ELEVATE
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CLASS
9

MOCK PAPER

SCIENCE [SA1]

Time : 3 Hrs. *MM : 90*

GENERAL INSTRUCTIONS

I. *Question paper comprises of two sections, A and B. You are to attempt both the sections.*
II. *All questions are compulsory.*
III. *All questions of section A and all questions of section B are to be attempted separately.*
IV. *Question numbers 1 to 3 in section A are one mark each, to be answered in one word or one sentence.*
V. *Question numbers 4 to 7 are two marks each, to be answered in about 30 words.*
VI. *Question numbers 8 to 19 are three marks each, to be answered in about 50 words.*
VII. *Question numbers 20 to 24 are five marks each, to be answered in about 70 words.*
VIII. *Question numbers 25 to 42 in section B are MCQ based on practical skills. Each question is a one mark question.*

SECTION – A

1. A drop of Dettol got evenly distributed in water How ?

2. Write equation for
(a) Position-time relation and
(b) Position-velocity relation.

3. Name the cell organelles which have their own DNA and ribosomes.

4. What would you observe when
(a) an aqueous sugar solution is heated to dryness.
(b) a mixture of iron fillings and sulphur powder is heated strongly.

5. How do '*g*' and '*G*' differ from each other ?

6. Give two major differences between Prokaryotes and Eukaryotes.

7. Difference between Xylem and Phloem.

8. Comment on the following statements :
(a) Evaporation produces cooling
(b) Rate of evaporation of an aqueous solution decreases with increase in humidity
(c) Sponge though compressible is a solid.

9. Rahul was taught about physical and chemical changes in school and his teacher instructed him to list various physical and chemical changes he saw in home and neighbourhood. He got surprised when his teacher marked cooking from LPG as a chemical change wrong. He got curious to know the reason after returning home he went to a neighbour who is chemistry professor and discussed his problem.
(a) What values are displayed by Rahul?
(b) Do you agree with Rahul's teacher or not? Explain.

10. A truck starts from rest and roll down a hill with a constant acceleration. It travels a distance of 400 m in 20 s. Find its acceleration. Also find the force acting on it if its mass is 7 metric tonnes (Hint : 1 metric tonne = 1000 kg)

11. A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate :

(a) The maximum height to which it rises.

(b) The total time it takes to return to the surface of the earth.

12. Show that the rate of change of momentum = mass × acceleration

13. Using the Newton's universal law of gravitation and second law of motion, find the mathematical expression for acceleration due to gravity on the surface of any planet.

14. Amit buys few grams of gold at the poles as per the instructions of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why?

15. **(a)** Name any two cell organelles which are bounded by double membranes.

(b) Why are mitochondria called semiautonomous organelles?

(c) Where one would find green chlorophyll pigment in a plant cell?

16. Name the tissues which show the following features :

(a) Cells are living ; cells show thickening; provides mechanical support to plants.

(b) Cells are dead ; cells show thickening; provides mechanical support to plants; made up of one type of cells.

(c) Cell are living; cells contain green coloured chloroplasts; possess intercellular spaces.

17. Name the following :

(a) Tissue that forms the inner lining of our mouth.

(b) Tissue that connects muscle to bone in humans.

(c) Tissue that transports food in plants.

(d) Tissue that stores fat in our body.

(e) Connective tissue with a fluid matrix.

(f) Tissue present in the brain.

18. Differentiate between Manure and Fertilizers.

19. (a) Define Manure.

(b) What are the advantages of using manures in the crop fields?

20. (a) Which separation techniques will you apply for the separation of the following?

(i) Sodium chloride from its solution in water

(ii) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride

(iii) Small pieces of metal in the engine oil of a car

(iv) Different pigments from an extract of flower petals

(v) Oil from water

(vi) Fine mud particles suspended in water.

(b) Why is a compound considered as pure substance but mixture is not considered as a pure substance?

(c) The 'sea-water' can be classified as a homogeneous as well as heterogeneous mixture comment.

OR

(a) Identify the following as either a physical or a chemical property :

(i) Silver tarnishes

(ii) Carbon dioxide freezes at –78°C

(iii) Sulphur burns in air

(iv) the frying of an egg

(v) the boiling of water

(vi) the breaking of glass

(b) Explain why, water is a compound and not a mixture?

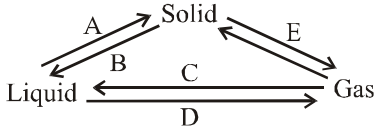
21. (a) Why do the gases exert more pressure on the walls of the container than the solids ?

