CBSE Class 09 Science
Sample Paper 03 (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. How will you justify that rusting if iron is a chemical change?

OR

A saturated solution becomes unsaturated on heating. Why is it so?

2. Define crystallisation.

3. Match the following with the correct response:

| (a) Lysosomes | (i) Golgi apparatus |

(b) Centriole	(ii) Suicidal bags
(c) Processing & packaging of cell secretions	(iii)Smooth endoplasmic reticulum
(d) Synthesis of lipids	(iv) Spindle formation

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

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

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

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

4. What happens to an animal cell when it is placed in a very dilute external medium? Why?

5. Which principle is involved in the working of a jet plane?

6. In brief state what happens when **Golgi apparatus** is removed from the cell?

OR

What is active transport?

7. Name a sexually transmitted disease by bacteria.

8. What is the number of electrons in the valence shell of chlorine (Z = 17) ?

9. Which structure is called little nucleus?

OR

Where are proteins synthesized inside the cell?

10. Which separation techniques will you apply for the separation of the butter from curd

11. Define average velocity.

OR

A plane has a take off speed of 88.3 m/s and requires 1365 m to reach that speed. Determine the acceleration of the plane and the time required to reach this speed.

12. What is disease ?

13. What do you mean by a resultant force?

14. **Assertion**: The force of attraction of the earth on an object is known as the weight of the object.

Reason: The SI unit of weight is the joule (J).

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:** Some diseases last for only very short periods of time and their symptoms are quickly visible, they are called chronic diseases.

Reason: Common cold, cough, typhoid are acute diseases.

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.

<div align="center">OR</div>

Assertion: Signs of disease are what physicians will look for on the basis of the symptoms.

Reason: Signs will give a little more definite indication of the presence of a particular disease.

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:** A tiger can accelerate from rest at the rate of 4 m/s^2.

Reason: The velocity attained by it in 10s is 40 m/s.

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) is false but reason (R) is true.

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

A solution that has dissolved as much solute as it is capable of dissolving, is said to be a

saturated solution. In other words, when no more solute can be dissolved in a solution at a given temperature, it is called a saturated solution. If the amount of solute contained in a solution is less than the saturation level, it is called an unsaturated solution. Chromatography is the technique used for the separation of those solutes that dissolve in the same solvent. The principle is that immiscible liquids separate out in layers depending on their densities. Sublimation is also used to separate substance.


i. The concentration of a solution is expressed by
   a. Mass by mass percentage of a solution
   b. Volume by volume percentage of a solution
   c. Mass by volume percentage of a solution
   d. All of these

ii. Chromatography is used to seperate
   a. Colours in a dye
   b. Pigments from natural colours
   c. Drugs from the blood
   d. All of these

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

iv. The amount of solute present per unit volume or per unit mass of the solution/solvent

is known as

a. The composition of the solute

b. The concentration of a solvent

c. The concentration of a solute

d. The concentration of a solution

v. A mixture of two or more miscible liquids, for which the difference in the boiling points is less than 25 K can be separated by the process called _____.

a. Fractional distillation

b. Distillation

c. Centrifugation

d. Filtration

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

Animal tissues are of many types such as epithelial tissue, connective tissue, muscular tissue and nervous tissue. Blood is a type of connective tissue, and muscle forms muscular tissue. The nature of the matrix differs in concordance with the function of the particular connective tissue. Blood has a fluid (liquid) matrix called plasma, in which red blood corpuscles, white blood corpuscles and platelets are suspended. Blood flows and transports gases, digested food, hormones and waste materials to different parts of the body. Bone is another example of connective tissue. It forms the framework that supports the body. It also anchors the muscles and supports the main organs of the body. Another type of connective tissue, cartilage, has widely spaced cells.


