CBSE Class 09

Science

Sample Paper 7 (2019-20)

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

i. The question paper comprises three sections - A, B and C. Attempt all the sections.
ii. All questions are compulsory. Internal choice is given in each section.
iii. All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
iv. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
v. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
vi. This question paper consists of a total of 30 questions.

Section A

1. If an atom contains one electron and one proton, will it carry any charge or not?

2. What is the valency of calcium is $CaCO_3$?

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

Poultry breeds	
Indigenous breeds.	Exotic breeds.
Assel, Bursa, and	White leghorn, Black Minorca, Rhode island red and

Kadaknath	Light Sussex

Egg and broiler production: Hens raised for egg production are called layers. Young birds are vaccinated. Their food should be rich in vitamins, minerals and macronutrients. They start laying eggs at the age of 5 months. The average egg production period in commercial layers is 500 days. Broilers are quick growing birds which are raised for 6-8 weeks. They attain the weight of 700g to 1.5kg. Their food is rich in vitamin A and K.

Answer the following questions:

i. What are the layers?
ii. What are broilers?
iii. What is the silver revolution?
iv. Name two indigenous and exotic breeds of poultry birds.

4. **Dicotyledons** or **"dicot"** comprise a traditional, major group of flowering plants (angiosperms) whose members typically have two cotyledons, or embryonic leaves, in their seeds, and whose flowers generally have parts in fours or fives, or multiplies thereof. Flowering plants that are not dicotyledons are designated as monocotyledons, a flowering plant group whose seed typically contains one cotyledon, and whose flower parts are generally in threes or multiples of threes.

   Angiosperms are a major group of land plants, with two-hundred-fifty thousand species. From a diagnostic point of view, the number of cotyledons used to distinguish dicots and monocots is neither a particularly handy (as they are only present for a

very short period in a plant's life) nor totally reliable character.

Aside from cotyledon number, other broad differences have been noted between monocots and dicots, are as follows;

Characteristics of Monocots and Dicots

	Monocots	Dicots
Seeds	Single cotyledon 	Two cotyledons 
Leaves	Parallel veins 	Branched veins 
Flowers	Floral parts often in multiples of 3 	Floral parts often in multiples of 4 or 5 
Stems	Vascular bundles scattered throughout stem 	Vascular bundles arranged in a ring 
Roots	Fibrous roots 	Taproot 

Answer the following questions:

i. Mention the difference between dicot and monocot with respect to flower.
ii. Specify the nature of roots in dicot and monocots respectively.
iii. Which is the major group of land plants?
iv. How many cotyledons are found in dicots and monocots respectively?

5. In a football and a stone of the same size, the inertia of

A. Football is greater

B. Football is lesser

C. Stone is greater

D. Stone is lesser

a. B and C

b. A and C

c. B and D

d. All of these

OR

The action and reaction forces referred in the third law

a. Must act on the same object.

b. May act on different objects.

c. Need not be equal in magnitude but must have the same direction.

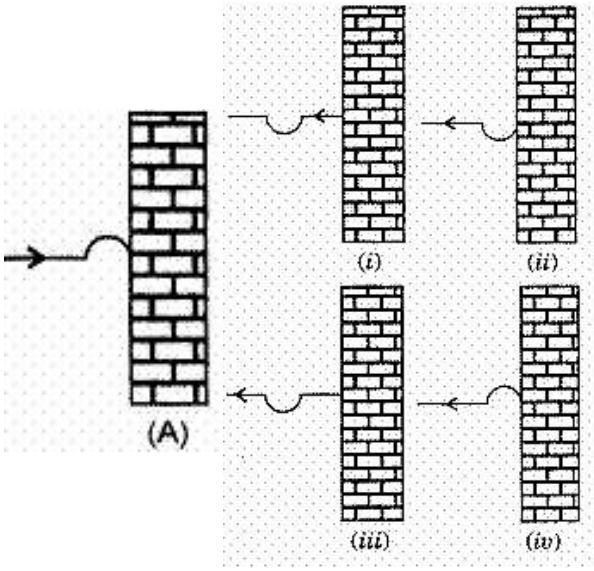
d. May act on different objects.