(b) When a jar of coffee is opened, people in all parts of the room soon notice the smell. Explain why this happens.

(c) Why do solids not diffuse?

(d) The following diagram shows the three states of matter and how they can be interchanged.

Name the changes A to E.

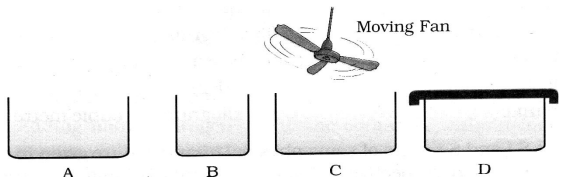


OR

(a) (i) State one similarity and one difference between evaporation and boiling.

(ii) List four factors which affect the rate of evaporation.

(b) Look at figure and suggest in which of the vessel A, B, C or D the rate of evaporation will be the highest ? Explain.



22. Derive three equations of motion.

OR

A sprinter in a 100 m race, covers 4 m in the first second, 30 m in the next 4 s, 52 m in another 4 s and finishes the race in 10 s.

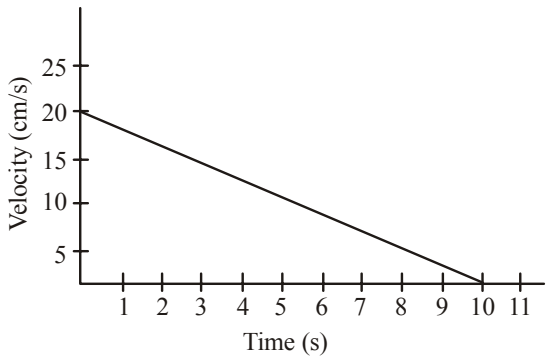
(a) Calculate the average velocity of the sprinter.

(b) In which time interval, is the average velocity attained by the sprinter maximum? State this velocity in appropriate units.

(c) Plot the distance-time graph for the motion of the sprinter.

(d) Find out the distance moved by the sprinter at the end of 6 s with the help of the graph.

23. The velocity-time graph of a ball of mass 20 g moving along a straight line on a long table is given in figure. How much force does the table exert on the ball to bring it to rest ?



OR

A ball of mass 10g is initially moving with a velocity of 50 ms^{-1}. On applying a constant force on ball for 2.0 s, it acquires a velocity of 70 ms^{-1}. Calculate

(a) the initial momentum of ball

(b) the final momentum of ball

(c) the rate of change of momentum

(d) the acceleration of ball, and

(e) the magnitude of force applied

24. (a) What are the different patterns of cropping?

(b) Why are legumes preferred in mixed cropping and inter-cropping?

OR

(a) Define Irrigation.

(b) What are the various methods of irrigation in India?

SECTION – B

25. A mixture of common salt, sulphur, sand and iron filings is shaken with carbon disulphide and filtered through a filter paper. The filtrate is evaporated to dryness in a china dish. What will be left in the dish after evaporation

(a) Sand (b) Sulphur

(c) Iron filings (d) Common salt

26. Seema took a 100 ml beaker and filled half the beaker with water and marked the level of water. She dissolved some salt with the help of a glass rod and recorded water level again. Choose the correct observation related to above activity.

(a) The water level increases appreciably

(b) The water level decreases

(c) The water level remains the same

(d) There is little increase in water level.

27. You have prepared four different mixtures in water using 1. Charcoal powder, 2. Chalk powder, 3. Slaked lime and 4. Detergent powder. If you filter these mixtures through a filter paper, there will be no residue left after filtration in the case of

(a) charcoal powder

(b) chalk powder

(c) slaked lime

(d) detergent powder.

28. In an experiment to separate the components of a mixture of sand, common salt and ammonium chloride, the component which will be removed by filtration is

(a) sand

(b) common salt

(c) ammonium chloride

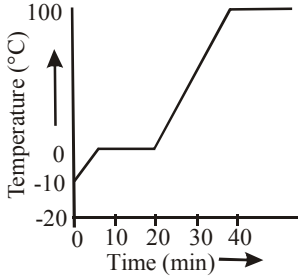
(d) None of these

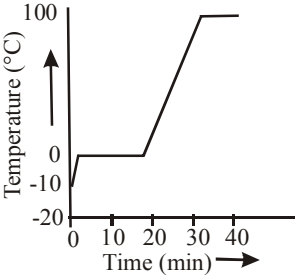
29. When we put some crystals of potassium permanganate in a beaker containing water, we observe that after some time whole water has turned pink. This is due to
(a) boiling
(b) melting of potassium permanganate crystals
(c) sublimation of crystals
(d) diffusion

