a change in their momentum. Comment on these suggestions. **[3]**

32. Observe the diagram of the cell below - answer the following questions. **[3]**



i. Label the parts of the cell

ii. what function does part 1 perform?

iii. If the organelle 2 is removed from the cell, what effect is it going to make on the functions of the cell?

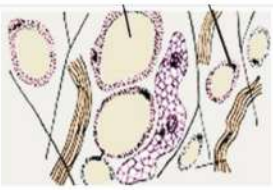
iv. Identify, whether it is plant cell or animal cell

v. Which structure is called 'Powerhouse of the cells'?

OR

How is a prokaryotic cell different from a eukaryotic cell?

33. Observe the given below image of the tissue and answer the following questions: **[3]**



i. Identify the type of tissue shown in the given image.

ii. Where is it found?

iii. Why this tissue acts as an insulator?

Section D

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

ii. Suppose the radius of the earth becomes twice of its present radius without any change in its mass. What will happen to your weight?

OR

A stone is dropped from the edge of a roof.

i. How long does it take to fall 4.9 m?

ii. How fast does it move at the end of that fall?

iii. How fast does it move at the end of 7.9 m?

iv. What is its acceleration after 1s and after 2 s?

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

OR

Write the main function of each of the following.

(a) Plasma membrane

(b) cell wall

(c) Ribosome

(d) Lysosome

(e) Nucleolus

(f) Endoplasmic reticulum

36. i. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293K. Find its concentration at this temperature. **[5]**

ii. Calculate the mass of glucose and mass of water required to make 200g of 25% solution of glucose.

Section E

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

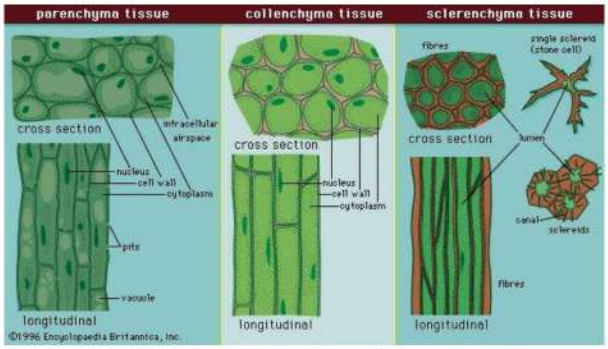
Permanent tissues are of two types that is Simple permanent tissues and Complex permanent tissues.

Simple permanent tissues subdivided as follows:

i. **Parenchyma:** Tissues provide support to plants. They are loosely packed and has large intracellular space. Parenchyma with chlorophyll which performs photosynthesis is called chlorenchyma.

ii. **Collenchyma:** Tissue are thickened at the corners, have very little intercellular space. It allows easy bending of various parts of a plant without breaking.

iii. **Sclerenchyma:** Cells of this tissue are dead and commonly seen in the husk of a coconut.



(i) In which of the simple plant tissue, deposition of lignin is found? Also describe lignin.

(ii) Why is cork impervious to gases and water?

OR

Which type of tissue is present in the cortex of the root and veins of the leaves?

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

Cattle Breeding

Cross-breeding helps in the development of certain desired characteristics in animals like, Increased milk production, Resistance against diseases, Breeds that require less amount of quality feed.

Exotic breed cattle (long lactation) are interbred with the locally bred cattle (high resistance to the diseases) to produce high quality bred that contain both the characteristics. In order to obtain a good quality of milk from the cattle, it is important to manage shelter, food, breeding and disease control of cattle. Cattle are prone to various internal and external parasites, bacteria and virus which are likely to affect their milk production.

(i) What are milch animals ?

(ii) What are the draught animals?

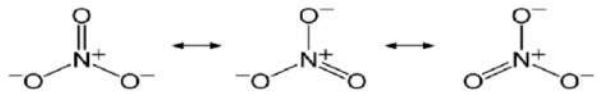
(iii) How does cross-breeding help in cattle breeding?

OR

Mention the preconditions for a good yield of milk.

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

Nitrate is an organic polyatomic ion carrying a **'-1' charge**, made of one Nitrogen and 3 Oxygen atoms. Nitrite is an inorganic polyatomic ion carrying a '-1' charge, made of one Nitrogen and two Oxygen atoms. The oxidation number in Nitrogen is +5.



An element ${}^{14}_{7}A$ exists as diatomic gas in nature which is relatively inert and forms 78% of earth's atmosphere.

(i) Identify the gas and write its molecular formula. Write the formulae of nitrite and nitrate ions.

(ii) How many moles of this gas would contain 12.044×10^{23} atoms of this element?

