Class: IX
SESSION : 2022-2023
SUBJECT: Science (086)
SAMPLE QUESTION PAPER - 3
with SOLUTION

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

1. The name of A, B, C and D in the following diagram are: **[1]**

a) A - Solidification, B - Vaporisation, C - Fusion, D - Condensation

b) A - Vapourisation, B - Fusion, C - Condensation, D - Solidification

c) A - Fusion, B - Vaporisation, C - Condensation, D - Solidification

d) A - Condensation, B - Vaporisation, C - Solidification, D - Fusion

2. To observe and compare the pressure exerted by solid iron cuboid, a student marked all the faces of cuboid from 1 to 6. After doing the experiment with all faces of cuboid, he observed that **[1]**

a) adjacent faces of cuboid exerted the same pressure

b) all the faces of cuboid exerted same pressure on the sand

c) opposite parallel faces of cuboid exerted unequal pressure on the sand

d) opposite parallel faces of the cuboid exerted some pressure on the sand

3. Following are a few definitions of osmosis read carefully and select the correct definition. **[1]**

a) Movement of solvent molecules from its higher concentration to

b) Movement of solvent molecules from higher

lower concentration

concentration to lower concentration of solution through a permeable membrane

c) Movement of solute molecules from lower concentration to higher concentration of solution through a semipermeable membrane

d) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane

4. Separation between compression and rarefaction is _____ the wavelength. **[1]**

a) half

b) one fourth

c) one third

d) twice

5. **Statement A:** Calculus, a new branch of mathematics was stated by Newton. **[1]**
Statement B: If mass remains the same, doubling the force will reduce the acceleration to half.
Which of the above two statements is true?

a) both A and B

b) statement B

c) none of these

d) statement A

6. An iron sphere of mass 30 kg has the same diameter as an aluminum sphere whose mass is 10.5 kg. The spheres are dropped simultaneously from a cliff. When they are 10 m from the ground, they have the same. **[1]**

a) kinetic energy

b) potential energy

c) acceleration

d) momentum

7. The structure of the nuclear membrane is suitable for: **[1]**

a) separation of chromosomes

b) the organisation of spindle for nuclear division

c) nucleocytoplasmic exchange of materials

d) synthesis of endoplasmic reticulum

8. The system of culturing five or six species of fish with different food habits, in a fishpond, is called **[1]**

a) composite fish culture

b) capture fishing

c) pisciculture

d) mariculture

9. Tendons help to connect **[1]**

a) muscle to muscle

b) muscle to bone

c) bone to cartage

d) bone to bone

10. Curved soundboard may be placed behind the stage because: **[1]**

a) it reflects the sound to a particular point in the hall

b) it makes the stage look beautiful

c) sound waves may be absorbed

d) after reflection, sound waves spread evenly across the width of the hall.

11. Which of the following statements are incorrect **[1]**

a. The properties of a compound are different from its constituents elements

b. A mixture is homogenous but a compound is heterogeneous

c. Formation of a compound is a chemical change

d. Formation of a mixture is a chemical change

a) (b) and (d)

b) (a), (b) and (c)

c) All of these

d) (a) and (b)

12. A heavier and a lighter body have equal momentum, then **[1]**

a) heavier will have more K.E.

b) lighter will have more K.E.

c) they will have equal K.E.

d) K.E. will be independent of momentum

13. Identify the incorrect statement(s). **[1]**

a) Atoms of the same element may have different masses.

b) Atoms of different elements may have same masses.

c) None of these

d) Atoms have been found to be made up of sub-atomic particles.

14. The most abundant material on the plant cell wall is: **[1]**

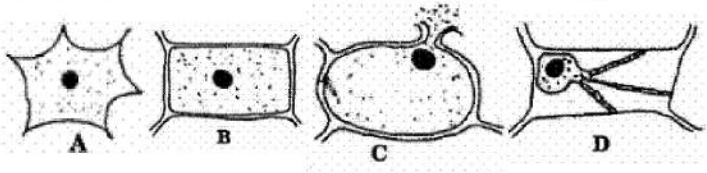
a) proteins

b) lipids

c) wax

d) cellulose

15. When an onion peel cell is placed in a hypertonic solution, it will look like? **[1]**



a) D

b) B

c) C

d) A

16. On tripling the speed of motion of a body, the change in K.E. is: **[1]**

a) 8 times

b) 2 times

c) 9 times

d) 4 times

17. **Assertion (A):** A vibrating tuning fork sounds louder when its stem is pressed against a desktop. **[1]**
Reason (R): When a wave reaches another denser medium, part of the wave is reflected.