(a)

(b)

(c)

(d)
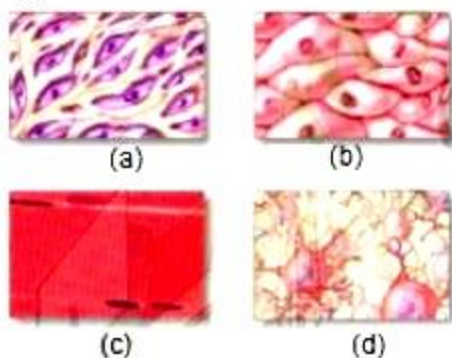
i. Identify the following figure.

a. Compact bone

b. Hyaline cartilage

c. Areolar tissue

d. Adipose tissue

ii. The cells of connective tissue are

a. loosely spaced

b. embedded in an intercellular matrix

c. both loosely spaced and embedded in an intercellular matrix

d. none of these

iii. Bone cells are embedded in a hard matrix that is composed of

a. calcium and phosphorus compounds

b. calcium and potassium compound

c. both calcium and phosphorus compounds and calcium and potassium compound

d. calcium and magnesium compound

iv. Two bones can be connected to each other through:

a. tendon

b. ligament

c. muscle

d. none of these

v. Cartilage is present in

a. nose

b. ear

c. trachea

d. all of these

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

A speeding car, a rolling stone, a flying aircraft, flowing water, blowing wind, a running athlete, etc. possess kinetic energy. In short, kinetic energy is the energy possessed by an object due to its motion. The kinetic energy of an object increases with its speed. The kinetic energy of a body moving with a certain velocity is equal to the work done on it to make it acquire that velocity. Kinetic energy possessed by an object of mass, m and moving with a uniform velocity, v is $\frac{1}{2}mv^2$. The work done is equal to the change in the kinetic energy of an object.
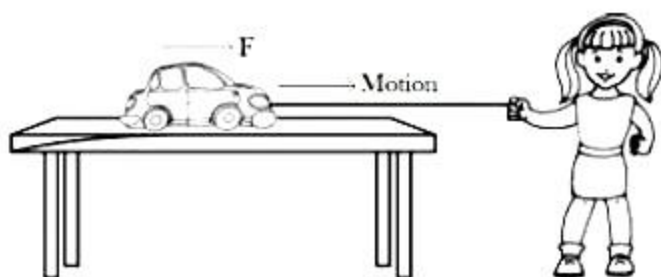
i. If the speed of a car becomes 2 times, its kinetic energy becomes

   a. 4 times

   b. 8 times

   c. 16 times

   d. 12 times

ii. Work is done by friction

   I. increases the kinetic energy of the body

   II. decreases the kinetic energy of the body

   III. increases the potential energy of the body

   IV. decreases the potential energy of the body.

   V. Choose the correct option among the following

   a. (I) and (III)

   b. (I) and (IV)

   c. Only (II)

   d. (II) and (IV)

iii. If the object is starting from its stationary position, that is, u = 0, then work is equal to

   a. $\frac{1}{2}mv$

   b. 2mv

   c. 3mv

   d. $\frac{1}{4}mv$

iv. An object of mass 15 kg is moving with a uniform velocity of $4ms^{-1}$. What is the kinetic energy possessed by the object?

   a. 230J

   b. 130J

   c. 120J

   d. 240J

v. A flying coconut posses:

   a. kinetic energy

b. potential energy

c. both (a) and (b)

d. none of these

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

In nature, a number of atoms of some elements have been identified, which have the same atomic number but different mass numbers. Many elements consist of a mixture of isotopes. Each isotope of an element is a pure substance. Chlorine occurs in nature in two isotopic forms. While hydrogen occurs in three isotopic forms. Isotopic have various applications such as an isotope of uranium is used as a fuel in nuclear reactors. The mass of an atom of any natural element is taken as the average mass of all the naturally occurring atoms of that element. Atoms of different elements with different atomic numbers, which have the same mass number, are known as isobars.

i. An isotope of cobalt is used in the

   a. treatment of cancer

   b. treatment of goitre

   c. as a fuel

   d. none of these

ii. The isotope deuterium of hydrogen has

   a. No neutrons and one proton

   b. One neutron and two protons

   c. One electron and two neutrons

   d. One proton and one neutron

iii. Which of the following reason correctly justifies: The identical chemical properties of all the isotopes of an element.

