CBSE Class 09 Science

Sample Paper 04 (2020-21)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

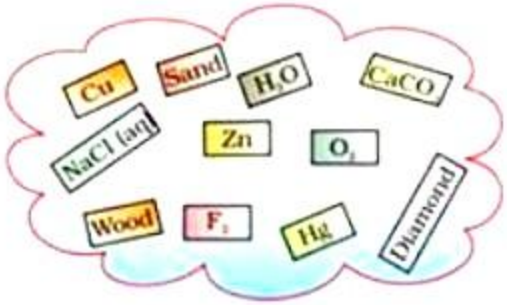
i. The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
ii. Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple-choice questions (MCQs), very short answer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

Section A

1. Name the technique to separate:-
   (i) butter from curd
   (ii) salt from sea-water
   (iii) camphor from salt

OR

Classify the substances given in Fig. into elements and compounds:



2. Explain the Pure substance.
3. Plasmolysis in a plant cell is defined as
   a. shrinkage of nucleoplasm
   b. shrinkage of cytoplasm in hypertonic medium
   c. break down (lysis) of plasma membrane in hypotonic medium
   d. shrinkage of nucleolus
4. Which organelles other than nucleus contain DNA?
5. Define 1 newton force.
6. Where are genes located?

OR

Name the organelle which shows the analogy as kitchen of the cell.

7. Why is rabies also called hydrophobia?
8. Are the electrons stationary in the stationary states?
9. Which kind of plastid is more common in leaves of the plant?

OR

What is the common name of mitochondria?

10. Name two metals which are both malleable and ductile.
11. Give an example of non-uniform acceleration?

OR

Define the term "speed".

12. What are disease-specific means of prevention?
13. A body is moving with uniform acceleration. Is its momentum constant?
14. **Assertion:** A spring balance that shows the weight of a body to be 6 N on earth will show

a weight of only 1 N when taken to the moon.

Reason: The weight of an object on the moon will be about one-sixth of what is on the earth.

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

15. **Assertion:** It is harder to make anti-viral medicine.

Reason: Viruses have few biochemical mechanisms of their own.

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

OR

Assertion: Maintaining good hygiene reduces the chances of developing an infection.

Reason: Our health is affected only by an unbalanced diet.

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

16. **Assertion:** The speed of a body can be negative.

Reason: If the body is moving in the opposite direction of positive motion, then its speed is negative.

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

17. **Read the following and answer any four questions:**

Air is a homogeneous mixture and can be separated into its components by fractional distillation. The air is compressed by increasing the pressure and is then cooled by

decreasing the temperature to get liquid air. This liquid air is allowed to warm-up slowly in a fractional distillation column, where gases get separated at different heights depending upon their boiling points. The properties that can be observed and specified like colour, hardness, rigidity, etc. are the physical properties. The interconversion of states is a physical change because these changes occur without a change in composition and no change in the chemical nature of the substance.

i. The boiling point of oxygen is
   a. -180°C
   b. -180°C
   c. -170°C
   d. -130°C

ii. _____ is a process that separates a pure solid in the form of its crystals from a solution.
   a. Simple evaporation
   b. Crystallisation
   c. Distillation
   d. None of these

iii. Which of the following are physical changes?
   I. Melting of iron metal
   II. Rusting of iron
   III. Bending of an iron rod
   IV. Drawing a wire of iron metal
   a. (I), (II) and (III)
   b. (I), (II) and (IV)
   c. (I), (III) and (IV)
   d. (II), (III) and (IV)

iv. Which of the following methods would you use to separate cream from milk?
   a. Fractional distillation
   b. Distillation
   c. Centrifugation
   d. Filtration

v. Which of the following are chemical changes?
   I. Decaying of wood

II. Burning of wood

III. Sawing of wood

IV. Hammering of a nail into a piece of wood

a. (I) and (II)