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

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

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** Any two objects in the universe attract each other by a force called gravitation force. **[1]**
Reason (R): The force of gravitation exerted by the earth is called gravity.

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

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

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** Usage of manure is advantageous for our environment. **[1]**
Reason (R): Manure contains chemical substances like nitrogen, phosphorus and potassium.

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

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

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** If the net external force on the body is zero, then its acceleration is zero. **[1]**
Reason (R): Acceleration does not depend on force.

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

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

c) A is true but R is false.

d) A is false but R is true.

Section B

21. Calculate the formula mass of sodium carbonate (Na_2CO_3. 10 H_2O). **[2]**

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

OR

What is Bose-Einstein Condensate?

23. Differentiate between parenchyma, collenchyma and sclerenchyma on the basis of their cell wall. **[2]**

24. Which type of ribosomes are found in prokaryotes and eukaryotes? **[2]**

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? **[2]**

26. A human heart on an average is found to beat 75 times a minute. Calculate its frequency. **[2]**

OR

A Child hears an echo from a cliff 4 seconds after the sound from a powerful cracker is produced. How far away is the cliff from the child? (Take velocity of sound in air as 340 ms^{-1})

Section C

27. Differentiate between a saturated and unsaturated solution. How will you test whether a given solution is saturated or not? **[3]**

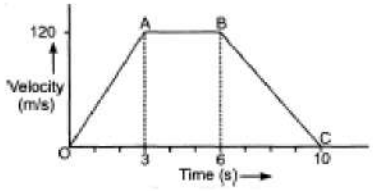
28. Give two reasons to justify an iron almirah is a solid at room temperature. **[3]**

OR

Suggest an activity to show that the rate of diffusion of liquids decreases with increase in density of the liquid.

29. **[3]**
    i. Identify the tissue given in the following figure.
    ii. Mention the characteristic features of the cells.
    iii. Specify the function of this tissue.
    iv. Name any one part of the plant, where these cells are present.

30. The velocity-time graph of an object of mass m = 50 g is shown in the figure. Observe the graph carefully and answer the following questions. **[3]**
    i. Calculate the force on the object in time interval 0 to 3 s.
    ii. Calculate the force on the object in the time interval 6 to 10 s.
    iii. Is there any time interval in which no force acts on the object? Justify your answer.



31. A ball is dropped from the jumping board of a swimming pool, which is at a height of 20 m. A second ball is thrown from the same board after one second with initial velocity u. If both the balls hit the water together, calculate the initial velocity of second ball. Do they hit the ground at the same time? (Take g = 10 ms^{-2}) **[3]**

32. Differentiate between a true solution and a colloid. **[3]**

33. A cheetah is the fastest land animal and can achieve a peak velocity of 100 kmh^{-1} up to distances less than 500 m . If a cheetah spots his prey at a distance of 100 m, what is the minimum time it will take to get its prey, if the average velocity attained by it is 90 kmh^{-1}? **[3]**

OR

A bus starting from rest moves with a uniform acceleration of 0.1 m s^{-2} for 2 minutes. Find:

a. the speed acquired.

b. the distance travelled.

Section D

34. i. Describe Bohr's model of an atom. Draw a sketch of Bohr's model of an atom with three shells. **[5]**

ii. What was the drawback of Rutherford's model of an atom?

OR

If Z = 3, what would be the valency of the element? Also, name the element.

35. Differentiate between various types of muscular tissues. Draw appropriate diagrams. **[5]**

OR

i. What will happen if cells are not properly organised in tissue?

ii. Under certain circumstances squamous epithelium is known as stratified squamous epithelium. Justify.

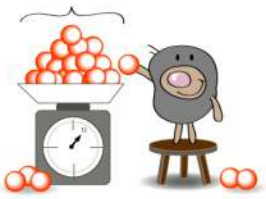
36. Make a comparison and write down ways in which plant cells are different from animal cells. **[5]**

Section E

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

A mole corresponds to the mass of a substance that contains 6.023×10^{23} particles of the substance. The mole is the SI unit for the amount of a substance. Its symbol is mol. By definition: 1 mol of carbon-12 has a mass of 12 grams and contains $6.022140857 \times 10^{23}$ of carbon atoms (to 10 significant figures).