   a. Isotopes have different atomic number

   b. Isotopes have the identical electronic configuration

   c. Isotopes have the different electronic configuration

   d. Isotopes have identical proton

iv. There are two atomic species X and Y, such that (X: proton-8, neutron-8; Y: proton-8, neutron-10) Which of the following statements is true about X and Y?

   a. X and Y are isobars

   b. X and Y have different chemical properties

   c. X and Y have different physical properties

d. All of these

v. Hydrogen exists in three isotopic forms, $_1H^1$, $_1H^2$, $_1H^3$ known as protium, deuterium and tritium. Why are all the isotopes neutral in nature?
   a. Since neutrons are neutral in nature hence isotopes are electrically neutral.
   b. All the isotopes have one electron and one proton, hence they are neutral.
   c. All the isotopes have one proton and one neutron, hence they are neutral.
   d. Increasing the number of protons in the isotopes make them neutral.

Section B

21. Water is called a universal solvent. Why?

OR

A solution has been prepared by mixing 5.6 mL of alcohol with 75 mL of water. Calculate the percentage (by volume) of alcohol in the solution.

22. Differentiate between the actual mass of a molecule and gram molecular mass.
23. How does cell to cell movement of water takes place in plants?

OR

Why is osmoregulation is necessary in aquatic organisms?

24. Becoming exposed to or infected with an infectious microbe does not necessarily mean developing noticeable disease. Explain.
25. The speed-time graph for a car is shown is Fig.
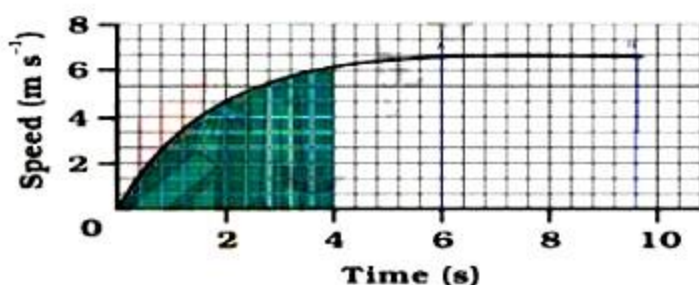
   a. How far does the car travel in the first 4 seconds? Shade the area on the graph that represents the distance travelled by the car during the period.
   b. Which part of the graph represents uniform motion of the car?
26. A man of mass 50 Kg runs up a flight of stairs having a rise of 5 m, in 4 s.
   i. What is the work done by the man?

ii. What is the average power developed by the man?

Section C

27. A stone is allowed to fall from the top of a tower 100 m high and at the same time another stone is projected vertically upwards from the ground with a velocity of 25 m/s. Calculate when and where the two stones will meet.

OR

What is the up thrust experienced by a cube of edge - length 5 cm made of iron when completely immersed in ethanol of density 0.8 g/cm^3

28. What is meant by mechanical energy? State its two forms. State the law of conservation of energy. Give an example in which we observe a continuous change of one form of energy into another and vice-versa.

29. What is meant by e/m ratio? What was the value of this ratio for a particle in the cathode rays?

30. What are the common symptoms of infection?

31. Draw a sketch of Bohr's model of an atom with three shells.

32. What is plasmolysis? What happens to a plasmolysed cell when it is placed in water?

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

   i. A to B

  ii. B to C

 iii. C to D
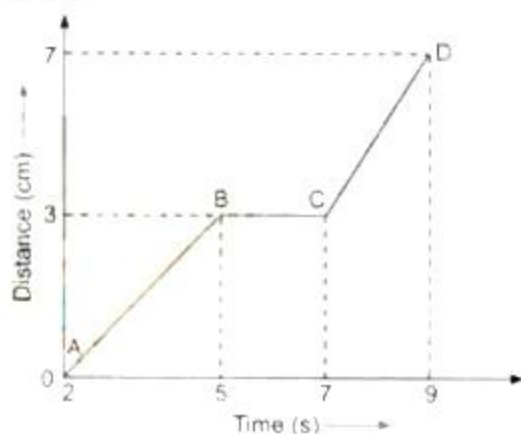
Section D

34.   i. Define momentum and mention its SI unit?