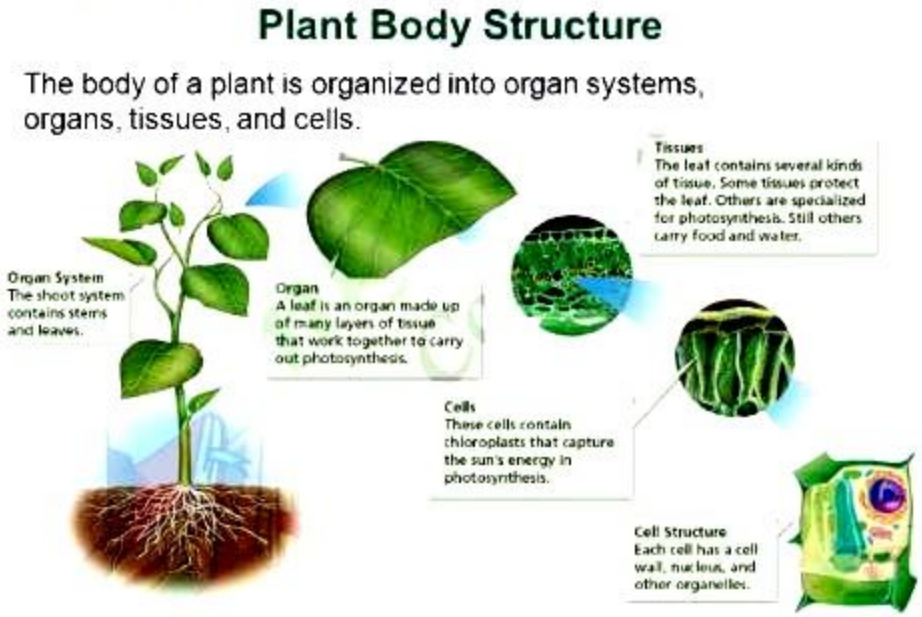
b. (II) and (III)

c. (III) and (IV)

d. (I) and (IV)

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

Plants are stationary or fixed they don't move. Since they have to be upright, they have a large quantity of supportive tissue. The supportive tissue generally has dead cells. Animals, on the other hand, move around in search of food, mates and shelter. Another difference between animals and plants is in the pattern of growth. The growth of plants occurs only in certain specific regions. New cells produced by meristem are initially like those of meristem itself, but as they grow and mature, their characteristics slowly change and they become differentiated as components of other tissues. The girth of the stem or root increases due to lateral meristem (cambium). Cells of meristematic tissue are very active, lack vacuoles.



i. Meristematic tissues are those which help in increasing the length and girth of the plant. Which of the following statement given below is correct about the meristematic tissue?

I. It is made up of cell that is incapable of cell division

II. It is made up of cell that is capable of cell division

III. It is composed of a single type of cell.

IV. It is composed of more than one type of cells

a. (I) and (II)

b. (II) and (III)

c. (III) and (IV)

d. Only (II)

ii. The dividing tissue of the plant is

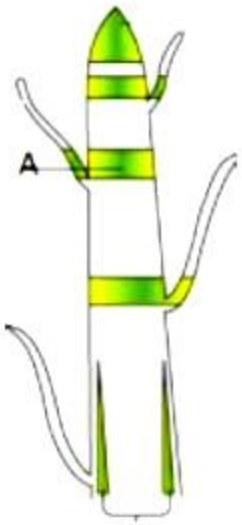
a. parenchyma

b. meristematic

c. aerenchyma

d. none of these

iii. Identify A in the given figure



a. apical

b. lateral

c. intercalary

d. none of these

iv. _____ is present at the growing tips of stems and roots

a. apical meristematic

b. intercalary meristematic

c. lateral meristematic

d. none of these

v. Cells of meristematic tissue are

a. dense cytoplasm

b. thin cellulose walls

c. prominent nuclei
d. all of these

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

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

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

ii. Power is defined as
   a. the rate of doing work
   b. the rate of transfer of energy
   c. both (a) and (b)
   d. neither (a) nor (b)

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

(I) 1 joule per second

(II) 1 joule per hour

(III) 1 joule per minute

(IV) 4 joule per hour

Choose the correct option among the following

   a. Only (I)
   b. (I) and (IV)
   c. (II) and (III)
   d. (II) and (IV)