6.02×10^{23} carbon atoms = 12 grams



(i) One mole of carbon atoms weighs 12 g. Find the mass of 1 atom of carbon in grams

[Avogadro's number = 6.022×10^{23} per mole]

(ii) Calculate the mass of 0.5 mole of N_2 gas

(iii) Calculate the mass of 0.2 mole of O -atoms

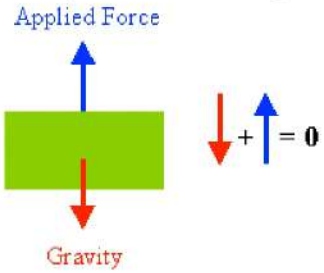
OR

Calculate the mass of 4 moles of aluminium atom [Given, N = 14 u, O = 16 u, Al = 27 u, Avogadro's number = 6.022×10^{23} per mole]

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

Work is the energy applied to an object as it moves some distance. The amount of work done is directly proportional to the magnitude of force applied, as well as the displacement of the object. In some cases, there may be an angle between the direction of displacement and the force vector.

A body of mass 5 Kg is lifted vertically at a height of 12m.



(i) How much force is applied in this condition?

(ii) How much work is done in lifting the body?

OR

What happens to the work performed?

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

A bee colony consists of a single queen and a large number of worker bees. Drones are present in the early stages but do not occur later on. All the functions of the colony are performed by worker bees. They build the hive, collect food,

feed themselves as well as the queen, store food and protect the hive. Genetically, a worker bee does not differ from a queen bee and can even become a laying worker bee, but in most species will produce only male (drone) offspring.

(i) Why are drones absent in the mature bee colony?

(ii) When and how are drones produced?

(iii) What is bee bread?

OR

Why worker bees are females but they do not lay eggs?

SOLUTION

Section A

1. **(c)** A - Fusion, B - Vaporisation, C - Condensation, D - Solidification
   Explanation:
   i. A – Fusion: Change of solid state into liquid state is known as fusion.
   ii. B – Vaporization: Change of liquid state into gases state is known as vaporization.
   iii. C – Condensation: Change of gases state into liquid state is known as condensation.
   iv. D – Solidification: Change of liquid state into solid state is known as solidification.
2. **(d)** opposite parallel faces of the cuboid exerted some pressure on the sand
   Explanation: Since force per unit area remains the same, so the same conclusion is drawn by both the students.
3. **(d)** Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane
   Explanation: Osmosis is the passive movement of water or any other solvent molecules from a region of higher water concentration to a region of lower water concentration through a semipermeable membrane.
4. **(a)** half
   Explanation: Wavelength is the length between two consecutive peaks, i.e. crest or two consecutive valleys, i.e. trough of a wave. Wavelength is represented by the Greek letter λ (lambda). Distance between crest and trough is half the wavelength = $\lambda/2$.
5. **(d)** statement A
   Explanation: The branch of mathematics, called Calculus was stated by Newton. Force is the product of mass and acceleration. So, acceleration = $\frac{force}{mass}$. Doubling of force will double the acceleration if the mass is kept the same.
6. **(c)** acceleration
   Explanation: When both spheres are dropped simultaneously from a cliff, they have the same acceleration. Because during free-fall acceleration of the body becomes equals to ($g= 9.8 m/s^2$) and 'g' depends on the mass of earth and radius of the earth.
7. **(c)** nucleocytoplasmic exchange of materials
   Explanation: The nuclear membrane allows the nucleocytoplasmic exchange of materials as the membrane behaves as a semipermeable membrane.
8. **(a)** composite fish culture
   Explanation: In Composite Fish Culture System, a combination of five or six fish species is used in a single pond. The fish selected in this system belong show different food habits. This ensures no competition for food and ensures better yield.
9. **(b)** muscle to bone
   Explanation: A tendon is a fibrous connective tissue that attaches muscle to bone. Tendons may also attach muscles to structures such as the eyeball.
10. **(d)** after reflection, sound waves spread evenly across the width of the hall.
    Explanation: A curved soundboard may be placed behind the stage so that sound after reflecting from the soundboard spreads evenly across the width of the hall. And regular reflection takes place.
11. **(a)** (b) and (d)
    Explanation:

- A compound is a substance formed when two or more elements are chemically bonded together. The property of the compound has always different from its constituents. A true solution is a homogeneous mixture.
- The compound has a fixed composition. The mixture has a variable composition. So, the compound is homogenous and the mixture is heterogeneous.
- A compound is a substance formed when two or more elements are chemically bonded together. So, the formation of a compound is a chemical change.
- Constituents of the mixture can be separated by physical methods. So, the Formation of a mixture is a physical change.
- So, statements (B) and (D) are incorrect statements.

