Class IX Session 2024-25
Subject - Science
Sample Question Paper - 3

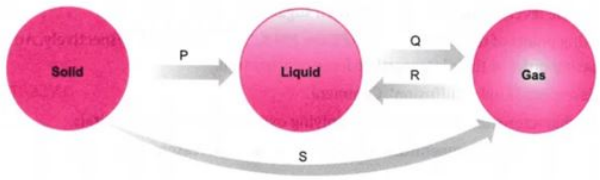
Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

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

Section A

1. Which of the changes is/are exothermic? **[1]**



a) P,Q,S b) R

c) P, S d) S

2. Four strips are cut from a fresh potato. The length of each strip is measured. One strip is placed in water and others in different concentrations of sugar solution. After an hour, the strips were measured again. The results are shown in the table. Which of the liquids P, Q, R and S is water? **[1]**

Liquid	Original length of strip (mm)	Final length of strip (mm)
P	75	75
Q	78	80
R	82	80
S	86	85

a) Q

b) S

c) P

d) R

3. A particle is moving in a straight line with initial velocity u and uniform acceleration a. If the sum of the distances travelled in t^{th} and $(t + 1)^{th}$ seconds is 100 cm, then its velocity after t seconds in cm s^{-1} is **[1]**

a) 50

b) 80

c) 30

d) 20

4. Gundhy bug is a pest of _____ **[1]**

a) Groundnut

b) Wheat

c) Rice

d) Mustard

5. Select the incorrect differences between collenchyma and scierenchyma. **[1]**

	Collenchyma	**Scierenchyma**
(i)	It is made up of dead cells.	Its cells are living
(ii)	Lumen or cell cavity is wide.	Lumen or cell cavity is usually narrow.
(iii)	It provides hardness to the region where it occurs.	It keeps the organ soft.
(iv)	Wall thickening is not uniform.	Wall thickening is uniform.
(v)	Pits are simple and straight	Pits are simple, oblique and may be branched.

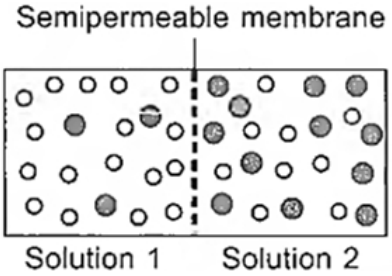
a) (i) and (iv) only

b) (i) and (iii) only

c) (ii), (iv) and (v) only

d) (i), (iii) and (iv) only

6. Study the given figure carefully. In which direction the net movement of water will take place? **[1]**



[Key : O Water molecule; ® Solute molecule]

a) From solution 1 to solution 2

b) Both From solution 1 to solution 2 and From solution 2 to solution 1

c) From solution 2 to solution 1

d) No movement will take place

7. A sample of $CaCO_3$ contains 3.01×10^{23} ions of Ca^{+2} and CO_3^{-2}. The mass of the sample is: **[1]**

a) 200 g

b) 50 g

c) 100 g

d) 5 g

8. Survival of plants in terrestrial environment has been made possible by the presence of **[1]**

a) conducting tissue

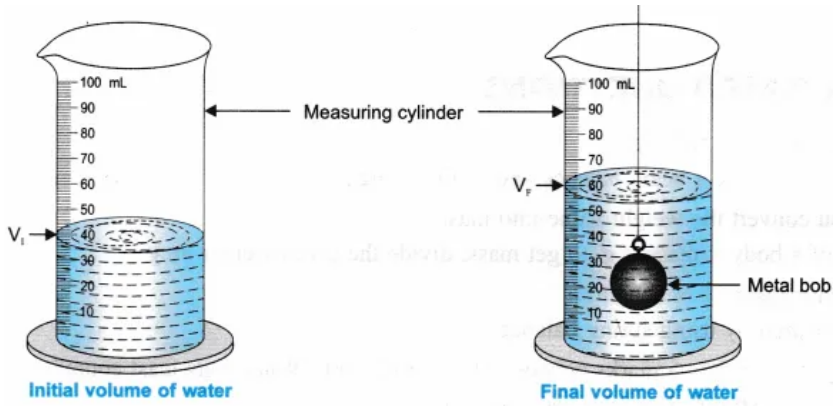
b) apical meristem

c) parenchymatos tissue

d) intercalary meristem

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

The volume of the metal cube is:



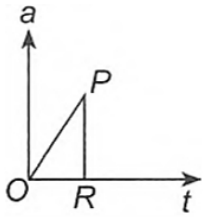
a) 18 cm^3

b) 24 cm^3

c) 20 cm^3

d) 22 cm^3

10. What would you conclude about the variation in velocity of a cyclist from the given graph? **[1]**



a) Velocity changes linearly if acceleration is changing non-linearly.

b) Velocity changes non-linearly if acceleration is changing linearly.

c) Velocity becomes uniform if acceleration becomes infinite.

d) Velocity becomes zero if acceleration becomes zero.