  ii. Explain how a karate player can break a pile of tiles with a single blow of his hand.

iii. How much momentum will a dumb-bell of mass 20 kg transfer to the floor, if it falls from a height of 80 cm? Take its downward acceleration to be 10 m/s².

OR

A body of mass 2 Kg is at rest at the origin of a frame of reference. A force of 5 N acts on it at t = 0. The force acts for 4 s and then stops.

i. What is the acceleration produced by the force on the body?

ii. What is the velocity at t = 4 s

iii. Draw the vt graph for the period t = 0 to t = 6 S.

iv. Find the distance travelled in 6 s.

35. Write a note on the protective tissue in plants. (Give appropriate diagram also).

36. Write the chemical formulae of the following by showing their symbol and valency.

(a) Magnesium chloride

(b) Calcium oxide

(c) Copper(II) nitrate

(d) Aluminium chloride

(e) Calcium carbonate.

OR

'SO_2 is an air pollutant released during the burning of fossil fuels and from automobile exhaust'.

i. Write the names of elements present in this gas.

ii. What are the valencies of sulphur in SO_2 and SO_3?

iii. Find out the number of molecules in 5 moles of SO_2.

iv. Calculate the number of moles in 320 g of SO_2 gas.

v. Calculate the molar mass of 10 moles of sodium sulphite.
[Given, atomic masses of S = 32 u,

O = 16 u, Na = 23 u and N_A = 6.022 × 10^{23} per mol]

Solution

Section A

1. Chemical change can be explained as a change in which a new substance is formed and the process is irreversible. The rust is a brown chemical compound known as hydrated ferric oxide ($Fe_2O_3.xH_2O$) which is formed when iron reacts with oxygen and water.

   Formula of rust shows that iron has undergone a chemical change.

   OR

   Solubility of a solute (other than gas) increase with the increase in temperature. On heating the liquid develops the capacity of dissolving some more solute to it. That is the saturated solution becomes unsaturated due to increase in the solubility.

2. **Crystallisation** is a process that separates a pure solid in the form of crystals from its solution. It is used to purify solids. E.g. Salt obtained from sea water is purified using crystallisation.

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

   Explanation:
   - Lysosomes are popularly known as 'suicidal bags'. They play a role in cell death.
   - The main function of the centriole is to help with cell division in animal cells. The centrioles help in the formation of the spindle fibers that separate the chromosomes during cell division (mitosis).
   - The Golgi apparatus is responsible for transporting, modifying, and packaging proteins and lipids into vesicles for delivery to targeted destinations.
   - The smooth ER is involved in the synthesis of lipids.

4. The animal cell will gain water and would swell up/may burst. Due to osmosis, water moves from the dilute external medium through the semi-permeable cell membrane into the cell with low water concentration.

5. Newton's third law of motion.

6. The Golgi apparatus is responsible for the transport of proteins and lipids and fatty materials to other cell organelles. If it is removed some cell organelles will stop working.

<div align="center">OR</div>

The movement of molecules across a membrane in cells against a concentration gradient with the help of ATP units is called active transport.

7. Syphilis, Gonnorhoea are bacterial sexually transmitted diseases.

8. The outer shell of any atom is called the valence shell.
   The electronic distribution of the element is : K(2), L(8), M(7).
   This means that the valence shell of chlorine has 7 electrons.

9. Nucleolus is the little structure present inside the nucleus.

<div align="center">OR</div>

Protein is synthesized in ribosomes which are usually present on the rough ER.