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

a. 0.76 unit
b. 0.36 unit
c. 0.98 unit
d. 0.76 unit

v. Which of the following statement are incorrect

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

(II) A stationary object may have energy

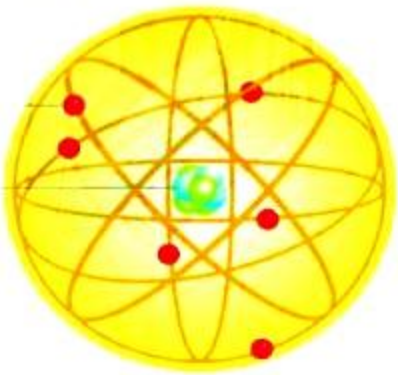
(III) A flying bird has kinetic energy only

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

a. III and IV
b. I and III
c. II and III
d. II and IV

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

E. Goldstein in 1886 discovered the presence of new radiations in a gas discharge and called them canal rays. Thomson proposed the model of an atom be similar to that of a Christmas pudding. The electrons, in a sphere of positive charge, were like currants in a spherical Christmas pudding. Rutherford designed an experiment for knowing how electrons are arranged In this experiment, fast-moving alpha (α)-particles were made to fall on a thin gold foil. Rutherford concluded from the α-particle scattering experiment that most of the space inside the atom is empty because most of the α-particles passed through the gold foil without getting deflected. A very small fraction of α-particles was deflected by 180 degrees. Very few particles were deflected from their path, indicating that the positive charge of the atom occupies very little space. (Image: Basic theory of an atom)



i. Who discovered the electron?

a. Rutherford

b. Chadwick
c. Thomson
d. Goldstein

ii. Which of the following statements is incorrect about the structure of an atom?
a. The whole mass of an atom is concentrated in the nucleus
b. The atom is an indivisible particle
c. The atom as a whole is neutral
d. The negative and positive charges are equal in magnitude

iii. Mass of α-particles is
a. 4u
b. 6u
c. 7u
d. 1u

iv. Which of the following is an incorrect statement in reference to observation in Rutherford's α-particle scattering experiment?
a. Some of the α-particles rebound after hitting the gold foil
b. Some of the particles deflected from their path
c. Some of the particles do not pass through the gold foil
d. Most of the particles pass straight through the gold foil

v. Arrange the following atomic models in the order of their chronological order
I. Rutherford's atomic model
II. Thomson's atomic model
III. Bohr's atomic model
a. (I), (II) and (III)
b. (II), (III) and (I)
c. (II), (I) and (III)
d. (III), (II) and (i)

Section B

21. State the principle of separating two immiscible liquids by separating funnel. Describe an activity with a diagram to separate a mixture of water and kerosene oil.

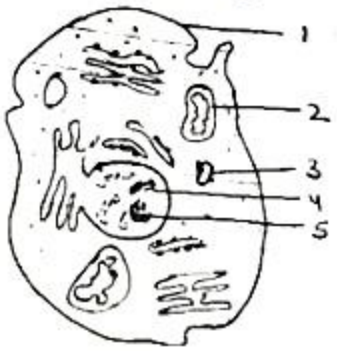
OR

Sodium chloride contains two elements, but it is still a pure substance. Give reason.

22. Calculate the number of aluminium ions (Al^{3+}) in 0.056 g of aluminium (Al_2O_3).
23. What will happen if chloroplast is taken out of the cell and illuminated?

OR

Observe the diagram of the cell below - answer the following questions.



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'?

24. Ruchi and Rahul are discussing on vaccination. Rahul during the discussion, submitted his fear that the inoculated vaccination can be dangerous because it contains dead germs. Ruchi explained and removed his fears.
    i. What could be Ruchi's explanation?
    ii. What values do you think Ruchi possess?
25. A stone is thrown in vertically upward direction with a velocity of 5 ms^{-1}. If the acceleration of the stone during its motion be 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?
26. Avinash can run at a speed of 8 ms^{1} against the frictional force of 10 N, and Kapil can move at a speed of 3 ms^{-1} against the frictional force of 25 N. Who is more powerful and why?