11. Elements with valency 1 are **[1]**

a) always non-metals

b) either metals or non-metals

c) always metalloids

d) always metals

12. Chlorenchyma and aerenchyma are modified/specialised **[1]**

a) phloem

b) parenchyma

c) sclerenchyma

d) collenchyma

13. The only cell organelle seen in prokaryotic cell is **[1]**

a) ribosomes

b) mitochondria

c) lysosomes

d) plastids

14. A food sample turned blue-black after addition of a few drops of iodine solution. This sample contains: **[1]**

a) starch

b) fat

c) protein

d) glucose

15. Which one is a physical change? **[1]**

a) Mixing $BaSO_4$ + NaCl

b) Mixing NH_3 and HCl

c) Burning magnesium in air

d) Adding NaCl to water

16. Which of the following type of irrigation system is used in areas closer to rivers? **[1]**

a) Dug wells
b) Tanks
c) River lift
d) Canals

17. **Assertion (A):** Motion of satellites around their planets is considered as accelerated motion. **[1]**
Reason (R): During their motion, the speed remains constant, while the direction of motion changes continuously.

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):** Gases are compressible but liquids are not. **[1]**
Reason (R): Structure of gas and liquid are different.

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):** Epithelial tissue form the lining of the mouth and alimentary canal and protect these organs. **[1]**
Reason (R): They help in the absorption of water and nutrients.

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

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

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

Section B

21. Explain briefly why a balloon filled with helium gas rises in air? Why does the balloon not rise indefinitely? **[2]**

OR

If a solid of the same density as that of a liquid is placed in it, what will happen to the solid?

22. The vegetables are cooked better and faster in a pressure cooker. Why is it so? **[2]**

23. A girl is sitting in the middle of a park of dimension 12 m $\times$ 12 m. On the left side of it there is a building adjoining the park and on the right side of the park, there is a road adjoining the park. A sound is produced on the road by a cracker. Is it possible for the girl to hear the echo of this sound? Explain your answer. **[2]**

24. The room temperature on Celsius scale is 25^{o}C. Convert it into the other two scales of measurement. **[2]**

25. An automobile vehicle has a mass of 1500 kg. What must be the force between the vehicle and road if the vehicle is to be stopped with the negative acceleration of 1.7 ms^{-2}? **[2]**

OR

Which of the following has more inertia:

a. a rubber ball and a stone of the same size?
b. a bicycle and a train?
c. a five rupees coin and a one-rupee coin?

26. Describe Bohr's model of the atom. **[2]**

Section C

27. A person standing between two vertical cliffs and 640 m away from the nearest cliff shouted. He heard the first echo after 4 seconds and the second echo 3 seconds later. Calculate **[3]**

i. the velocity of sound in air, and

ii. the distance between the cliffs.

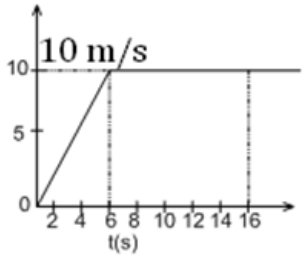
28. Study the data given below and answer the questions which follow: **[3]**

Particle	**Electrons**	**Protons**	**Neutrons**
A	2	3	4
B	10	9	8
C	8	8	8
D	8	8	10

i. Write the mass number and atomic number of particles A, B, C, D.

ii. Which particles represent a pair of isotopes? Explain.

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



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

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

OR

The velocity of a body in motion is recorded every second as shown-

time (s)	0	1	2	3	4	5	6	7	8	9	10
velocity (m/s)	60	54	48	42	36	30	24	18	12	6	

Calculate the -

a. acceleration

b. distance travelled and draw the graph.

30. Due to heavy rains and speedy winds a tree broke and fell on the road. Two persons from local shops came and begin to remove that broken part of the tree, but in vain as the log was too heavy. A passerby came to their help with a few solid heavy sticks. Consequently, the heavy log was put aside and the commutation on the road began as usual. **[3]**

(a) Comment upon the value(s) displayed by the passerby?