10. Centrifugation : Butter will get separated upon centrifugation

11. Average velocity is the ratio of the total displacement to the total time taken.

<div align="center">OR</div>

acceleration = 2.86 m/s^2

time= 30.8s

12. Disease is a condition of derangement or disturbed functioning (dis–without, ease–comfort) of the body or its part. A condition in which the affected person is unable to carry out normal activities is termed as disease.

13. When two or more forces act on a body simultaneously, then the single force which produces the same effect as produced by all the forces acting together is known as the resultant force.

14. (c) A is true but R is false.
    Explanation: The force of attraction of the earth on an object is known as the weight of the object. It is denoted by W. The SI unit of weight is Newton (N).

15. (d) A is false but R is true.
    Explanation: Some diseases last for only very short periods of time and their symptoms are quickly visible, they are called acute diseases. Example – common cold, cough, typhoid, etc. They do not cause long term bad effects on the body.

<div align="center">OR</div>

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

Explanation: Signs of disease are what physicians will look for on the basis of the symptoms. Signs give a little more definite indication of the presence of a particular disease. Physicians will also get laboratory tests done to pinpoint the disease further.

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

    Explanation: Initial velocity (u) = 0 , acceleration (a) = 4 m/s^2

    v = u + at

    v = 0 + 4 × 10

    v = 40 m/s

17.   i. (d) All of these

    ii. (d) all of these

    iii. (c) Centrifugation

    iv. (d) Concentration of the solution

    v. (a) Fractional distillation

18.   i. (d) adipose tissue

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

    iii. (a) calcium and phosphorus compounds

    iv. (b) ligament

    v. (d) all of these

19.   i. (a) 4 times

    ii. (c) Only (II)

    iii. (a) $\frac{1}{2}$ mv

    iv. (c) 120J

    v. (a) kinetic energy

20.   i. (a) treatment of cancer

    ii. (d) one proton and one neutron

    iii. (b) Isotopes have identical electronic configuration.

    iv. (c) X and Y have different physical properties

    v. (b) All the isotopes have one electron and one proton, hence they are neutral.

Section B

21. Water is known as a universal solvent because it has the ability to dissolve a wide variety of substances. It has a unique property to break the electrostatic forces that hold the ionic

compounds. It can practically dissolve everything and anything in it.

<div align="center">OR</div>

Given, Volume of alcohol present in solution = 5.6 ml

Volume of water = 75 ml

Total volume of solution = (75 + 5.6) ml = 80.6 ml

Percentage volume of alcohol in solution = $\frac{\text{Volume of alcohol}}{\text{Total volume of solution}} \times 100 = \frac{5.6\text{mL}}{80.6\text{mL}} \times 100 =$ 6.95 %

Therefore, Volume percentage of alcohol in solution = 6.95%.

22. Actual mass of a molecule is obtained by dividing the molar mass by Avogadro's number whereas gram molecular mass represents the molecular mass expressed in grams, i.e., it is the mass of 1 mole of molecules, i.e., Avogadro's number of molecules.

23. **Water** is passively transported into the roots and then into the xylem. Cell to cell movement of water inside the plant takes place through osmosis.

<div align="center">OR</div>

Aquatic organisms have higher concentration of water outside their bodies, which causes endo–osmosis. Osmoregulation i.e., the maintenance of constant osmotic pressure in the fluids of an organism by the control of water and salt concentrations.

24. Because of strong immune system, our body is normally fighting off microbes. We have cells which are specialised to kill the pathogenic microbes. These cells are active when infecting microbes enter the body and if they are successful in removing the pathogen, we remain disease-free. So even if we are exposed to infectious microbes, it is not necessary that we suffer from diseases.