12. **(b)** lighter will have more K.E.
    Explanation: The lighter body will have more K.E because kinetic energy is inversely proportional to the mass of the body.
13. **(c)** None of these
    Explanation:
    - Atoms of different elements may have the same masses. E.g. Argon and Calcium.
    - Atoms of the same element may have different masses as in the case of isotopes.
    - Atoms are made up of sub-atomic particles - electron, proton, and neutron.

    All the statements are correct.
14. **(d)** cellulose
    Explanation: Cellulose is an important structural component of the primary cell wall of green plants, many forms of algae, and the oomycetes. Some species of bacteria secrete it to form biofilms. Thus, cellulose is the most abundant organic polymer on Earth.
15. **(a)** D
    Explanation: Due to plasmolysis liquid moves out from the cell and the cell membrane shrinks.
16. **(c)** 9 times

    Explanation: K.E. is proportional to V^2.
    So, when speed is tripled, KE. is nine-time.
17. **(c)** A is true but R is false.
    Explanation: If the tuning fork is held in hand and hit with a hammer, a sound is produced as the prongs of the tuning fork set surrounding air particles into vibrational motion. The sound produced by the tuning fork in the air is barely audible. However, if the tuning fork is set on a desktop. The desktop begins vibrating at the same natural frequency as the tuning fork. The tuning fork forces surrounding desktop particles into vibrational motion. The vibrating desktop in turn forces surrounding air particles into vibrational motion. As the surface area of the desktop is greater than the surface area of the tuning fork, more surrounding air particles will be forced into vibration. This causes an increase in the amplitude and thus loudness of the sound.
18. **(b)** Both A and R are true but R is not the correct explanation of A.
    Explanation: Both A and R are true but R is not the correct explanation of A.
19. **(c)** A is true but R is false.
    Explanation: Usage of manure is advantageous for our environment as manure contains large quantities of organic matter. It is prepared by the decomposition of animal excreta and plant wastes. It helps in enriching the soil with nutrients and organic matter, increasing soil fertility and its water holding capacity. Manure do not contain chemical substances. Fertilizers contain chemical substances like nitrogen, phosphorus, and potassium.

20. **(c)** A is true but R is false.
Explanation: acceleration = $\frac{\text{force}}{\text{mass}}$ i.e.,
if net external force on the body is zero (F = 0), then, the acceleration of a body is also zero.

Section B

21. Formula mass of sodium carbonate (Na_2CO_3. 10 H_2O). = (2×atomic mass of Na) + (1 × atomic mass of C)+(3 × atomic mass of O)+10 [(2 × atomic mass of H) + (1 × atomic mass of O)]
=[(2 × 23) + (1 × 12) +(3 × 16) +10 (2 × 1) + (1 × 16)]
= 46+12+48+180
= 286 u
22. This is because of the absence of kinetic energy in the solid state since the particles are very closely packed.

OR

It is a phenomenon which occurs at very low temperature. In 1995, Carle Wieman (a physicist from USA) chilled atoms of a gas of extremely low density, to the lowest temperature ever achieved, and created a new state of matter called the Bose-Einstein condensate. This effect is based on the works of the Indian physicist, Prof. Satyendra Nath Bose and Albert Einstein. They predicted the existence of the Bose Einstein condensate in 1925 and therefore, this effect is named after them. Scientists consider this as the fifth state of matter. At very low temperatures
(around 2×10^{-7} K) a Bose-Einstein condensate can be formed in which several thousand atoms become a single entity (a superatom). This effect has been observed with atoms of rubidium (Rb) and lithium (Li).

23.

Parenchyma	Collenchyma	Sclerenchyma
The cell wall is thin and made up of cellulose.	The cell wall is irregularly thickened at the corners due to deposition of **pectin**.	The cell wall is very thick due to deposition of an impermeable substance called **lignin** (a chemical substance which acts as cement and hardens them).