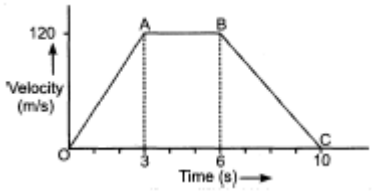
(b) Name the energy stored when the heavy log of the tree was lifted to some height?

31. 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.



32. How is a prokaryotic cell different from a eukaryotic cell? **[3]**

OR

Illustrate only a plant cell as seen under electron microscope. How is it different from animal cell?

33. i. Which process in meristematic tissue converts it to permanent tissue? **[3]**

ii. Which feature of meristematic tissue helps aquatic plants to maintain buoyancy in water?

iii. Why epidermis of plants living in dry habitats is thicker?

iv. Identify the following.

a. Living component of xylem

b. Dead element of phloem

v. Which type of conducting tissues conduct water and minerals vertically?

Section D

34. A stone is dropped from the edge of a roof. **[5]**

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

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

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

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

OR

Show that the weight of an object on the moon is $\frac{1}{6}$th of its weight on the earth. Given, the mass of the earth M_e = 6×10^{24} kg , mass of the moon, M_m =$7{\cdot}4\times10^{22}$ kg , The radius of the earth, R_e = 6400 km and radius of the moon, R_m = 1740 km.

35. i. State what will happen when human red blood cells are placed in a hypotonic salt/sugar solution. **[5]**

ii. Why plant cell shrinks when kept in a hypertonic solution.

iii. Why lysosomes are known as suicidal bags?

OR

Make a comparison and write down ways in which plant cells are different from animal cells.

36. Distinguish between compounds and mixtures. **[5]**

Section E

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

Animal tissue has various types of epithelial tissue, connective tissue, muscular tissue, and nervous tissue and of tissue one of them is the connective tissue which consists of blood, bone, cartilage. Blood is the fluid matrix called plasma in which red blood cells, white blood cells, and platelet are suspended while bone form the framework that supports the body it also anchors the muscle and supports the main organ of the body. Two bones are connected by a ligament. cartilage is a solid matrix composed of sugar and protein.

i. Name the tissue which connects muscle to a bone. (1)

ii. Matrix of bone cells are composed of (1)

iii. Two bones are connected by ligament how muscle connects to the bone? (2)

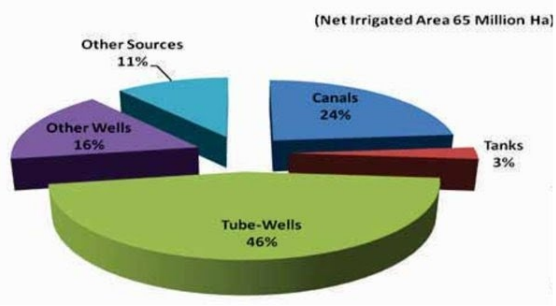
OR

Where the cartilage is found in the human body? (2)

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

Irrigation

The process of supplying water to crop plants through human efforts by means of canals, wells, reservoirs, tube wells etc., is known as irrigation. Most agriculture in India is dependent on timely monsoons and sufficient rainfall spread through most of the growing season. However, the extra water required by crops is met through irrigation.



i. Which is the most common source of irrigation? (1)

ii. Mention the various sources of irrigation. (1)

iii. Which is the least use source of irrigation? (2)

OR

What are the other sources of irrigation? (2)

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

A solution of a solid in a liquid such as water can be prepared by adding it slowly to water with constant stirring at a certain temperature (room temperature). If the addition process is continued, a stage is ultimately reached in the dissolution process when no more of the solid dissolves. Rather it starts setlling at the bottom of the container such as a glass beaker. The solution at this stage is said to be saturated. The solubility of a solute is always expressed with respect to the saturated solution. It may be defined as the maximum amount of the solute that can be dissolved in 100 g of the solvent to form a saturated solution at a given temperature. Please remember that the role of temperature is very important. If temperature is increased, the solution becomes unsaturated. In case the temperature is decreased, the solution becomes supersaturated. As a result, crust of the solute gets deposited on the surface.

i. What do mean by the term Solubility? (1)

ii. 20 g of a solute are dissolved in 500 g of the solvent. The solubility of the solute is: (1)

iii. When a saturated solution becomes unsaturated? (2)

OR

What do you mean by concentration of solution? (2)

Solution

Section A

1.