25.
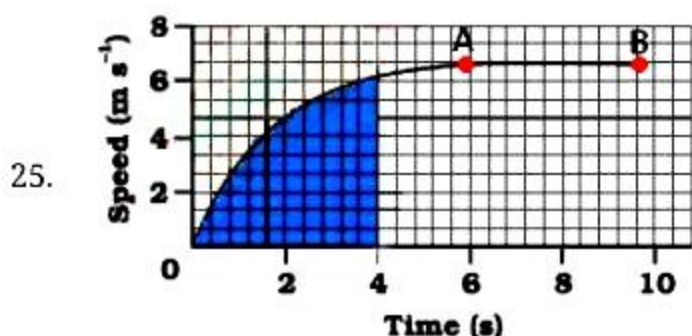
a. Distance travelled by car in the 4 second

The area under the slope of the speed – time graph gives the distance travelled by an object.

In the given graph

56 full squares and 12 half squares come under the area slope for the time of 4 seconds.

Total number of squares = 56 + $\frac{12}{2}$ = 62 squares

The total area of the squares will give the distance travelled by car in 4 seconds. on the time axis,

5 squares = 2 seconds, therefore 1 square = 2/5 seconds

on speed axis there are 3 squares = 2 m/s

therefore, area of one square = $\frac{2}{5}$ s × $\frac{2}{3}$ s = 4/15 m

so area of 62 squares = $\frac{4}{15}$ m × 62 = 248/15 m = 16.53 m

Hence the car travels 16.53 m in the first 4 seconds.

b. The straight line part of graph, from point A to point B represents a uniform motion of car.

26. Mass of Man = 50 Kg

Distance moved = 5m

Time Taken = 4 s

  i. Work Done = Force × Acceleration

In this case, Increase in Potential energy = Work done = Mgh

$$= 50 \times 10 \times 5$$

= 2500 J

 ii. Power = $\frac{WorkDone}{TimeTaken}$

$$= \frac{2500}{4}$$

=625 W

Section C

27. Suppose both the stones will meet after t seconds and h be the height from the ground. Given height of the tower is 100m

Consider the stone falls from the top of the tower. So distance covered by the stone at time t can be calcualted according to equation of motion

$$h = ut + \frac{1}{2}gt^2$$
$$= 0 \times t + \frac{1}{2} \times 10 \times t^2$$
$$= 5t^2$$

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

$= 25 \times t + \frac{1}{2} \times (-10) \times t^2$

= 25t - 5t^2

h + h' = 100 m

5t^2 + 25t - 5t^2 = 100

25t = 100

t = 4 s

$h = 5t^2 = 5 \times 4 \times 4 = 80$ m

Therefore, the two stones will meet after 4 seconds when the falling stone would have covered a height of 80 m.

OR

Volume of the cube = (side)^3 = 5^3 cm^3 = 125 cm^3

= 125×10^{-6} m^3

Volume of ethanol displaced = 1.25×10^{-4} m^3

Density of ethanol = 0.8g/cm^3

1 cm^3 of ethanol has a mass of 0.8

1 m^3 (that is 106 cm^3) of ethanol will have a mass = 0.8×10^6 g

= 8×10^{5}g = 800 Kg

The Density of ethanol = 800 Kg/m^3

Mass of ethanol = 1.25×10^{-4}×800 = 0.1Kg

Weight of ethanol displaced = 0.1×9.8 = 0.98N

By Archimedes's principles

Up thrust = weight of fluid displaced = 0.98N

28. It is the sun of KE and PE of an object. It states that energy can neither be created nor be destroyed. We observe a continuous change in energy in a simple pendulum and its: explanation. At the mean position, the energy is wholly kinetic while at the extreme position it is wholly potential. As the pendulum oscillation, its energy continuously changes between kinetic and potential.

29. $\frac{e}{m}$ ratio is the ratio of charge of the particle to mass of those particle.

The $\frac{e}{m}$ ratio for cathode rays was found out to be 1.759×10^{11} C / Kg.

30. In nearly all the infections of the human body, there is a rise in body temperature, an increased rate of heart beat, increased frequency of respiration, dry tongue, poor appetite, concentration of urine and changes in white blood cells circulating the blood.

31. Bohr's model of an atom with three shells:

The three stationary orbits are designated as K-shell (nearest to the nucleus), M-shell and N-shell.