6. When a force retards the motion of a body the work done is

   a. uncertain
   b. zero
   c. negative
   d. positive

7. A body of mass 20kg climbs up 20 steps of the stairs in 20 seconds. If each step is 20cm high. What is the power used in climbing the stairs ($g = 10\mathrm{m}/\mathrm{s}^2$)
   a. 200w
   b. 40w
   c. 400w
   d. 20w

8. If the pulse hits at the fixed and as shown in the diagram A. Immediately reflected pulse is:



a. (iv)

b. (ii)

c. (iii)

d. (i)

OR

In what direction does the buoyant force on an object immersed in a liquid act?

9. Statement A: Methyl Bromide is a liquid fumigant.
   Statement B: Excreta of birds contain bacteria salmonella which causes food poisoning
   Which of the two statements is true?

   a. Statement B

   b. Both a and b

   c. None of these

   d. Statement A

10. On the laboratory table, four watch glasses were placed with labels A, B, C and D. Watch glass 'A' had chalk powder, 'B' had sago powder, 'C' had common salt and 'D'

had powdered sugar. On adding two drops of iodine to the content of each watch glass, the one turning blue-black will be :

a. C

b. B

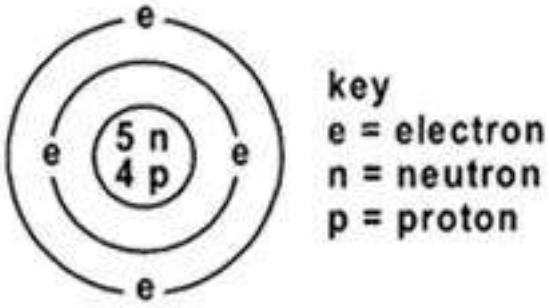
c. D

d. A

11. Which among the following diseases spreads through sexual contact as well as through blood?

a. AIDS
b. Gonorrhoea
c. Syphilis
d. Hepatitis

12. The diagram given below represents the atom of an element.



Which symbol gives the above information?

a. $_4B^9$

b. $_4F^9$

c. $_4O^9$

d. $_4Be^9$

OR

The melting points of two solids [A] and [B] are 300 K and 350 K respectively. Which has stronger inter-particle forces?

a. Both have the same inter-particle forces.

b. Both have the greater inter-particle forces.

c. Solid [B]

d. Solid [A]

13. **Assertion:** Evaporation of spirit from the skin make the skin feel cool.

    Reason: It liberates latent heat of vaporisation from the skin.

    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.

14. **Assertion:** The position-time graph of a body moving uniformly in a straight line is parallel to position-axis.

    Reason: The slope of the position-time graph in a uniform motion gives the velocity of an object.

    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.

15. i. State one importance of photoperiod in agriculture.
    ii. Improved varieties can be produced in both animals and plants. How?
    iii. What is the advantage of selecting seeds of crops with wider adaptability for agriculture?
16. i. What is the mass of 0.5 moles of NH_2? [Given the atomic mass of N =14 u, the atomic mass of = 1 u.]
    ii. Calculate the number of particles in 31 g of P molecules. (Atomic mass of P = 31u)
    iii. Find the number of moles in 87 g of K_2SO_4. (Atomic masses of K = 39 u, S = 32 u and O = 16 u)

OR

Write the electronic configuration of any one pair of isotopes and isobars.

17. A balloon of volume 50 m^3 is filled with hot air of density 0.4 kgm^{-3}, if the weight of the fabric of balloon is 12 kgf and equipment 'P' is attached to it, such that balloon is in the state of equilibrium. Calculate:i) Weight of hot air,ii) Weight of hot air, balloon and equipmentiii) Upthrust,iv) Weight of equipment.