(iii) What is the mass of one atom of H in a.m.u if Avogadro's number have been 1×10^{10} instead of 6.02×10^{23}?

OR

Calculate the molecular mass of NH_4NO_3 [Given atomic masses N = 14 u, O = 16 u, H = 1 u]

Solution

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Class 09 - Science

Section A

1. **(a)** (B) and (D) are correct
   Explanation: Because in both cases no new substance with new chemical properties is formed.
2. **(b)** endocytosis
   Explanation: Amoeba acquires its food through the process of Endocytosis. Actually it has cytoplasmic projections called psedupodia (false feet) that extend out of its body. It moves the pseudopodia towards the food and take it in its body through the process of endocytosis.
3. **(d)** in uniform motion
   Explanation: From the given v-t graph, it is clear that the velocity of the object is not changing with time i.e., the object is in uniform motion.
4. **(c)** Eutrophication
   Explanation: The enrichment of water bodies with nutrients leading to excessive growth of phytoplankton is called **Eutrophication**. **Eutrophication** or more precisely **hypertrophication**, is the enrichment of a water body with nutrients, usually with an excess amount of nutrients. This process induces the growth of plants and algae and due to the biomass load, may result in oxygen depletion of the water body.
   Eutrophication is an enrichment of water by nutrient salts that causes structural changes to the ecosystem such as increased production of algae and aquatic plants, depletion of fish species, general deterioration of water quality, and other effects that reduce and preclude use. Eutrophication is almost always induced by the discharge of phosphate-containing detergents, fertilizers, or sewage into an aquatic system.
5. **(b)** intercalary meristem
   Explanation: If the tip of sugarcane plant is removed the apical meristem is also removed as it is situated in the apices of growing roots and stem. Intercalary meristem are located at the base of leaves or nodes and leads to the increase in the length of an organ such as leaves and internodes.
6. **(d)** Endocytosis
   Explanation: Amoeba acquires its food by the process of endocytosis with the help of finger-like projections called pseudopodia (Pseudo means false; podia means feet). The flexibility of the plasma membrane enables amoeba to use pseudopodia to engulf food and other material from its environment.
7. **(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.
8. **(d)** Chlorenchyma
   Explanation: Parenchyma tissues which contain chlorophyll and helps in photosynthesis are called chlorenchyma.
9. **(c)** 20 cm^3
   Explanation: 60 – 40 = 20 cm^3
10. **(b)** increasing with time
    Explanation: Acceleration is directly proportioned to time, it varies linearly with time and increases with respect to time.
11. **(d)** Avogadro constant
    Explanation: The fixed number of atoms or molecules present in the gram atomic mass of an atom or molecules is 6.022 $\times 10^{23}$. This number is known as Avogadro constant.
12. **(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.

13. **(c)** Prokaryotic

Explanation: Prokaryotic cells lack a nuclear envelope and membrane-bound cell organelles.

14. **(c)** 1-A, 2-C, 3-B, 4-D

Explanation:

(1) 1 mole of O_2	(A) 6.022×10^{23} molecules
(2) 1 mole of N	(C) 6.022×10^{23} atoms
(3) 1 mole of C	(B) 12 g
(4) 1 mole of H_2O	(D) 18 g

15. **(c)** 0.01g of NaCl + 99.99g of water

Explanation: Mass% = $\frac{\text{mass of solute}}{(\text{mass of solute} + \text{mass of solvent})} \times 100$

$= \frac{0.01g \times 100}{(0.01+99.99)0} = \frac{0.01 \times 100}{100.00} = 0.01\%$

Hence, the mass of solute =0.01 g and the mass of solvent = 99.99gms.

16. **(a)** intercropping

Explanation: When two or more crops are grown simultaneously on the same field; in a definite pattern, it is called inter-cropping. Unlike intercropping, no set pattern is followed in mixed cropping.

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

Explanation: Speedometer measures instantaneous speed of automobile.

18. **(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.

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

Explanation: Animals of colder regions and fishes of cold water have a thicker layer of subcutaneous fat. The thick layer of subcutaneous fat acts as an insulator and prevents the heat of the body to escape out. The layer of fat acts as subcutaneous insulation of the body for thermoregulation.

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

Explanation: Electrons in different orbits have fixed energies.

Section B

21. When a machine or person does different amounts of work or uses energy in different interval of time, the ratio between the total work or energy consumed to the total time is average power.