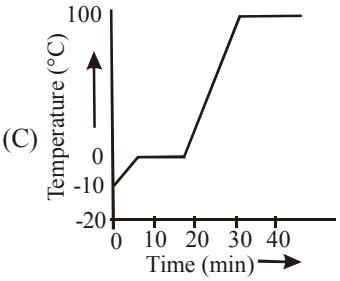
30. To determine the melting point of ice, a student immersed a thermometer bulb in a beaker and heated the beaker on a low flame. He would observe:
(a) an increase in temperature during melting of ice.
(b) A decrease in temperature during melting of ice.
(c) an increase in temperature during melting of ice.
(d) The temperature remains constant during melting of ice.

31. A student set up an apparatus for finding the melting point of ice. When half the ice melted, the temperature shown by thermometer is:
(a) more than 0° C (b) less than 0° C
(c) 0° C (d) None of these

32. Heating of ice/water from – 10° to 100° C at a constant rate is correctly represented by :

(A)


(B)


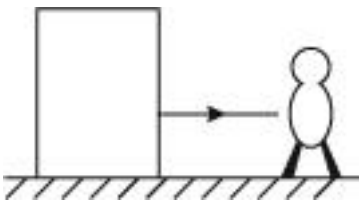
(C)


(a) A (b) B
(c) C (d) A, C

33. A student was asked to add alum with equal amount in three test tubes containing pond water, sandy water and distilled water. After shaking well, correct observation is:
(a) Pond water forms homogeneous solution.
(b) Sandy water forms homogeneous solution.
(c) Distilled water forms homogeneous solution.
(d) All are correct.

34. A student was given a mixture of iron filings and sulphur in the ratio 1 : 2 by weight. He was then asked to heat the mixture over a flame and to observe the colour change. The student will observe that the mixture becomes:
(a) Black (b) Grey
(c) Yellow (d) Orange

35. A man pulls a block heavier than himself with a light rope.



The magnitude of friction is the same between the man and the ground and between the block and the ground. Then
(a) if both move, the acceleration of the man is greater than the acceleration of the block.
(b) the block will not move unless the man also moves
(c) the man can move even when the block is stationary.
(d) None of these.

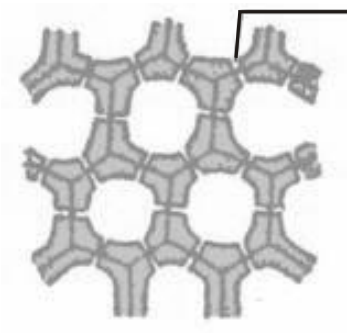
36. A stone is thrown in a vertically upward direction with a velocity of $5ms^{-1}$. If the acceleration of the stone during its motion is $10ms^{-2}$ in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?
(a) S = 1.5m, t = 1 sec
(b) S = 1.25, m t = 0.5 sec
(c) S = 1m, t = 0.5 sex
(d) S = 1.25 m, t = 0.75 sec

37. A student is given two temporary slides one is of cheek cells and other is of onion peel. On which basis he correctly catagorised these two slides?
(a) Nucleus (b) Cytoplasm
(c) Cell wall (d) Mitochondrion

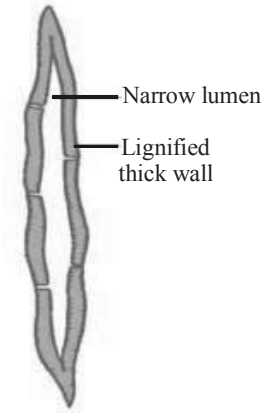
38. A coverslip must always be placed very gently while mounting in order to
(a) avoid the entry of oil bubbles
(b) stop the stain from oozing out
(c) avoid crushing of the material
(d) stop the material from drying

39. A student after observing a slide find out that cells are long, elongated and tapering at the ends. The slide may be of:
(a) Aerenchyma
(b) Sclerenchyma fibre
(c) Parenchyma
(d) Collenchyma

40. Which of the following diagrams represents the T.S. of Sclerenchyma?



(A)



(B)

(a) A (b) B
(c) Both A and B (d) Neither A and B

41. Observe the given figure carefully and choose the correct combination given below

(A)

(B)

(a) A - *Macrobrachium rosenbergii* (Fresh water); B- *Peneaus monodon* (Marine)
(b) A - *P. monodon* (Fresh water); B - *Peneaus monodon* (Marine)
(c) A - *M. rosenbergii* (Marine); B - *P. monodon* (Fresh water)
(d) A - *P. monodon* (Marine); B - *M. rosenbergii* (Fresh water).