18. i. 'An increase in temperature of the water bodies would lead to water pollution'. Explain.
    ii. Suggest any two methods to prevent water pollution.

OR

State any two harmful effects of

i. Air pollution
ii. Water pollution.

19. How does cell to cell movement of water takes place in plants?

20. Why are plants and animals made of different types of tissue?

21. A solution of H_2SO_4 acid is labelled as 95 per cent. What mass of this solution should be diluted with water to get 5 L of solution containing 10 g of H_2SO_4 per litre?

22. What happens to the force between two objects, if

    i. The mass of one object is doubled?
    ii. The distance between the objects is doubled and tripled?
    iii. The masses of both objects are doubled?

23. On a certain planet, a small stone tossed up at 15 m/s vertically uploads takes 7.5 s to return to the ground. What is the acceleration due to gravity on the planet?

24. A rocket is moving up with a velocity v. If the velocity of this rocket is suddenly tripled, what will be the ratio of two kinetic energies?

OR

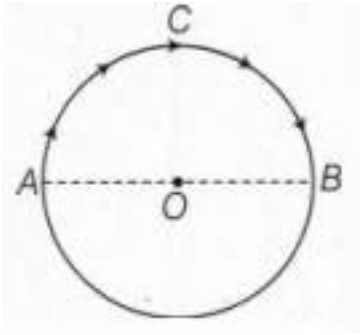
An atom 'M' of an element reacts with oxygen to form M_2O_3. Calculate the valency of the element 'M'.

25. i. Under which category of mixtures will you classify alloys and why?
    ii. Whether a solution is always liquid or not. Comment.
    iii. Can a solution be heterogeneous?

OR

Classify each of the following as a physical or a chemical change. Give reasons.

i. Drying of a shirt in the sun.
ii. Rising of hot air over a radiator.
iii. Burning of kerosene in a lantern.
iv. Change in the colour of black tea on adding lemon juice to it.
v. Churning of milk cream to get butter.

26. 

An insect moves along a circular path of radius 10 cm with a constant speed. It takes 1 min to move from a point on the path to the diametrically opposite point, find

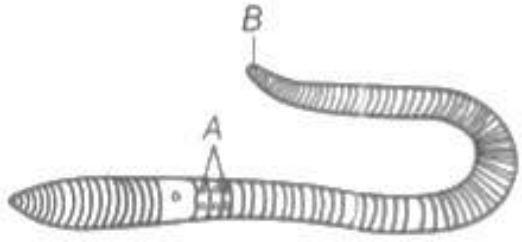
i. the distance covered,
ii. the speed,
iii. the displacement and
iv. the average velocity.

27. The transportation system of plants is composed of complex permanent tissue. They have their transportation system within themselves. Justify in detail with appropriate diagrams.

28. i. Name two airborne diseases. How does the disease-causing microbes spread through air?
ii. How does HIV virus spread from a patient to a healthy person?
iii. How does the immune system of our body function?

OR

Study the figure and answer the following questions:



i. Identify the organism and name the phylum to which it belongs.
ii. Label A and B.
iii. Name the type of symmetry.
iv. Name two other organisms belonging to the above phylum.

29. i. At some moment, two giant planets Jupiter and Saturn of the solar system are in the same line as seen from the earth. Find the total gravitational force due to them on a person of mass 50 kg on the earth. Could the force due to the planets be important?

Mass of the Jupiter = 2×10^{27} kg

Mass of the Saturn = 6×10^{26} kg

The distance of Jupiter from the earth = 6.3×10^{11} m

The distance of Saturn from the earth = 1.28×10^{12} m

ii. A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then will it weigh the same or more or less. Give a reason for your answer.