Section C

27. Why is the weight of an object on the moon $1/6^{th}$ its weight on the earth?

OR

What is the magnitude of the gravitational force exerted by a 15Kg mass on a 25Kg mass separated by a distance of 25cm. What is the acceleration produced on each mass?

28. A 150 kg car engine develops 500 W for each kg. What force does it exert in moving the car at a speed of 20 ms^{-1}?
29. How many atoms would be present in a black dot marked on the paper with graphite pencil as a full stop at the end of a sentence. [Given mass of a dot = 10^{-18} g]
30. What do you mean by immediate cause of disease ?
31. Calculate the following in 32 g of ozone [O_3]:

    a) The number of gram - atoms of oxygen.

    b) The number of atoms of oxygen.

    c) The number of molecules of ozone
32. What are secretory proteins? Give an example of secretory protein.
33. A motorcyclist drives from A to B with a uniform speed of 30 km h^{-1} and returns back with a speed of 20 km h^{-1}. Find its average speed.

Section D

34. Derive the mathematical relation of Newton's second law of motion.

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. The transportation system of plants is composed of complex permanent tissue. They have their transportation system within themselves. Justify in detail with appropriate diagrams.
36. a. Verify by calculating that 5 moles of CO_2 and 5 moles of H_2 do not have the same mass.
    b. What would be the gram atomic mass of one atom of oxygen?

OR

3.42 g of sucrose are dissolved in 18 g of water in a beaker. Find the number of oxygen atoms in the solution.

CBSE Class 09 Science

Sample Paper 04 (2020-21)

Solution

Section A

1. **(i)** Technique to separate butter from curd: **Centrifugation**
   (ii) Technique to separate salt from sea-water: **Evaporation**
   (iii) Technique to separate camphor from salt: **Sublimation**

   OR

   Elements: Cu, Zn, O_2, F_2, Hg, Diamond
   Compounds: H_2O, $CaCO_3$

2. A pure substance is a substance which contains particles of only one kind and has a definite set of properties.
   e.g. Sugar, salt, water and nitrogen are pure substances.
3. (b) shrinkage of cytoplasm in hypertonic medium
   Explanation: Plasmolysis is mainly known as shrinking of cell membrane in hypertonic solution and great pressure.
4. Mitochondria and plasmids contain DNA.
5. We define one newton as that force which when acting on a mass of 1 kg produces in it an acceleration of $1m/s^2$ in its own direction.
   $1N = 1kgm/s^2$
6. Genes are located on chromosomes in the nucleus.

   OR

   The organelle which shows the analogy as the kitchen of the cell is the chloroplast.

7. Rabies is also called hydrophobia because its main symptom is fear of water.
8. A stationary state is a pure quantum state with all observables independent of time.
   No, the electrons are not stationary. Only the energy which is associated with the electrons is stationary or fixed.
9. The kind of plastid that is more common in the leaves of the plant is Chloroplast.

OR

Mitochondria is commonly known as power house of the cells. The mitochondria is a double membrane-bound organelle found in all eukaryotic organisms.

10. Copper and silver are both malleable and ductile metals.
11. A car travelling along a straight road having much traffic increases or decreases its speed by unequal amounts in equal intervals of time.

OR

The distance travelled by an object per unit time is known as speed of the object.

12. Disease prevention is a procedure through which individuals, particularly those with risk factors for a disease, are treated in order to prevent a disease from occurring.
13. No. It is because the body is moving with an uniform acceleration. Hence,its velocity is increasing continuously and as a result the momentum of the body also increases.
14. (a) Both A and R are true and R is the correct explanation of assertion.
    Explanation: The weight of an object on the moon will be about one-sixth of what is on the earth. Thus, a spring balance that shows the weight of a body to be 6 N on earth will show a weight of only 1 N when taken to the moon.
15. (a) Both A and R are true and R is the correct explanation of assertion.
    Explanation: It is harder to make anti-viral medicine than making anti-bacterial medicines because viruses have few biochemical mechanisms of their own. They enter our cells and use our machinery for their life processes.