$Average\ Power = \frac{Time\ work\ done\ or\ energy\ consumed}{Total\ time}$

OR

Mass of car = 1500 kg

Vel. of car = 60 kmh^{-1} = $\frac{60 \times 1000}{60 \times 60}$ = 16.67ms^{-1}

W.D. = Change in K.E. of the car = K_f - K_i

$K_i = \frac{1}{2}mv^2 = \frac{1}{2} \times 1500 \times (16.67)^2$

$= \frac{1}{2} \times 1500 \times 277.89$

= 208416.68

Also K_f = 0

∴ W = 0 - 208416.68

= -208416.68 J

22. 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.

23. Given : Time = 2s, velocity of sound in water = 1531 ms^{-1}

Let the depth of water = d

Therefore total distance travelled by sound before it is detected by the sonar = 2 d

Using the expression distance = Velocity × Time

We have 2d = 1531 × 2

Therefore d = $\frac{1531 \times 2}{2}$ = 1531 m

24. This is because of the absence of kinetic energy in the solid state since the particles are very closely packed.
25. Mass of bullet (m) = 10 g = 0.01 kg

    Initial velocity of the bullet (u) = 0

    Final velocity of the bullet (v) = 300 ms^{-1}

    Time (t) = 0.003 s

    Now acceleration of the bullet $a = \frac{v-u}{t} = \frac{300-0}{0.003} = 100,000 ms^{-2}$

    Hence force on the bullet F = ma

    F = 0.01 $\times$ 100,000 = 1000 N

    OR

    We are given,

    Initial velocity u = 0 ms^{-1}

    Distance travelled, S = 400 m

    Time interval, t = 20 s

    Mass of the truck, m = 7 m ton = 7000 kg

    a) To find the acceleration of the truck

    Using the equation of motion, S = ut + $\frac{1}{2}at^2$ we have

    400 = 0 + $\frac{1}{2}$ a$(20)^2 \Rightarrow$ a = $\frac{2\times400}{20\times20}$ = 2ms^{-2}

    b) To find the force acting on the truck

    Using Newton's second law of motion,

    F = m $\times$ a = 7000 $\times$ 2 ms^{-2} = 14000 N
26. **Isotopes** are atoms with the same number of protons but different number of neutrons. Since the atomic number is equal to the number of protons and the atomic mass is the sum of the number of protons and neutrons, it can also be said that **isotopes** are atoms of the same element with the same atomic number but different mass number.

    Isotopes of carbon:

    ${}_6C^{12}$ and ${}_6C^{14}$ both have same number of electrons and protons but different number of neutrons. Their electronic configuration is the same viz. **2, 4**.

    Isobars: Isobars are atoms (nuclides) of different chemical elements that have the same number of nucleons. They have the same atomic mass but different atomic number.

    ${}_{20}Ca^{40}$ (Electronic configuration of calcium is **2,8,8,2)** and ${}_{18}Ar^{40}$ (Electronic configuration of argon is **2,8,8**) are isobars.

Section C

27. i. (d)
    ii. Intellectual honesty, desire to know more and improve.
    iii. Submitting honest information for income tax returns, honest dealings.
28. i. Scientific values associated with above anecdotes are intellectual honesty, open-mindedness, and ability to accept failure for the benefit of the common good.
    ii. Mention any example(s) - say your perception about culture and traditions / your incorrect understanding of a physical phenomenon - and subsequent change in belief.
    iii. Such a personal attribute helps in the improvement of the cognitive/thought processes, and leads to a better learning.
29. a. We know that area under v-t graph gives displacement.

    So, Area = distance (S) = area of triangle + area of rectangle

    Area of triangle = $\frac{1}{2} \times base \times height$

    = $\frac{1}{2} \times 6 \times 10$

    = 30 m

    Area of rectangle = length $\times$ breadth

    = (16-6) $\times$ 10

    =10 $\times$ 10

    = 100 m

    Total area = 100 + 30 = 130m

    Therefore distance covered by the runner in 16s = 130 m

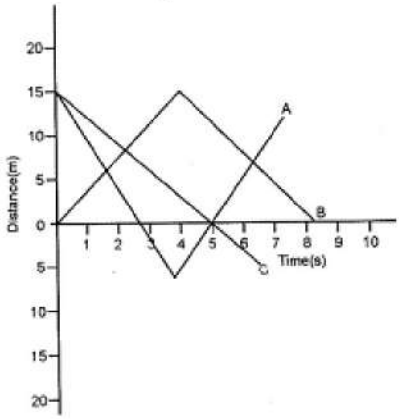
    b. Since, at t = 11 sec, runner is travelling with uniform velocity so, there is no change in velocity hence acceleration is zero.

    OR

i. GRAPH A: The displacement of the body is 12 m and the distance travelled is 37 m

ii. GRAPH B: Displacement is zero and the distance travelled is 15 + 15 = 30 m

iii. GRAPH C: Displacement is about 5 m and distance travelled is about 20 m.