30. i. From Rutherford's α-particle scattering experiment, give the experimental evidence for deriving the conclusion that
    a. most of the space inside the atom is empty.
    b. the nucleus of an atom is positively charged.

ii. An element has mass number = 32 and atomic number = 16, find
    a. the number of neutrons in the atom of the element.
    b. the number of electrons in the outermost shell of the atom.

iii. On the basis of Rutherford's model of an atom, which subatomic particle is present in the nucleus of an atom?

OR

Write the formulae for the following and calculate the molecular mass for each one of them.

i. Caustic potash
ii. Baking soda
iii. Limestone
iv. Caustic soda
v. Ethanol
vi. Common salt

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Science

Sample Paper 7 (2019-20)

Solution

Section A

1. An electron is a negatively charged particle, whereas a proton is a positively charged particle. The magnitude of their charges is equal. Therefore, an atom containing one electron and one proton will not carry any charge. Thus, it will be a neutral atom.

2. The valency of Ca in $CaCO_3$ is 2+(i.e. Ca^{2+}).

3. i. Egg-laying poultry birds are called **layers.**
   ii. The specialized meat-producing poultry birds are called **broilers.**
   iii. The tremendous rise in the availability of poultry products is called Silver Revolution.
   iv. Following are the example of poultry birds
   I**ndigenous breed:** Assel and Kadaknath.
   Exotic breed: Rhode island red and Light Sussex
4. i. In dicots, flowers are pentamerous whereas in monocots flower is trimerous.
   ii. In dicots, tap-root is found and in monocots fibrous root present.
   iii. The major group of land plants is angiosperm.
   iv. In dicots two cotyledons and in monocots single cotyledons are present.
5. (a) B and C
   Explanation: Inertia is the measure of the mass of a body. The greater the mass of the body, the greater is their inertia. Hence, inertia of football is less and stone is greater.

   OR

   (d) May act on different objects.
   Explanation: Newton's Third Law of Motion states: 'To every action there is an equal and opposite reaction'. It must be remembered that action and reaction always act on different objects. Action of one object generates reaction in other.
6. (c) negative **Explanation:** The nature of work done in case of retarding motion is negative.

Suppose a force F brings a body moving with velocity v to rest (retards), then work done = change in KE = KE_f = KE_i

W = 0 - $\frac{1}{2}$ m u^2 = -$\frac{1}{2}$ m u^2

7. (b) 40w **Explanation:**

   Mass = 20 kg, height = 20 × $\frac{20}{100}$ m = 4m, time taken = 20 s.
   Power = $\frac{work\ done}{time}$
   Power = $\frac{mgh}{t} = \frac{20 \times 10 \times 4}{20}$ watt = 40 w.

8. (b) (ii)
   Explanation: Reaction is always equal and opposite to action.

OR

An object immersed in a liquid experiences buoyance force In the upward direction only.

9. (a) Statement B
   Explanation: Methyl bromide is a gaseous fumigant. Excreta of birds contain bacteria salmonella which causes food poisoning.
10. (b) B
    Explanation: Sago contains starch
11. (a) AIDS **Explanation:** Most commonly, people get or transmit HIV/AIDS through sexual behaviors and needle or syringe use. Only certain body fluids—blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, and breast milk—from a person who has HIV can transmit HIV.
12. (d) $_4Be^9$

    Explanation: The atomic number of the atom is 4 as it has 4p in its nucleus. The mass number of the atom is 5+4=9

    The element is Be.

OR

(c) Solid [B]

Explanation: The melting point of a solid is an indication of the strength of the force of attraction between its particles. So, solid B has more intermolecular force of attraction.