24. Ribosomes can be found in both eukaryotic and prokaryotic organisms. Generally prokaryotic ribosomes are called 70S ribosomes, which are smaller than eukaryotic ribosomes Ribosomes consist of two subunits, and these two subunits are called 30S and 50S, the smaller unit and the larger unit respectively. Smaller subunit and larger subunit of eukaryotic ribosomes are described as 40S and 60S respectively, and the whole ribosome is 80S. This is lager than the prokaryotic ribosome.
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 $v^2 - u^2 = 2$ aS 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. Frequency is defined as the number of beats per second. The heart beats 75 times in 60 second, therefore its frequency is v = $\frac{75}{60} = 1.25HZ$

OR

Given: Time of echo = 4s, velocity of sound in air = 340 ms^{-1}
Distance of cliff from child (S) = ?

Using the expression S = $\frac{V \times t}{2}$

We have S = $\frac{340 \times 4}{2}$ = 680 m

Section C

27.

Sr.No.	Saturated Solution	Unsaturated Solution
1.	It is solution in which no more solute can be dissolved at a given temperature.	It is a solution in which more amount of solute can be dissolved without raising the temperature.
2.	When temperature of saturated solution is decreased then the solute starts separating from the solution in the form of crystalline solid.	When temperature of unsaturated solution is decreased then it becomes saturated.

28. An iron almirah is a solid due to following reasons:
(i) It has definite volume and shape. This means that it is hard and rigid.
(ii) It has high melting point and it's density is very high.

OR

(i) Take two beakers filled with water.
(ii) Put a drop of blue ink slowly along the sides of the first beaker and honey in the same way in another beaker.
(iii) Leave it undisturbed.
(iv) We observe that honey diffuses slowly as compared to ink.
(v) This experiment shows that lesser the density, faster the rate of diffusion.

29. i. The tissue given in the figure is collenchyma.
ii. The cells of collenchyma are living, elongated, thickened at the corners and have very little intercellular space.
iii. It provides mechanical support and flexibility to the plant.
iv. It is present in leaf stalks, below the epidermis.

30. i. Given mass, m = 50 g = $\frac{50}{1000}$ kg.

Acceleration during intervals 0 to 3 s = $a_1 = \frac{v-u}{t} = \frac{120-0}{3} = 40$ m/s^2

According to Newton's second law of motion : Force, F_1 = ma = $(\frac{50}{1000}) \times 40 = 2$ N

ii. Acceleration during intervals 6 to 10 s = $a_2 = \frac{v_2-v_1}{t} = \frac{0-120}{(10-6)} = -\frac{120}{4} = -30$ m/s^2

Similarly, Force, $F_2 = ma_2 = \frac{50}{1000} \times (-30) = -1.5$ N.

iii. Time interval in which no force acts on the object ='3's - '6' s i.e A to B.
This is because in this interval, the velocity of object is constant i.e. 120 m/s .

Hence, Acceleration= '0' m/s^2. Therefore, F= '0' N.

31. Case (i) = For the first ball
Initial velocity (u) = 0

Final velocity (v) = ?

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

Distance of fall (S) = 20 m

Time of fall (t) = ?

Using $S = ut + \frac{1}{2}at^2$ we have time of fall of the first ball

$20 = 0 \times t + \frac{1}{2} \times 10 \times t^2$

$=> t^2 = 4$

$=> t = 2\ s$

Since the second ball is thrown 1 second later. Therefore for the two balls to reach the ground at the same time, the second ball should in motion for t = 2 - 1 = 1 second

Therefore using the equation $S = ut + \frac{1}{2}at^2$ we have

$20 = u \times 1 + \frac{1}{2} \times 10 \times 1^2$

$=> u = 15ms^{-1}$

32.

True solution	Colloid
1. A true solution is a homogeneous mixture of two or more substances. 2. The size of the particles is less than 1 nm. 3. It is always clear and transparent. 4. The particles cannot be seen even with a microscope. 5. It does not show Tyndall effect. 6. Example: Salt solution	1. A colloidal solution is a heterogeneous mixture of two substances. 2. The range of particle size is between 1 nm and 100 nm. 3. It is translucent. 4. The particles of a colloidal solution can be seen with the help of a microscope. 5. It shows Tyndall effect since a beam of light can be scattered by the particles. 6. Example: Milk

33. Speed of the cheetah in ms^{-1} is $90 \times \frac{5}{18}$ $ms^{-1} = 25ms^{-1}$

Distance of the prey = 100 m

Therefore time to catch the prey = $\frac{Distance}{Speed} = \frac{100}{25} = 4S$

OR

a. u = 0, a = 0.1 ms^{-2}, t = 2min = 120 seconds.

v = u + at = 0 + 0.1 × 120 = 12 ms^{-1}

so speed acquired = v = 12ms^{-1}

b. S = 0 × 120 + $\frac{1}{2}$ × 0.1 × 120^2 = 720 m.