OR

(c) A is true but R is false.

Explanation: Maintaining good hygiene also reduces the chances of developing an infection. Our health is affected not only by an unbalanced diet but also by disease-causing organisms which may be water-borne, air-borne, and food-borne.

16. (d) Assertion (A) reason (R) both are false.
    Explanation: Speed can never be negative because it is a scalar quantity.
17. i. (a) -180°C
    ii. (b) Crystallisation
    iii. (c) (I), (III) and (IV)

iv. (c) Centrifugation

v. (a) (I) and (II)

18. i. (d) Only (II)

ii. (b) meristematic

iii. (c) intercalary

iv. (a) apical meristematic

v. (d) all of these

19. i. (a) watt

ii. (c) both (a) and (b)

iii. (a) Only (I)

iv. (b) 0.36 unit

v. (a) III and IV

20. i. (c) Thomson

ii. (b) The atom is an indivisible particle

iii. (a) 4u

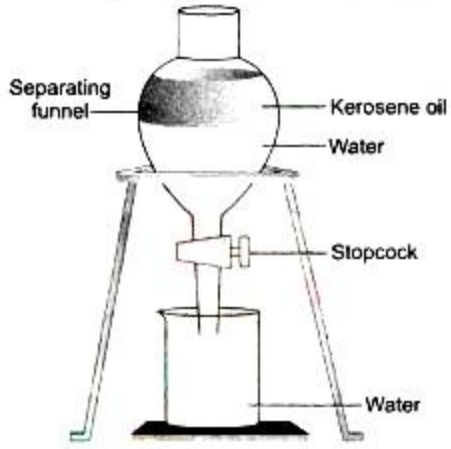
iv. (a) Some of the α-particles rebound after hitting the gold foil

v. (c) (II), (I) and (III)

Section B

21. **Principle of separation of two Immiscible liquids :** Two immiscible liquids can be separate out in layers depending on difference in their densities in separating funnel.

Activity: Separation of kerosene oil from water.



Procedure:

a. Pour the mixture of kerosene oil and water in separating funnel as shown in figure.

b. Close the mouth of funnel with cork and shake it vigorously.

c. Let it stand undisturbed for sometime so that separate layers of kerosene oil and

water are formed.

d. Oil being less dense will float over water. It means water has more density than kerosene oil.
e. Open the stopcock of the separating funnel and pour out the lower layer of water carefully.
f. Close the stopcock of the separating funnel as the oil reaches the stopcock.

Result: The two immiscible liquids having different densities can be separate out with the help of separating funnel.

OR

The two elements sodium and chlorine have combined with each other by chemical reaction to form sodium chloride (NaCl) which is a chemical compound. Since these elements cannot be separated from each other by any physical process, sodium chloride is a pure substance.

22. Molecular mass of alumina ((Al_2O_3) = $2 \times Al^3 + 3 \times O^{2-}$

= 2 × 27 u + 3 × 16 u

= 102 u

Gram molecular mass = 102 u

1 mole of alumina (Al_2O_3) = 102 g

102 g of Al_2O_3 = 1 mol

0.056 g of Al_2O_3 $\frac{1 \times 0.056}{102} mol$

= $5.49 \times 10^{-4} mol$

We know that one mol of alumina contains 2 mol of Al^{3+} ions.

Therefore, $5.49 \times 10^{-4} mol$ of Al_2O_3 contains $2 \times 5.49 \times 10^{-4} mol$

Therefore, Number of Al^{3+} ions in 0.056 g = $2 \times 5.49 \times 10^{-4} \times 6.022 \times 10^{23}$

= 6.613×10^{20} ions of Al^{3+}

23. Chloroplast is a semiautonomous cell organelle which on illumination can perform the function of photosythesis and release oxygen even outside the cell provided it is kept in isotonic medium and receives raw material of carbon dioxide.

OR

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

24. i. Ruchi explained that the process of vaccination includes inducing immunity by administering a vaccine to allow the immune system to prevent infection.

    ii. Ruchi possess the acquired knowledge of vaccination she showed the helpful value and awareness also.