13. (c) Assertion (A) is true but reason (R) is false.
    Explanation: Evaporation of spirit from skin make the skin feel cool because it absorbs latent heat of vaporisation from the skin.
14. (d) Assertion (A) is false but reason (R) is true.
    Explanation: If the position-time graph of a body moving uniformly in a straight line is parallel to the position axis, it means that the position of body is changing at constant time. The statement is abrupt and shows that the velocity of body is infinite.
15. i. Photoperiod is important for the growth and flowering of plants.
    ii. Hybridisation and genetic modification are two processes used for the production of new and improved species.
    iii. Selecting the seeds of crops with wider adaptability for agriculture helps in stabilising crop production under different environmental conditions.
16. i. Molar mass of NH_2 = Atomic mass of N + 3 $\times$ Atomic mass of H
    = 14 + 3 $\times$ 1 = 17 g/mol
    = Mass of 1 mole of NH_3
    $\therefore$ Mass of 0.5 mole of NH_3 = 17 $\times$ 0.5 = 8.5 g
    ii. Molar mass of P_4 molecules = 4 $\times$ Atomic mass of P = 4 $\times$ 31 = 124g
    Number of particles (N) = $\frac{Given\ mass}{Molar\ mass} \times Avogadro's\ number$
    $\Rightarrow N = \frac{m}{M} \times N_A$
    $\Rightarrow N = \frac{31}{124} \times 6.022 \times 10^{23}$
    = 1.5 $\times$ 10^{23}
    iii. Molar mass of K_2SO_4 = 2 $\times$ Atomic masses of K + Atomic mass of S + 4 $\times$ Atomic mass of O
    = 2 $\times$ 39 + 32 + 4 $\times$ 16
    = 78 + 32 + 64 = 174 g/mol
    Number of moles = $\frac{Given\ mass}{Molar\ Mass}$ = = $\frac{87}{174} = 0.5mol$

OR

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.

17. i) Weight of hot air = Volume × Density × g
= 50 × 0.4 × g
= 20 kgf
ii) Weight of hot air, balloon and equipment
= 20 +12 + P = (32 + P) kgf
iii) Upthrust = Weight of air displaced
= hdg
= 50 × 1.3 × g
= 65 kgf
By law of floatation we have,
32 + P = 65
P = 65 - 32 = 33 kgf

18. i. As the temperature of the waterbody increases, aquatic life is disturbed, immature egg and larvae die and this further disturbs the ecological balance.
ii. Two methods to prevent water pollution are:
    a. Treatment of sewage separately before discharging it into water sources.
    b. Cooling of hot water of industries before discharge.

OR

i. Two harmful effects of air pollution are:
   a. Results in respiratory problems, such as asthma, bronchitis, etc.
   b. Acid rain affects monuments, plants and animals adversely.

ii. Two harmful effects of water pollution are:
   a. Leads to waterborne diseases such as typhoid, cholera, jaundice, etc.
   b. Accumulation of toxins in water causes the death of aquatic life.

19. **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.

20. Plants and animals are two different types of organisms. Plants are autotrophic organisms. They prepare their own food by photosynthesis. Since plants are stationary or fixed organisms, they do not require as much energy as is required by animals. Most of the tissues in plants are therefore supportive in nature. Most of these tissues such as xylem, phloem, sclerenchyma and cork are dead tissues i.e., they do not contain living protoplasm. There are some tissues in plants which divide throughout life. They divide for the growth and reproduction of the plants. Animals on the other hand, are heterotrophic organisms (depend directly or indirectly on autotrophs for their nutrition) and use locomotion. They have to move in search of food, mate and shelter. They need more energy as compared to that required by plants. Most of the tissues in animals contain living protoplasm. In contrast to plants, growth in animals is uniform.

21. The concentration of the acid is given as 95 percent.
    This means that 95 g of H_2SO_4 is present in 100 g of the acid solution.

    1 L of the diluted H_2SO_4 solution should contain 10 g of H_2SO_4.

    Therefore, 5 L of the diluted solution should contain 50 g of H_2SO_4.

    50 g of H_2SO_4 will be present in $\frac{50 \times 100}{95}$ g of the solution

    or 50 g of H_2SO_4 will be present in 52.63 g of the solution.

    Therefore, 52.63 g of the given solution should be diluted with water to get 5 L of solution containing 10 g of H_2SO_4 per litre.