Section D

34. i. To overcome the objections raised against Rutherford's model of the atom, Neils Bohr put forward the following postulates about the model of an atom:

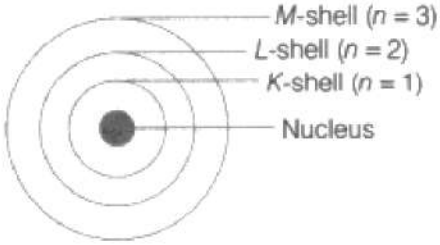
a. An atom consists of the positively charged nucleus around which electrons revolve in discrete orbits, i.e. electrons revolve in certainly permissible orbits and not just in any orbit.

b. Each of these orbits is associated with a certain value of energy. Hence, these orbits are called energy shells or energy levels. As the energy of an orbit is fixed (stationary), the orbit is also called stationary state.

c. Starting from the nucleus, energy levels (orbits) are represented by numbers (1, 2, 3, 4, etc.) or by alphabets (K, L, M, N, etc.).

d. The electrons present in the first energy level (E_1) have the lowest energy. Energies increases on moving towards outer energy levels.
e. The energy of an electron remains the same as long as it remains in discrete orbit and it does not radiate energy while revolving.
f. When energy is supplied to an electron, it can go to higher energy levels. While an electron falls to a lower energy level when it radiates energy.

Three shells or orbits are presented by the letters K, Z, M (or the numbers, n = 1, 2, 3)



ii. The drawbacks of Rutherford's model of an atom are:
a. It could not explain the stability of an atom when charged electrons are moving under the attractive force of the positively charged nucleus.
b. Rutherford's model could not explain the distribution of electrons in the extra nuclear portion of the atom.

OR

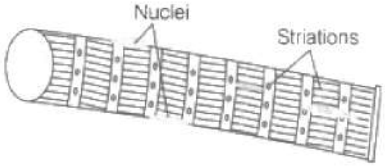
When atomic number Z = 3, the element will have 3 protons in its nucleus.
Since the atom is electrically neutral, the number of electrons in its shells will be equal to the number of protons .
The element will have 3 electrons in its different shells.
The maximum number of electrons that can be accommodated in the first orbit (n = 1) or K-shell will be = $2n^2 = 2$
So, the 3 electrons in the element would be distributed as 2, 1.
The number of valence electrons (i.e. electrons in the outermost shell) is 1.
Valency = number of valence electrons (for 4 or lesser valence electrons)
The element can easily give away its outermost single electron for achieving a duplet (Helium) configuration.
The valency of the element is 1. The given element is Lithium (Li).

35.

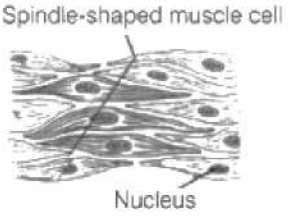
Types	**Striated Muscles**	**Unstriated Muscles**	**Cardiac Muscles**
Structure	These are made up of long, cylindrical, unbranched and multinucleate cells. These show alternate light and dark striations.	These muscles are made up of long uninucleate cells with pointed ends.	These are made up of cells, which are cylindrical, branched and uninucleate.
Striations	They show alternate light and dark bands or striations.	These do not show striations.	These muscles show faint striations.

Types	Striated Muscles	Unstriated Muscles	Cardiac Muscles
Site/Location	These are located in limbs and are mostly attached to bones to help in body movement.	These are mostly present in the walls of the alimentary canal. blood vessels, ureters, bronchi of the lungs and in the iris of eyes.	These are present only in the walls of the heart.