Graph C represents a motion with negative acceleration.

30. Weight of an object = mg

where 'm' is mass of the object at the equator than at the poles as the magnitude of 'g' is less at the equator than at the poles.

So, his friend will not agree with weight of the gold at the poles when measured at equator.

31. Kiran's suggestion is wrong because the mass of insect is very small and velocity of insect will be same as that of motor car after collision;hence change in momentum of insect cannot be greater than that of a motor car.Akhtar's statement is also wrong;because the force is not due to larger velocity,it is due to change in momentum.

32. a. 1. Cell membrane
    2. Mitochondrion
    3. RER
    4. Chromosome
    5. Nucleolus

    b. Selective transport of substances.

    c. Cell becomes energy deficient

    d. Animal cell (cell wall absent)

    e. Mitochondria

OR

Prokaryotic cell	Eukaryotic cell
Size : generally small (1-10 µm) where 1 µm = 10^{-6}m	Size: generally large (5-100 µm)
Nuclear region: It is not well defined and known as the nucleoid.	Nuclear region: well defined and surrounded by a nuclear membrane
Chromosome: single	More than one chromosome
Membrane-bound cell organelles absent	Membrane-bound cell organelles are present.

33. i. The given image shows adipose connective tissue.

ii. Adipose connective tissue is found below the skin and between internal organs.

iii. The cells of adipose connective tissue are filled with fat globules. So the storage of fats let it act as an insulator.

Section D

34. i. We know that, Original weight,W_o = mg = $\frac{GMm}{R^2}$, where M is the mass of the earth, m= mass of body.

Let the new mass of earth = M'

According to question, New mass, M' = M + 10% of M = M + $\frac{10}{100}$M = M + $\frac{M}{10}$ = $\frac{11M}{10}$ = 1.1M

∴New weight, W_n= $\frac{GM'm}{R^2}$ = $\frac{G\times1.1Mm}{R^2}$

Now, Ratio of new weight to original weight = $\frac{New\ weight}{Original\ weight}$ = $\frac{1.1GMm/R^2}{GMm/R^2}$ = 1.1

New weight becomes 1.1 times the original weight of body.

i.e., weight of body will increase by 10%.

ii. Again, Original Weight, $W_o = \frac{GMm}{R^2}$, where R is the radius of the earth.

According to question, when R changes to 2R, the new weight is given by,

New weight, $W_n = \frac{GMm}{4R^2}$

Now, Ratio of new weight to original weight $= \frac{New\ weight}{Original\ weight} = \frac{GMm/4R^2}{GMm/R^2} = \frac{1}{4}$

Therefore, New weight becomes $\frac{1}{4}$ times of original weight

OR

A stone is dropped from the edge of a roof.

Given, initial velocity $u = 0$

Acceleration $g = 9.8$ m/s^2

i. Displacement $= s = 4.9$ m

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

$4.9 = 0 \times t + \frac{1}{2} \times 9.8 \times t^2$

$t^2 = \frac{9.8}{9.8} = 1$

$\Rightarrow t = 1$ s

The stone takes 1 s to fall 4.9 m

ii. We have, $v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 9.8 \times 4.9$

$v^2 = 96.04$

$\Rightarrow v = \sqrt{96.04} = 9.8$ m/s

At the end of 4.9 m, stone will be moving at a speed of 9.8 m/s

iii. We have, $v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 9.8 \times 7.9$

$v^2 = 154.84$

$\Rightarrow v = 12.44$ m/s

The stone will be moving with a speed of 12.44 m/s at the end of 7.9 m.

iv. During the free fall the acceleration produced in a body remains constant.

So, acceleration after 1 s = 9.8 m/s^2

Acceleration after 2 s = 9.8 m/s^2

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

(a) Plasma membrane – The cell membrane separates the cell from its external environment, and is selectively permeable (controls what gets in and out). It protects the cell and provides stability. Proteins are found embedded within the plasma membrane, with some extending all the way through in order to transport materials.

(b) Cell wall – The cell wall is a rigid organelle composed of cellulose and lying just outside the cell membrane. The cell wall gives the plant cell it's box-like shape. it also protects the cell. The cell wall contains pores which allow materials to pass to and from the cell membrane

(c) Ribosome – Ribosomes are small particles which are found individually in the cytoplasm and also line the membranes of the rough endoplasmic reticulum. Ribosomes produce protein. They could be thought of as "protein factories" of the cell.