22. Force of attraction between two objects is given by
$F = \frac{Gm_1m_2}{r^2}$

i. If the mass of one object is doubled then the force will be doubled.
ii. If the distance between the objects is doubled then the force becomes one-fourth and if the distance between the objects is tripled then the force becomes one-ninth.
iii. If masses of both objects are doubled then the force becomes four times.

23. Initial velocity,u=15 m/s
Final velocity,v = 0

From first equation of motion,
$v = u + at$
$\implies 0 = 15 + at$

$\implies t = \frac{-15}{a}$sec
∴ time taken to reach the highest point = $\frac{-15}{a}$sec
Time taken to reach downward $= \frac{-15}{a}\,s$
∴ Time taken for the entire journey $= 2\left(\frac{-15}{a}\right)$

$\implies 2\left(\frac{-15}{a}\right) = 7.5s$

Therefore,a = -4 m/s^2

Therefore,the acceleration due to gravity on the planet = -4 m/s^2

24. Initial velocity = v, then final velocity, v= 3v
Initial kinetic energy = $\frac{1}{2}mv^2$
Final kinetic energy (KE) = $\frac{1}{2}mv'^2 = \frac{1}{2}m(3v)^2 = 9\left(\frac{1}{2}mv^2\right)$
$(KE)_{initial}$: $(KE)_{final}$ =1:9.

OR

Two atoms of element ‘M’ combine with 3 atoms of oxygen.
Therefore, the number of oxygen atoms that combine with one atom of element ‘M’= 3/2

Therefore, the valency of element 'M'=$\frac{3}{2} \times 2$ = 3

Note: The valencies of the elements are interchanged while writing the chemical formula of the compound formed by the elements.

25. i. Alloys are a homogeneous mixture of metals or non-metals because
    a. It shows the properties of its constituents, and
    b. It has variable composition, e.g. brass is considered a mixture because it shows the properties of its constituents, copper and zinc; and it has a variable composition.

    ii. No, a solution is not generally a liquid always. For e.g. alloys are known to be solid solutions.

    iii. The term solution is generally used for 'true solution'. In this case, the solution is always homogeneous.
    In the case of 'colloidal solution', that is not a true solution i.e. the solution is heterogeneous.

OR

i. It is a physical change because moisture in the shirt is converted from its liquid state to gaseous state because of the heat of the Sun.

ii. It is a physical change because water in the radiator is converted from a liquid state to gaseous state.

iii. It is a chemical change because combustion of kerosene occurs and new products are formed.

iv. It is a chemical change because there is a reaction between citric acid present in lemon and the compounds of the tea resulting in the formation of new products.

v. It is a physical change because the cream suspended in milk is separated by churning (centrifugation).

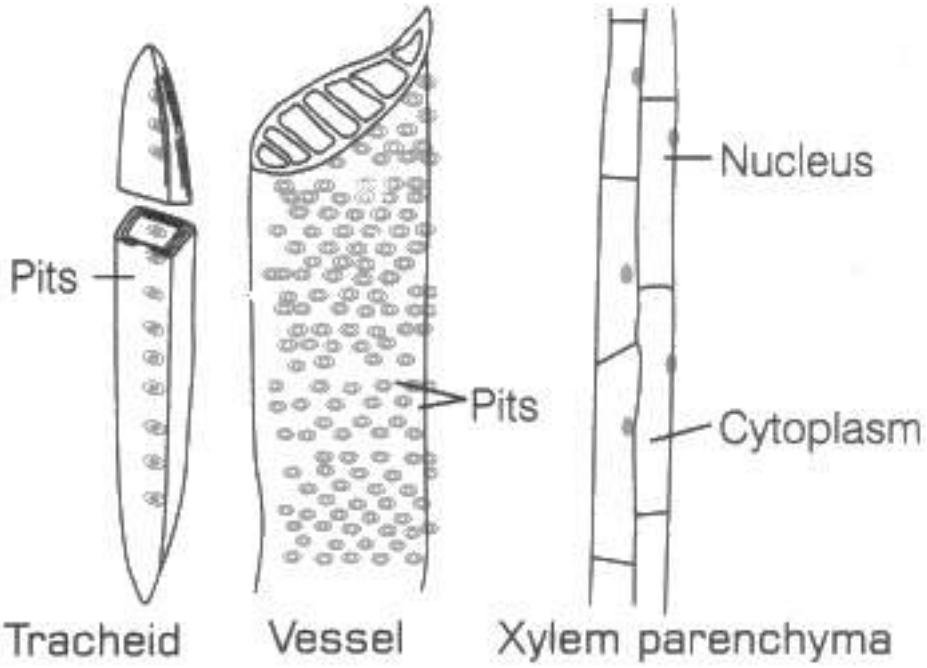
26. As given in the question that the insect takes 1 min to move from one point to a diametrically opposite point, which means in 1 min the insect will be completed a half revolution. So, the distance covered will be equal to 'half of the circumference' of the circular path and displacement will be equal to the diameter of the circular path. Suppose the insect was at A initially and it moves along ACB to reach the diametrically