(b) R

Explanation: Changes of state are examples of phase changes or phase transitions. All phase changes are accompanied by changes in the energy of a system. The energy change in the phase transitions can be explained as follows:

Phase Change Name	**Phase**	**Energy Change**	**Example**
Freezing	Liquid to solid	Exothermic	Freezing water
Melting (P)	Solid to liquid	Endothermic	Ice melting
Condensation (R)	Gas to liquid	Exothermic	Water vapour burns
Evaporation (Q)	Liquid to gas	Endothermic	Boiling water
Sublimation (S)	Solid to gas	Endothermic	Dry ice
Deposition	Gas to solid	Exothermic	Formation of frost

2. **(a)** Q

Explanation: Sugar solution is hypertonic to cell sap of potato, whereas water acts as a hypotonic solution to it. When the potato strip is placed in water, its cells will gain water by osmosis, resulting in increase in size of potato strip. When the potato strips are put in sugar solution of different concentrations, the cells will lose water resulting in decrease in the size of strip. As only potato strip placed in liquid 'Q' shows increase in length, this shows that liquid 'Q' is water.

3. **(a)** 50

Explanation: Distance travelled in t^{th} second of uniformly accelerated motion is

$S_t = u + \frac{a}{2}(2t - 1)$ ...(i)

Distance travelled in $(t + 1)^{th}$ second can be written as

$S_{t+1} = u + \frac{a}{2}[2(t + 1) - 1]$

or $S_{t+1} = u + \frac{a}{2}(2t + 1)$ ...(ii)

$s_t + s_{t+1} = 100$ cm (given)

$u + \frac{a}{2}(2t -1) + u + \frac{a}{2}(2t + 1) = 100$ [Using (i) and (ii)]

or $2u + 2at = 100$ or $u + at = 50$;

$\therefore v = 50\ cms^{-1}$

4.

(c) Rice

Explanation: Gundhi bugs are also called stink bugs as a characteristic foul odor is produced by scent glands present on the abdomen. These stink bugs are distributed in all the tropical and sub-tropical regions. In India, it is used as a pest of all rice-growing areas.

5.

(b) (i) and (iii) only

Explanation: In plants, collenchyma is a permanent living tissue of primary body. It provides flexibility to soft aerial parts like leaves, young stem of plant so that they can bend without breaking. Sclerenchyma consists of thick-walled, dead cells. It provides hardness to the region where it occurs.

6. **(a)** From solution 1 to solution 2

Explanation: The movement of water from a region of its higher concentration to a region of its lower concentration through a semi-permeable membrane is called osmosis. Since, concentration of water is high in solution 1, therefore, water will move from solution 1 to solution 2 by the process of osmosis.

7.

(b) 50 g

Explanation: The mass of one mole of $CaCO_3$ is equal to 100 g. 6.022×10^{23} ions are equivalent to one mole. Therefore, mass of 3.01×10^{23} ions will be equivalent to $(\frac{100}{2})$ g or 50 g.

8. **(a)** conducting tissue

Explanation: The conducting tissues in plants conduct different saps and have different structures. The primary conducting tissues of plants are xylem and phloem. Xylem conducts water from roots to the other parts of the plant, whereas phloem transports food and other material from the leaves to other parts of plants.

9.

(c) 20 cm^3

Explanation: 60 – 40 = 20 cm^3

10.

(b) Velocity changes non-linearly if acceleration is changing linearly.

Explanation: For the given graph, a = kt, where k is some positive constant. So, velocity $v = u + at = u + (kt)t = 4 + kt^2$ i.e., varies non-linearly.

11.

(b) either metals or non-metals

Explanation: Elements with valency 1 are easily loss or gain electron. So, elements with valency 1 are either metals or non-metals. For example hydrogen is nonmetal and Lithium is metal both having valency 1.

12.

(b) parenchyma

Explanation: Parenchyma cells containing chloroplasts are collectively termed as chlorenchyma. Special parenchyma tissue is found in the aquatic plants and some land plants (e.g., petiole of Banana, Canna). It is known as aerenchyma. It consists of a network of parenchyma cells that enclose very large air cavities.

13. **(a)** ribosomes

Explanation: Unlike eukaryotic cell, a prokaryotic cell lacks membrane-bound organelles like plastids, mitochondria and endoplasmic reticulum but smaller and randomly scattered ribosomes are seen.