(d) Lysosome –Lysosomes are small sac-like structures surrounded by a single membrane and containing strong digestive enzymes which when released can break down worn out organelles or food. The lysosome is also known as a suicide sac.

(e) Nucleolus – It synthesizes ribosome

(f) Endoplasmic Reticulum – Produces lipids and proteins and also in intracellular transport of substances.

36. i. Concentration of sol = $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$

$= \frac{36}{136} \times 100$

= 26.4% (by mass)

ii. Given mass of solution(M) = 200g

Concentration of solution = 25%

Since, Mass by Mass percentage of solution = $\frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$

$\Rightarrow 25 = m \times \frac{100}{200} g$

$\Rightarrow m = 25 \times \frac{200}{100} = 50g$

$\therefore$ mass of solute = 50g

mass of solvent (water) = M - m = 200g - 50g = 150g

Section E

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

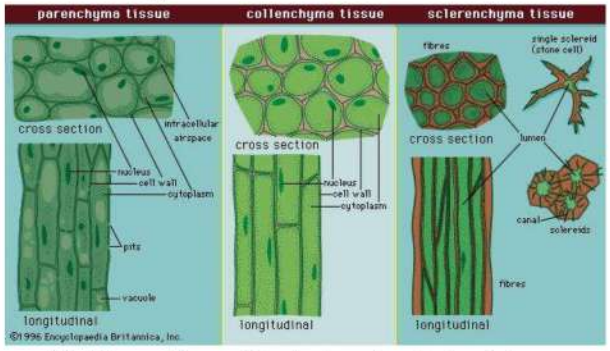
Permanent tissues are of two types that is Simple permanent tissues and Complex permanent tissues.

Simple permanent tissues subdivided as follows:

i. **Parenchyma:** Tissues provide support to plants. They are loosely packed and has large intracellular space. Parenchyma with chlorophyll which performs photosynthesis is called chlorenchyma.

ii. **Collenchyma:** Tissue are thickened at the corners, have very little intercellular space. It allows easy bending of various parts of a plant without breaking.

iii. **Sclerenchyma:** Cells of this tissue are dead and commonly seen in the husk of a coconut.



(i) Sclerenchyma, Lignin is a chemical substance present in the cell wall of plant that acts as cement and hardens it.

(ii) Due to presence of a chemical substance called suberin.

OR

The parenchyma tissue is present in the cortex of roots and sclerenchyma tissue is present in the veins of the leaves.

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

Cattle Breeding

Cross-breeding helps in the development of certain desired characteristics in animals like, Increased milk production, Resistance against diseases, Breeds that require less amount of quality feed.

Exotic breed cattle (long lactation) are interbred with the locally bred cattle (high resistance to the diseases) to produce high quality bred that contain both the characteristics. In order to obtain a good quality of milk from the cattle, it is important to manage shelter, food, breeding and disease control of cattle. Cattle are prone to various internal and external parasites, bacteria and virus which are likely to affect their milk production.

(i) Animals that produce milk are called **milch animals**. In India, buffaloes are the primary source of milk. Example - Cows, goats, buffaloes.

(ii) Animals that are used for carrying out agricultural work like tilling, carting etc. are called draught animals (males and females that are poor in milk-yielding varieties).

(iii) Cross-breeding helps in the development of certain desired characteristics in animals like,

i. Increased milk production.

ii. Resistance against diseases.

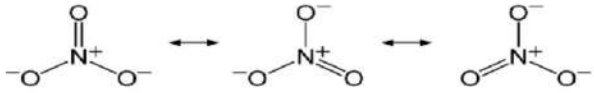
iii. Breeds that require less amount of quality feed.

OR

In order to obtain good quality milk from the cattle, it is important to manage shelter, food, breeding, and disease control of cattle.

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

Nitrate is an organic polyatomic ion carrying a **'-1' charge**, made of one Nitrogen and 3 Oxygen atoms. Nitrite is an inorganic polyatomic ion carrying a '-1' charge, made of one Nitrogen and two Oxygen atoms. The oxidation number in Nitrogen is +5.



An element ${}^{14}_{7}A$ exists as diatomic gas in nature which is relatively inert and forms 78% of earth's atmosphere.

(i) Nitrogen gas (N_2), nitrate ion (NO_2^-), nitrate ion (NO_3^-)

(ii) 1 mole of N_2 gas 6.022×10^{23} molecules of N_2

$= 2 \times 6.022 \times 10^{23}$ atoms of N

$= 12.044 \times 10^{23}$

(iii)As H atom contains only protons, so mass of one atom of H = 1 amu.

OR

Molecular mass of NH_4NO_3

$= 14 + 1 \times 4 + 14 + 3 \times 16$

= 80 u