opposite point B in 1 min.

i. ∴ The distance moved in 1 min = πr
   = 3.14 × 10 = 31.4 cm
ii. ∴ Speed = $\frac{Distance}{Time}$ = $\frac{31.4}{1}$ = 31.4 cm/min
iii. ∴ Displacement, AB = 2r = 2 × 10 = 20 cm
iv. ∴ Average velocity,
   v_{av} = $\frac{Displacement}{Time}$ = $\frac{20\ cm}{1\ min}$ = 20 cm/min.

27. 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.

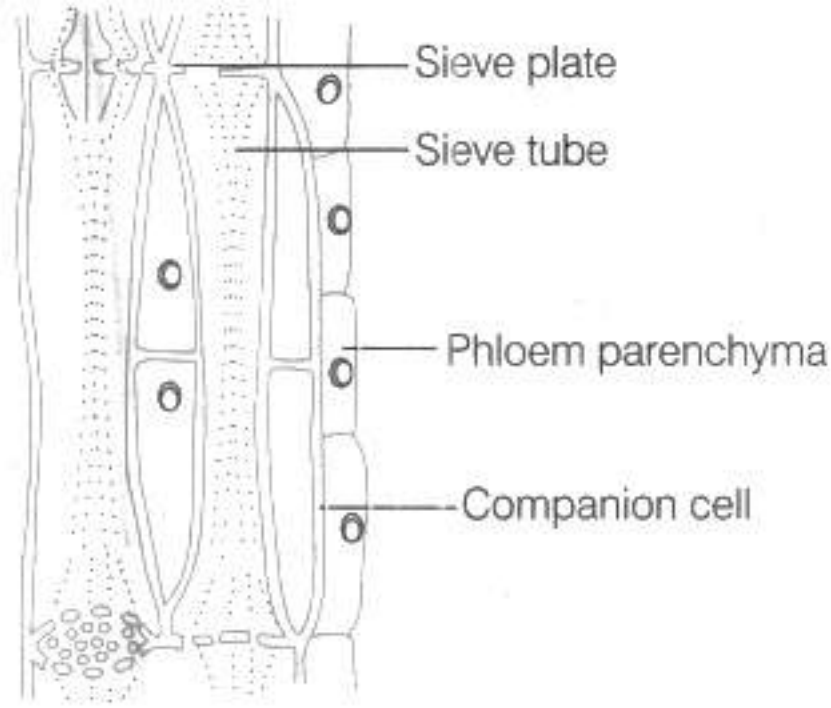
Elements of phloem:

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.