14. **(a)** starch

Explanation: Many different food groups contain a carbohydrate known as starch. Using an iodine solution, you can test for the presence of starch. When starch is present, the iodine changes from brown to blue-black or purple.

15.

(d) Adding NaCl to water

Explanation: Adding of common salt (NaCl) to water is physical change as no new substance is formed and no heat is evolved during the addition of salt in water. Also, salt can be obtained by evaporation.

16.

(c) River lift

Explanation: When it is not possible to supply enough water through a normal canal system, then a river lift system is utilized to ensure a steady supply. This can happen in areas with uneven topography, or in areas which are far from a water reservoir.

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

Explanation: Satellites revolve around their planets in almost circular orbits with constant speed. Thus, during their motion, the speed remains constant, while the direction of motion changes continuously. As a result, there is a change in their velocity. Therefore, the motion of satellites around their planets is considered as accelerated motion.

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

Explanation: The molecules of a gas are separated very far and there is a lot of empty space between them. Hence gases can be compressed easily. In liquids molecules are closer to each other and can be brought further closer only under very high pressure.

19.

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

Explanation: The functions of epithelial tissues are as follows:

i. The cells of epithelial tissue form the outer layer of the skin (body surface).
ii. The epithelial tissues inside the body form the lining of the mouth and alimentary canal and protect these organs by secreting mucous.
iii. They also help in the absorption of water and nutrients.

20.

(c) A is true but R is false.

Explanation: Electrons in different orbits have fixed energies.

Section B

21. The mass of the balloon filled with helium is less than the mass of the air displaced by it. Hence upthrust acting on the balloon is more than its weight. As a result the balloon experiences a net upthrust which makes it rise. As the balloon rises it experiences lesser and lesser upthrust due to the fact that with height the density of air decreases. At a certain point the weight of the balloon may be completely balanced by the upthrust acting on it. Thereafter the balloon stops rising.

OR

In such a case when the density of solid is exactly equal to that of the liquid, it will remain in equilibrium and keep floating in it. The solid will float in such a way that the entire part of it will remain within the liquid, its upper surface coinciding with the liquid surface.

22. In a pressure cooker, pressure is raised by preventing the vapours formed inside to escape from the closed cooker. This causes water to boil at much higher temperature than its normal boiling point. Due to this reason, vegetables can be cooked better and faster in a pressure cooker.
23. If the time gap between the original sound and reflected sound received by the listener is around 0.1s, only then the echo can be heard.

Velocity of sound in air = 344 m/s.

Time interval = 0.1 s

Therefore, The minimum distance travelled by the reflected sound wave for the distinctly listening to the echo = Velocity of the sound $\times$ Time interval = 344 $\times$ 0.1 = 34.5 m

Since, the girl is sitting in middle of a park of dimension 12 m ×12 m, Therefore; The distance travelled by the sound reflected from the building and then reaching to the girl = (6 + 6) = 12 m, which is much smaller than the required distance. Therefore, Girl will not hear any echo of sound.

24. Temperature on Kelvin scale = 25 + 273

= 298 K

Temperature on Fahrenheit scale = $\frac{9}{5} \times 25 + 32 = 77^0\text{F}$

25. Mass of the vehicle (m) = 1500 kg

Negative acceleration (a) = -1.7 ms^{-2}

∴ Force of friction between the road and vehicle

F = ma

F = 1500 $\times$ (-1.7)

= -2550 N

Negative sign means force is acting in the direction opposite to the direction of motion of the vehicle.

OR

a. a stone of the same size will have more inertia than a rubber ball.
b. A train will have more inertia than a bicycle.
c. A five rupees coin will have more inertia than a one-rupee coin.

Explanation: Inertia is associated with mass. Inertia is directly proportional to the mass of a body. Objects having more mass have more inertia.

26. Neils Bohr proposed a model of atom in 1912 to remove the drawbacks of Rutherford's atomic model and to explain the structure of an atom in detail. The features of Bohr's model of atom are given below**:-**

i) An electron revolves in the orbit of atom with well-defined energy.

ii) Energy of orbits increases from the inner shell to the outer shells i.e. energy of orbit nearest to the nucleus is the lowest.

iii) If energy is supplied to an electron, it moves from a lower orbit to a higher orbit. When an electron moves from a higher orbit (energy level) to a lower orbit (energy level), energy is radiated as electromagnetic waves.