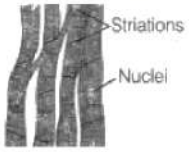
i. Striated muscle



ii. Smooth muscle



iii. Cardiac muscle



OR

i. Different organisms whether unicellular or multicellular need to perform many functions in the body such as respiration, digestion, locomotion. In multicellular organisms, cells present in a group and specialized in one particular function form a tissue. Some tissues help in growth, while others in locomotion and some in body movement. So, if cells are not organized in these tissues, then a highly organized and specialized process will become disorganized. There will be no coordination in the functioning of the cells and body.

ii. The squamous epithelial cells line the cavities of the mouth, oesophagus, alveoli, and blood vessels. This tissue gives protection against mechanical injury and also blocks the entry of germs. If the squamous epithelium is arranged in many layers, it is known as a compound squamous tissue called the stratified squamous epithelium. We find these kinds of tissues in the skin and also the lining of the oesophagus.

36.

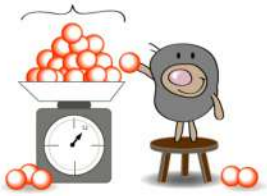
Plant cell	Animal cell
1. cell wall is present.	1. cell wall is absent.
2. Plastids are present.	2. Plastids are absent.
3. They have dictyosomes instead of Golgi body.	3. They have Golgi apparatus.
4. centrosomes and centrioles are absent.	4. centrosomes and centrioles are present.
5. Vacuoles are larger in size.	5. vacuoles are smaller in size.
6. Daughter cells separate from each other due to formation of cell plate.	6. Daughter cells separate from each other due to contrition or furrow formation.

Section E

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

A mole corresponds to the mass of a substance that contains 6.023×10^{23} particles of the substance. The mole is the SI unit for the amount of a substance. Its symbol is mol. By definition: 1 mol of carbon-12 has a mass of 12 grams and contains $6.022140857 \times 10^{23}$ of carbon atoms (to 10 significant figures).

6.02×10^{23} carbon atoms = 12 grams



(i) 1 mole of carbon atom = 6.022×10^{23} atoms

6.022×10^{23} atoms of carbon weigh = 12g

1 atom of carbon weigh = $\frac{12}{6.022 \times 10^{23}}$

$= 1.99 \times 10^{-23}$ g

(ii) n = 0.5 mol; M = $14 \times 2 = 28$ g; m = ?

mass of N_2 = n × M = $0.5 \times 28 = 14.0$ g

(iii) n = 0.2 mol; M = 16 g; m = ?

mass of O atom = n × M = $0.2 \times 16 = 3.2$ g

OR

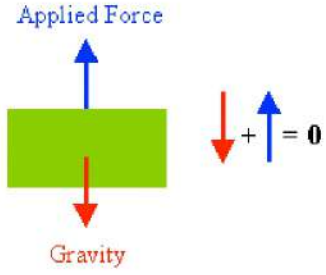
n = 4 mol; M = 27 g; m = ?

mass of aluminium atom = n × M = $4 \times 27 = 108$ g

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

Work is the energy applied to an object as it moves some distance. The amount of work done is directly proportional to the magnitude of force applied, as well as the displacement of the object. In some cases, there may be an angle between the direction of displacement and the force vector.

A body of mass 5 Kg is lifted vertically at a height of 12m.



(i) Mass = m = 5 Kg

Height = h = 12 m.

g = Acceleration due to gravity = 9.8 m/s^2

P.E. = mgh

$= 5 \times 12 \times 9.8$

= 588 J

(ii) Mass = m = 5 Kg
Height = h = 12 m.
g = Acceleration due to gravity= 9.8 m/s^2
Force = ?
Work Done = P. E. energy of the Body
Force × Distance Moved = 588
F × 12 = 588
F = 49 N

OR

The work done in lifting the body gets stored as potential energy.

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

A bee colony consists of a single queen and a large number of worker bees. Drones are present in the early stages but do not occur later on. All the functions of the colony are performed by worker bees. They build the hive, collect food, feed themselves as well as the queen, store food and protect the hive. Genetically, a worker bee does not differ from a queen bee and can even become a laying worker bee, but in most species will produce only male (drone) offspring.

(i) They take part in nuptial flight after which they but not allowed to enter the colony.
(ii) During new colony formation and from unfertilized eggs.
(iii) Bees produce food substances for worker bees and larvae in the form of bee bread.

OR

Colony behavior, egg laying and ovary development in worker honey bees is prevented by queen pheromones and open brood pheromone. However, in the absence of these regulating pheromones, workers may develop ovaries which will enable them to lay their own eggs.