28. i. Pneumonia and the common cold are two airborne diseases.
Spreading of disease-causing microbes occurs through the little droplets thrown out by an infected person when he sneezes or coughs. Someone standing close by can breathe in these droplets and microbes get a chance to start a new infection.

ii. These are microbial diseases, that can be transmitted by sexual contact from one

partner to the other. However, STDs do not spread by casual physical contact. It includes hugs, handshakes, sports such as wrestling or by any other way in which we touch each other socially. Syphilis and AIDS are common examples of sexually transmitted diseases.

iii. When virus, bacteria or other microbes enter our body, they begin to multiply and cause infection. As a result of infection, the cells of our body get damaged and signs and symptoms of an illness appear. Our immune system comes into action in response to infection. It recruits many cells to the affected tissue to kill off the disease-causing microbes. This recruitment process is called inflammation. Due to the effect of this process swelling, pain and fever occur.

OR

i. The organism is earthworm and the phylum to which it belongs is Annelida.

ii. A-Genital papillae, 5-Anus

iii. Symmetry-Bilaterally symmetrical

iv. Two other organisms belonging to this phylum are Nereis and leech.

29. i.

a. Gravitational force acting on the 50 kg,

$F = mg = 50 \times 9.8 = 490$ N

b. Gravitational force acting on the 50 kg mass due to jupiter,

$$F_{Jupiter} = \frac{G \times M_{jupiter} \times M_{person}}{(\text{distance of jupiter from the earth})^2}$$

$$F_{Jupiter} = \frac{6.67 \times 10^{-11} \times 2 \times 10^{27} \times 50}{6.3 \times 10^{11} \times 6.3 \times 10^{11}}$$

$F_{Jupiter} = 1.68 \times 10^{-5}$ N

c. Gravitational force acting on the 50 kg mass due to saturn

$$F_{saturn} = \frac{G \times M_{saturn} \times M_{person}}{\left(\text{distance of saturn from the earth}\right)^2}$$

$$F_{saturn} = \frac{6.67 \times 10^{-11} \times 6 \times 10^{26} \times 50}{1.28 \times 10^{12} \times 1.28 \times 10^{12}}$$

$F_{saturn} = 1.12 \times 10^{-6}$ N

$\therefore$ Total gravitational force due to the Jupiter and the Saturn = $(1.68 \times 10^{-5} + 1.12 \times 10^{-6}) = 1.8 \times 10^{-5}$ N

Thus, the combined force due to the planets Jupiter and Saturn (1.8×10^{-5}) N is

negligible as compared to the gravitational force i.e. 490 N due to the earth.

ii. We know that g at the equator is less than g at poles (Antarctica). Thus, weight at the equator is less than weight at the pole (Antarctica). A bag of sugar weighs 'w' at a certain place on the equator. If this bag is taken to Antarctica, then it will weigh more due to the greater value of g.

30. i.

a. As most of the α-particles passed straight through the gold foil.
b. A few of the α-particles which are positively charged get deflected due to the positive charge of the nucleus.

ii.

a. Number of neutrons = mass number - atomic number = 32 - 16 = 16
b. The electronic configuration of the element will be as follows:

K	L	M
$2,$	$8,$	6

Hence, the number of electrons in the outermost shell is 6.

iii. According to Rutherford's model of an atom, positively charged protons are present in the nucleus of an atom.

OR

i. KOH

Molecular mass of KOH = 39 + 16 + 1 = 56 u

ii. $NaHCO_3$

Molecular mass of $NaHCO_3$ = 23 + 1+ 12+3 $\times$ 16 = 23 + 1 + 12 + 48 = 84 u

iii. $CaCO_3$

Molecular mass of $CaCO_3$ = 40 + 12 + 3 $\times$16 = 100 u

iv. NaOH

Molecular mass of NaOH = 23 + 16 + 1 = 40u

v. C_2H_5OH

Molecular mass of C_2H_5OH or C_2H_6O

= 2 $\times$ 12 + 6 $\times$ 1 + 16 = 24 + 6 + 16 = 46u

vi. NaCI

Molecular mass of NaCl = 23 + 35.5 = 58.5 u (5)