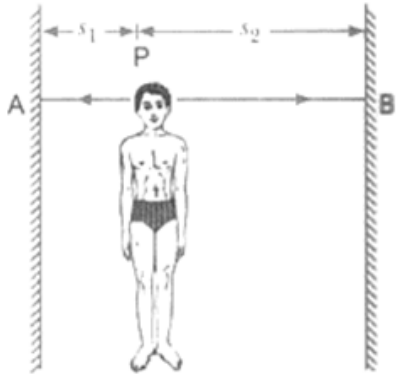
iv) Each orbit or shell represents an energy level. Such orbits are represented as K,L,M,N,O (named starting from the centre of an

atom).

v) The shell or orbits are associated with a certain amount of energy and energy of orbits/shells increases from the nucleus towards the valence shell.

Section C

27. i. Let P be the person standing between the cliffs A and B. Let s_1 be a distance of nearest cliff A from P and s_2 the distance of second cliff B from P. The first echo is heard when sound reaches the person after being reflected from cliff A.



Given, s_1 = AP = 640 m

Time interval of first echo, t_1 = 4 seconds

From relation, 2 $s_1 = v\ t_1$, we have

The speed of sound, $v = \frac{2s_1}{t_1}$

$\frac{2\times640}{4}$

Therefore, Speed of sound in air, v = 320 m/s

ii. The second echo is heard when the sound reaches the person after being reflected from the cliff B.

Time interval of second echo, t_2 = 4 + 3 = 7 seconds

Therefore, From relation, 2 $s_2 = v\ t_2$,

We have, $\frac{vt_2}{2}$

$\frac{320\times7}{2}$

= 1120 m

Therefore, Distance between cliffs A and B,

$s = s_1 + s_2$ = 640 + 1120 = 1760 m

28. i.

Particle	**Atomic number**	**Mass number**
A	3	3 + 4 = 7
B	9	9 + 8 = 17
C	8	8 + 8 = 16
D	8	8 + 10 = 18

ii. Particles C and D as they have same number of protons, i.e. same atomic number but different mass number.

29. a. We know that area under v-t graph gives displacement.

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

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

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

= 30 m

Area of rectangle = length $\times$ breadth

= (16-6) $\times$ 10

=10 $\times$ 10

= 100 m

Total area = 100 + 30 = 130m

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

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

OR

a. (a) Acceleration =slope of the velocity time graph

a = $\frac{V_2-V_1}{t_2-t_1}$

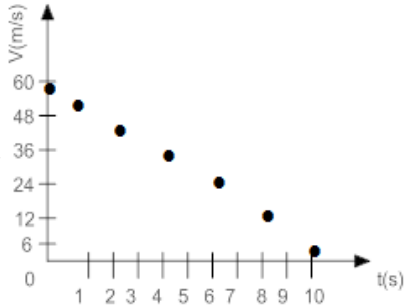
$a = \frac{54-24}{1-6} = \frac{30}{-5} = -6m/s^2$

b. Distance = $S = ut + \frac{1}{2}at^2$

$= 60 \times 10 + \frac{1}{2}(-6) \times (10)^2$

= 600-300 = 300m

c.



30. (a) Social value, conceptual value, presence of mind.

(b) Potential energy.

31. 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.

32.

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

OR

Animal cell	Plant cell
Cell wall absent.	Cell wall present.
Vacuoles are small.	Vacuoles are large.
Chloroplast absent.	Chloroplast present.

33. i. Differentiation is the process by which meristematic tissue takes up a permanent shape, size and function.

ii. Large air cavities present in parenchyma (aerenchyma) of aquatic plants help the plant to maintain buoyancy in water.

iii. Epidermis of plants living in dry habitats are thicker in order to prevent loss of water.

iv. a. Xylem parenchyma consists of living cells having thin cell walls.

b. Phloem fibres are the dead element of phloem.

v. Tracheids and vessels of xylem are the two conducting tissues, which conduct water and minerals vertically.

Section D

34. A stone is dropped from the edge of a roof.

Given, initial velocity $u = 0$

Acceleration $g = 9.8$ m/s^2

i. Displacement =$s = 4.9$ m

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

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

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

$\Rightarrow t = 1$ s

The stone takes 1 s to fall 4.9 m

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

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

$v^2 = 96.04$

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

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

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

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

v^2 = 154.84

$\Rightarrow v = 12.44$ m/s

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

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

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

Acceleration after 2 s = 9.8 m/s^2

OR

Suppose the mass of the moon is M_m and its radius is R_m. Let a body of mass m is placed on the surface of the moon.