25. Given u = 5 ms^{-1}, g = -10 ms^{-2}, h = ? and t = ? at the highest point the velocity of the stone will be zero, therefore v = 0 ms^{-1}

    Using the equation $v^2 - u^2 = 2aS$ we have $0^2 - 5^2 = 2 \times (-10) \times h$,

    therefore $h = \frac{20}{25} = 1.25\ m$

    Using the equation v = u + gt we have t = $\frac{v-u}{g} = \frac{0-5}{-10} = 0.5s$

26. Power of Avinash $P_A = F_A . v_A = 10 \times 8 = 80$ W

    Power of Kapil $P_K = F_K . v_K = 25 \times 3 = 75$ W

    So, Avinash is more powerful than Kapil.

Section C

27. Gravity is directly related to mass. The more mass an object has, the more gravitational pull it has.

    Now, the moon is significantly smaller than the earth (in fact, it is about the size of the earth's core). Gravity is dependent on the size of the object. Your weight on the moon is 1/6 of that on earth because the moon has 1/6 the mass of the earth.

    Since we know

    $W = m \times g$

    Mass of object remains the same whether on earth or moon but the value of acceleration on moon is $1/6^{th}$ of the value of acceleration on earth. Because of this weight of an object on moon is $1/6^{th}$ its weight on the earth.

OR

Mass of first Body = m_1 = 15Kg

Mass of second Body = m_2 = 25Kg

r = Distance between them = 25cm = 0.25m

F = Gravitational force = $\frac{Gm_1m_2}{r^2}$

$= \frac{6.673\times10^{-11}\times15\times25}{(0.25)^2}$

$= 4.004 \times 10^{-7}N$

Both 15Kg and 25Kg mass attracts each other by a force equal to 4.004×10^{-7} N.

Since F = ma

a = Acceleration

Acceleration of the 15Kg mass = $\frac{F}{m} = \frac{4.004\times10^{-7}}{15}$

= 2.67×10^{-8} m/s^2

Acceleration of the 25Kg mass = $\frac{4.004\times10^{-7}}{25}$

= 1.60×10^{-8} m/s^2

28. Here, Mass of Car =150 Kg.

Power developed by a car for one Kg = 500W

Total Power developed by a car for 150 Kg = $150 \times 500 = 7.5 \times 10^4$ W

We know that, Force = $\frac{Power}{Velocity} = \frac{7.5\times10^4}{20} = 3.75 \times 10^3$ N

Therefore, Force = 3750 N.

29. Given, Mass of dot of graphite = 10^{-18} g.

Molecular mass of Graphite (C)= 12 u

We know that, 1 mole of carbon atoms has mass = 12 g

Also, 1 mole of carbon = 6.022×10^{23} atoms

Thus, 12 g of carbon contains = 6.022×10^{23} atoms.

$\therefore 10^{-18}$ g of carbon contains = $\frac{6.022\times10^{23}}{12} \times 10^{-18}$ carbon atoms = 5.02×10^4 carbon atoms.

30. Immedidiate, precipilating, primary or first level of cause of a disease is the actual agent or factor that causes the disease, e.g., virus in common diarrhoea.

31. 1 Mole of substance = Gram Atomic Mass = Avogadro Number of atoms

    (a) The atomic mass of an element expressed in grams is called the **gram atomic mass.**

    48 gms of ozone contains 3 gram – atoms of oxygen

    32 gms of ozone will contains (3 x 32)/48 gram – atoms of oxygen

    Therefore, 32 gms of ozone will contains **2 gram – atoms of oxygen**

    (b) Gram Molecular Mass of ozone = 6.023×10^{23} molecules of ozone = 1 Mole of ozone molecules

    1 molecule of ozone contains 3 atoms of oxygen.

    1 mole of ozone will contain $3 \times 6.023 \times 10^{23}$ atoms of oxygen.

    48 g of ozone will contain $3 \times 6.023 \times 10^{23}$ atoms of oxygen.

    32 g of ozone will contain $3 \times 6.023 \times 10^{23}$ x 32/48 atoms of oxygen.