The atom with three shells can accommodate a maximum of 2, 8 and 18 electrons respectively.
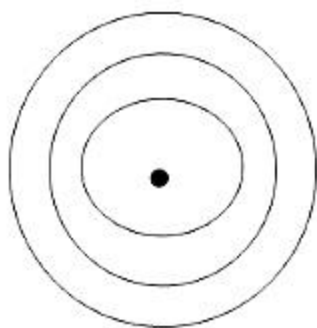
32. Shrinkage of protoplast from the cell wall in presence of hypertonic solution due to exosmosis is know as plasmolysis. When a plasmolysed cell is placed in water, the concentration of water in the outside medium is more than the concentration in the cell. Hence, water moves inside the cell leading to its swelling.

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

$$\text{speed} = \frac{Distance}{Time}$$
$$= \frac{3cm}{(5-2)s}$$
$$= 1 \text{ cm/s}$$

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

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

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

$$\text{speed} = \frac{Distance}{Time}$$
$$= \frac{(7-3)cm}{(9-7)s} = \frac{4cm}{2s}$$
$$= 2 \text{ cm/s}$$

Section D

34. i. Momentum is the product of mass and velocity of an object with which it is moving.SI

unit of momentum is kg m/s.

ii. The karate player strikes the pile of tiles by moving his hand very fast. In doing so, the large momentum of fast-moving hand is reduced to zero in a very short time when it strikes the pile of tiles. This exerts a very large force on the pile of tiles which is sufficient to break them.

iii. **Given:** Mass of dumb-bell (m) = 20 kg

Height s= 80 cm = 0.8 m, Acceleration (a) = 10 m/s and initial velocity (u) = 0

We know that $v^2 = u^2 + 2as$

$v^2 = 0 + 2 \times 10 \times 0.8$

$v^2 = 16 \ m^2/s^2$

$v = 4$ m/s

The momentum transferred to the floor = mv = 20× 4 = 80 kg m/s.

OR

Force,F = 5N

Mass,m = 2 kg

i. $F = m \times a$

$\implies 5 = 2 \times a$

$\implies a = 2.5 \ m/s^2$

Therefore,acceleration produced by the body is 2.5 ms^{-2}

ii. Final velocity,v = 0

Initial velocity ,u = 0 (body starts from Rest)

Time,t = 4 s

From the relation,

$v = u + at$

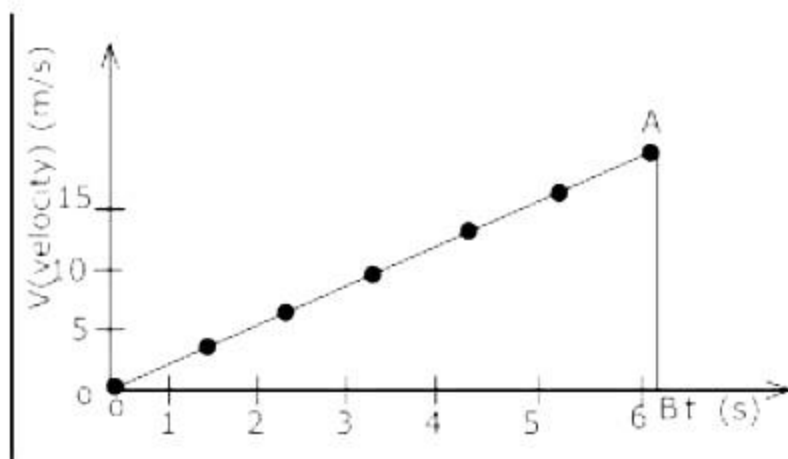$\implies v = 2.5 \times 4$

$\implies v = 10 \ m/s$

Therefore,the velocity at t=4 s is 10ms^{-1}

iii.

| For t = 0	1	2	3	4	5	6
V = 0	2.5	5	7.5	10	12.5	15

iv. Distance Travelled = Area under v/t curve = Area of $\triangle AOB$

$$= \frac{1}{2} \times \text{Base} \times \text{Height}$$
$$= \frac{1}{2} \times OB \times AB$$
$$= \frac{1}{2} \times 6 \times 15$$
$$= 45\,m$$

Therefore, distance travelled in 6 s is 45 m.