Therefore, the weight of the body on the moon, W_m =mg' = $\frac{GM_m m}{R_m^2}$ .....(1)

Mass of body, m will remain same on earth and moon.

Here, The weight of the same body on the earth's surface, W_e =mg = $\frac{GM_e m}{R_e^2}$ .....(2)

Where M_e = Mass of earth and R_e = Radius of the earth.

Dividing equation (1) by (2), we get

$\frac{W_m}{W_e} = \frac{M_m}{M_e} \times \frac{R_e^2}{R_m^2}$ .....(3)

Now, the mass of the earth, $M_e = 6 \times 10^{24}$ kg (Given)

mass of the moon, $M_m = 7{\cdot}4 \times 10^{22}$ kg (Given)

The radius of the earth, R_e = 6400 km and radius of the moon, R_m = 1740 km

Now, Putting these values in equation (3), we get

$\frac{W_m}{W_e} = \frac{7.4 \times 10^{22} kg}{6 \times 10^{24} kg} \times (\frac{6400\ km}{1740\ km})^2$

or $\frac{W_m}{W_e} \approx \frac{1}{6}$ or $W_m = \frac{W_e}{6}$ Hence proved.

Therefore, The weight of the body on the moon is about one-sixth of its weight on the earth.

35. i. When human red blood cells are placed in hypotonic salt/sugar solution they swell due to endosmosis.

ii. Plant cell shrinks when kept in hypertonic solution because the concentration of the solvent is more inside the cell. It shrinks due to exosmosis.

iii. Lysosomes are known as suicidal bags because, during the breakdown of cell structure, lysosome bursts and enzymes eat up their own cells.

OR

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	6. Daughter cells separate from each other due to contrition or

of cell plate.	furrow formation.

36.

S.No.	Compounds		Mixtures
1.	Compounds are formed as a result of chemical reactions between two or more elements or compounds.	1.	Mixture is formed by simply mixing two or more constituents. There are no chemical reactions between the constituents.
2.	The components of a compound are always present in a definite ratio by mass.	2.	The components of a mixture may be present in any ratio.
3.	The properties of a compound are entirely different from its constituents.	3.	The properties of a mixture are the same as those of its constituents.
4.	Compounds are always homogeneous in nature.	4.	Mixtures are usually heterogeneous (except in solutions).
5.	Compound formation is accompanied by absorption or evolution of light, heat or electrical energy.	5.	Heat, light or electrical energy may not be evolved or absorbed during the formation of a mixture.
6.	Melting and boiling points of a compound are usually sharp and fixed.	6.	Melting and boiling points of a mixture are usually not sharp and fixed.
7.	The constituent elements of a compound can not be separated by any physical method. Special chemical methods or electrochemical methods are employed to separate them.	7.	The constituent elements of the mixture can be easily separated by physical means.
8.	For example, Water, Carbon dioxide.	8.	For example, A mixture of iron filings and sulphur.

Section E

37. i. Tendon.
    ii. Matrix of a bone cell composed of calcium and phosphorus compound.
    iii. Muscles are connected to the bone by the structure called tendon.

    OR

    Ear, Nose, and Trachea.

38. i. The most common source of irrigation is tube wells. Irrigation is the artificial process of applying controlled amounts of water to land to assist in the production of crops.
    ii. The various sources of irrigation are canals, tanks, tube wells, other wells, and other sources like rainwater harvesting.
    iii. The last source of irrigation tanks.

    OR

    The other sources include rainwater harvesting and watershed management.

39. i. The maximum amount of solute that can dissolve in a given amount of solvent.
    ii. Given, Mass of solute = 20g
    Mass of solvent = 500g
    Mass-Volume percentage = $\frac{20}{500} \times 100$
    = 4%
    Solubility of 500 g of solute = $\frac{4}{100} \times 500$
    = 20g
    Hence, the solubility of 20g of solute in 500g of solvent is 20g.
    iii. A saturated solution becomes unsaturated by either heating it or by adding more of the solvent.

    OR

    Concentration of a solution is defined as the amount of solute that is present in a given amount of solution. It can be expressed in terms of: Mass by the mass percentage of a solution = $\frac{\text{mass of solute}}{\text{mass of solution}} \times 100$.