    Therefore, 32 g of ozone will contain 1.205×10^{24} atoms of oxygen.

    (c) 48 g of O_3 contains 6.023×10^{23} molecules of ozone.

    1 g of O_3 will contain $\frac{6.023 \times 10^{23}}{48}$ molecules of ozone.

    32 g of O_3 will contain $\frac{6.023 \times 10^{23}}{48} \times 32$ molecules of ozone.

    $= 4.015 \times 10^{23}$ molecules of ozone.

32. Proteins which are synthesised by the cell and then released into outer medium of the cell are called secretory proteins. Examples of secretory proteins include mucus, digestive enzymes and hormones.

33. Let, The distance from point 'A' to point 'B'= AB = x,

    Time taken to reach from A to B, when motorcyclist drives with speed 30 km h^{-1} = t_1 = $\frac{x}{30}$

    Similarly,Time taken to reach from B to A, when motorcyclist drives with speed 20 km h^{-1} = t_2 = $\frac{x}{20}$

    Now, Total time = t_1 + t_2 = $\frac{5x}{60}h$

    Average speed for entire journey = $\frac{\text{Total distance}}{\text{Total time}}$ = $\frac{2x}{\frac{5x}{60}}$ = 24 km h^{-1}.

Section D

34. Consider an object of mass 'm' moving along a straight line with an initial velocity 'u' (say). It is uniformly accelerated to velocity 'v' in time t by the application of a constant force 'F' for time 't'.

    Then, initial momentum of the object = mu

    $\therefore p_1$ =mu

Final momentum of the object = mv

$\therefore p_2$ =mv

$\therefore$ Change in momentum =$p_2 - p_1 = mv - mu = m(v-u)$

The rate of change in momentum $= \frac{m \times (v-u)}{t}$

According to Newton's second law of motion, we have

$F \propto \frac{M(v-u)}{t}$

$F = kM\frac{(v-u)}{t}$

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

Therefore,$F = k \times m \times a$ .... (i)

Here,

a= acceleration

k = a constant of proportionality.

When m = 1 kg, a = 1 ms^{-2} then F=1N

$1N = 1Kgms^{-2}$

Let us substitute these values in equation (i),we get

$1N = k \times 1kg \times 1ms^{-2}$

$\therefore K = 1$

From equation (1), we have

F = ma

This represents the second law of motion.

Thus, the second law of motion gives a method to measure the force acting on an object as a product of its mass and acceleration.

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

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

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

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

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

$\implies t_1^2 = 10$

$\implies t_1 = \sqrt{10}$

$\therefore t_1 = 3.16sec$

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

u = 0

S = -100 m

$a = -10m/s^2$

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

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

$\implies T^2 = 20$

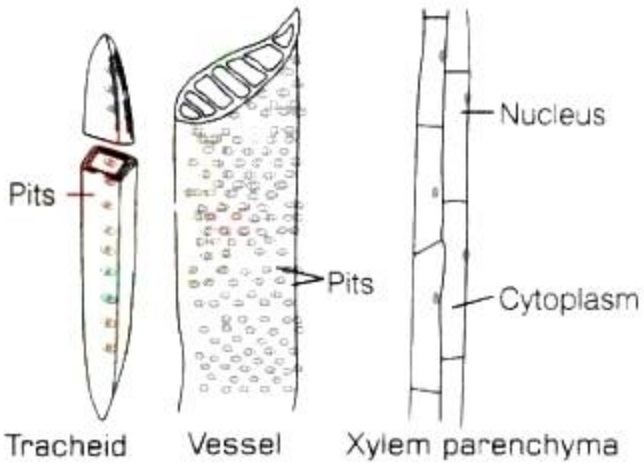
$\implies T = \sqrt{20}$

$\implies T = 4.47sec$

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

35. In plants, there are pipe-like vessels through which water and minerals can enter the plants. These vessels are made up of elongated cells and thick walls. A group of cells forms a tissue which performs a specialized function within the organisms. These are conducting tissues. These conducting tissues are divided into two types which are xylem and phloem.

    i. **Xylem:** It is a vascular tissue that spreads from the top to bottom of the plant. It helps in the transportation of water and minerals from roots to other parts of the plant.