35. The protective tissue or the outermost covering of cells in plants is known as the epidermis, which performs protective function (protecting plants from adverse conditions). It is usually made up of a single layer of cells. In dry habitats, epidermis gets thicker to protect the plant from undue loss of water.
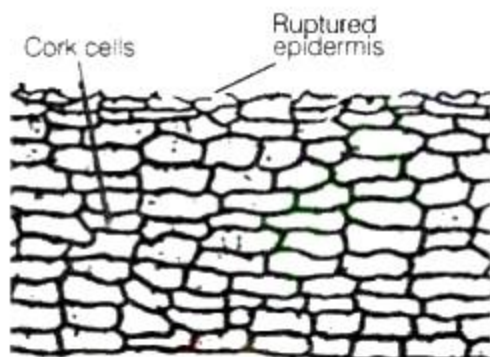
On aerial parts of the plant, epidermal cells often secrete a waxy, water-resistant layer on their outer surface. This waxy covering aids in protecting the plant against loss of water, mechanical injury and invasion by parasitic fungi. The cells of epidermal tissue are present in a continuous layer without intercellular spaces.

Small pores are present on the epidermis of the leaf. These pores are called stomata. They are enclosed by two kidney-shaped cells called guard cells. They help in gaseous exchange and transpiration.
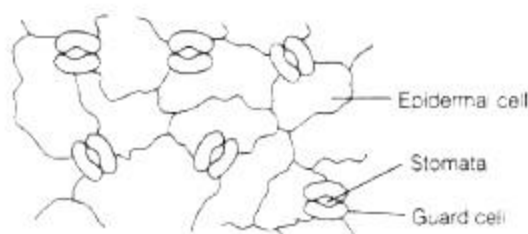
As the plant grows older, a strip of secondary meristem replaces the epidermis of the stem. This forms several layers thick cork or bark of the tree in which cells are dead and compactly arranged without intercellular spaces.

36. **Chemical formulae of**

    (a) Magnesium chloride

    Symbols; Mg | Cl

    Valencies: 2 | 1

    cross-over valencies

    Mg_1Cl_2 or $MgCl_2$

    Thus, the formula of magnesium chloride is $MgCl_2$.

    (b) Calcium oxide

    Symbols; Ca | O

    Valencies: 2 | 2

    cross-over valencies

    Ca_2O_2 or CaO

    Thus, the formula of Calcium oxide is CaO.

    (c) Copper(II) nitrate

    Symbols; Cu | NO_3

    Valencies: 2 | 1

    cross-over valencies

    $Cu_{1(}NO_{3)2}$ or $Cu(NO_3)_2$

    Thus, the formula of copper nitrate is $Cu(NO_3)_2$.

    (d) Aluminium chloride

    Symbols; Al | Cl

    Valencies: 3 | 1

    cross-over valencies

    $_{Al1}Cl_2$ or $AlCl_2$

    Thus, the formula of Aluminium chloride is $AlCl_2$.

(e) Calcium carbonate.

Symbols; Ca | CO_3

Valencies: 2 | 2

cross-over valencies

$Ca_2(CO_3)_2$ or $CaCO_3$

Thus, the formula of Calcium carbonate is $CaCO_3$.

OR

i. Sulphur and oxygen.

ii. Valency of sulphur in SO_2 = 4

Valency of sulphur in SO_3 = 6

iii. 5 × Avogadros number = 5 × 6.022 × 10^{23}

= 3.011 × 10^{23} molecules

iv. m = 320 g, Molar mass (m) of

SO_2 = 32 + 2 × 16 = 64 g/mol

$\Rightarrow n = \frac{m}{M} = \frac{320}{64}$ = 5 moles

v. Molar mass of 10 moles of Na_2SO_3

= 10 [23 × 2 + 32 +16 × 3] = 1260 g