Elements of xylem:

a. **Tracheids and Vessels**: It is Tubular structure and transport water and minerals

vertically.

b. **Parenchyma:** It stores food and helps in sideways conduction of water.

c. **Fibres**: It is supportive in function.

ii. **Phloem** It transports food from leaves to other parts of the plant. Food is prepared in leaves by the process of photosynthesis.

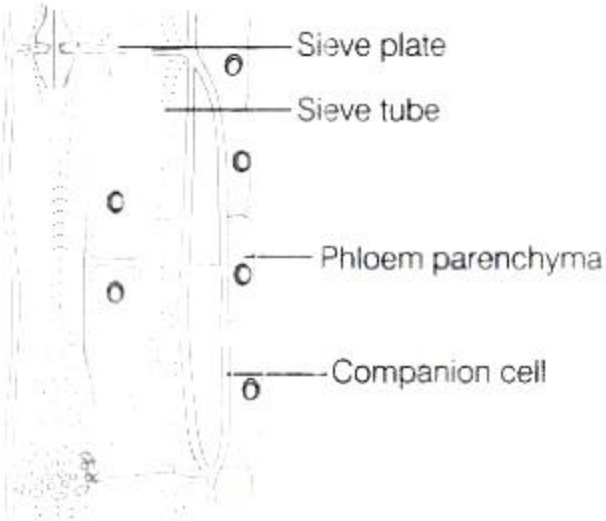
Elements of phloem:

a. **Sieve tubes**: It is tubular cells with perforated walls. These consist of living cells.

b. **Companion cells:** It is small elongated cells with dense cytoplasm.

c. **Phloem parenchyma** : It is Thin-walled cells. Mainly function in storage and transportation of food.

d. **Phloem fibres** It is Thick-walled cells. These are dead cells. Provide mechanical strength to tissue.



Both xylem and phloem maintain a transportation system within the plants. There is continuous transportation of food, water and minerals within the plant. This transportation is necessary for the proper growth and maintenance of the plant.

36. a.

CO_2	H_2
1 mole = 44g	1mole = 2g (atomic mass of H= 1)
5 mole= 44 ×5 =220g	5mole = 2 ×5 = `10g

It is clearly shown that 5 moles of CO_2 and 5 moles of H_2 does not have the same mass.

b. 1 mole of O = 16 g of O =6.022×10^{23} atoms

Mass of one O atom = $\frac{6.022 \times 10^{23}}{16} = 0.376 \times 10^{23}$ g.

OR

Given, Mass of sucrose ($C_{12}H_{22}O_{11}$) =3.42 g

Molecular mass of sucrose ($C_{12}H_{22}O_{11}$) = 12×C + 22× H +11× O= 12 ×12 +22× 1 +11 ×16 =144+22+176 =342 g /mol

Number of moles of sucrose = $\frac{Mass\ of\ Sucrose}{Molar\ mass\ of\ sucrose} = \frac{3.42g}{342gmol^{-1}}$ = 0.01 mol

It is clear from formula of sucrose ($C_{12}H_{22}O_{11}$) ;

1 mol of sucrose ($C_{12}H_{22}O_{11}$) contains = 11 × N_A atoms of oxygen

0.01 mol of sucrose ($C_{12}H_{22}O_{11}$) contains = 0.01 × 11 × N_A atoms of oxygen = 0.11 × N_A atoms of oxygen

Number of moles of water = $\frac{Mass\ of\ water}{Molecular\ mass\ of\ water} = \frac{18g}{18gmol^{-1}}$ =1 mol

1 mol of water (H_2O) contains = 1 × N_A atom of oxygen

Total number of oxygen atoms = Number of oxygen atoms from sucrose + Number of oxygen atoms from water = 0.11 N_A + 1.0 N_A = 1.11 N_A

Therefore, Number of oxygen atoms in solution = 1.11 × Avogadro's number = 1.11 × 6.022 × 10^{23} = 6.68 × 10^{23} atoms.