42. Following are five steps for testing metanil yellow in *arhar* dal.
(i) Make powder of 5 g of *arhar* dal.
(ii) Put dal powder in a test tube.
(iii) Add 2-4 drops of conc. HCl and observe the change in colour.
(iv) Filter the content and keep the filtrate separately

(v) Add 10 mL of water and shake it well.

(a) (i), (ii), (iii), (iv), (v)

(b) (i), (iv), (v), (ii), (iii)

(c) (i), (iii), (iv), (v), (ii)

(d) (i), (ii), (v), (iv), (iii)

HINTS & SOLUTIONS

SECTION – A

1. This is because there is enough space between the particles of water and Dettol gets into the spaces between the particle of water. (1 mark)

2. (a) $S = ½4t + at^2$
(b) $2as = v^2 – u^2$ (1 mark)

3. Mitochondria and Chloroplast. (1 mark)

4. (a) Initially the water will evaporate and then sugar will get charred. (1 mark)
(b) Iron sulphide will be formed. (1 mark)

5.

	Acceleration due to gravity (*g*)	**Universal gravitational constant (*G*)**
1.	It is acceleration required by a body due to earth's gravitational pull on it.	It is equal to the force of attraction between two masses of 1 kg each separated by a distance of 1 m.
2.	The value of *g* is different at different places on the surface of the earth. Its value varies from one celestial (heavenly) body to another.	'*G*' is a universal constant i.e. its value is the same everywhere in the universe. ($G = 6.67 \times 10^{-11}$ Nm^2) kg^{-2}

(2 marks)

6.

	Prokaryotes		**Eukaryotes**
1.	Nuclear material not bounded by nuclear envelope and lies directly in the cytoplasm.	1.	Nuclear material is present in nucleus bounded by well developed double-membrane nuclear envelope
2.	Membrane-bounded cell organelles absent.	2.	Membrane-bounded cell organelles are present.

(1 + 1 = 2 marks)

7.

	Xylem	**Phloem**
1	Xylem helps in conduction of water and minerals.	Phloem helps in conduction of food materials and organic solutes.
2	The flow of material is mostly unidirectional.	The flow of material is bidirectional.
3	Xylem consists of tracheids, vessels, xylem parenchyma and xylem fibres.	Phloem consists of sieve tubes, companion cells, phloem parenchyma and phloem fibers.

(1 + 1 = 2 marks)

8. (a) Evaporation produces cooling as the particles at the surface of the liquid gain energy from the surroundings and change into vapour thereby producing a cooling effect. (1 mark)

(b) Air around us cannot hold more than a definite amount of water vapour at a given temperature which is known as humidity. So, if the air is already rich in water vapour, it will not take up more water therefore, rate of evaporation of water will decrease. (1 mark)

(c) A sponge has minute holes in which air is trapped. Also the material is not rigid. When we press it, the air is expelled out and we are able to compress it. (1 mark)

9. (a) Keen to learn, curiosity, problem solving approach etc. are some values displayed by Rahul. (1 mark)

(b) Yes, when cylinder knob is opened liquefied gas comes out in the form of vapours thus a phase change occurs (physical change). Now when LPG is ignited combustion occurs thus chemical change takes place. Thus cooking from

LPG involves both physical and chemical change. (2 marks)

10. $u = 0$, $s = 400$ m, $t = 20$ s
$m = 7000$ kg

Using $s = ut + \frac{1}{2}at^2$, (1 mark)

we have $a = \frac{2s}{t^2} = \frac{2 \times 400}{(20)^2} = 2$ ms^{-2}

(1 mark)

Force = ma = 7000 kg × 2 ms^{-2}
= 14,000 N (1 mark)

11. (a) Initial velocity, $u = 49$ ms^{-1}
Final velocity, $v = 0$ ms^{-1}
Acceleration due to gravity, $g = -9.8$ ms^{-1}
Distance = Height, h = ?

$v^2 - u^2 = 2gs$
or $(0)^2 - (49)^2 = 2 \times (-9.8) \times s$
or $-2401 = 19.6 \times s$

or $s = \frac{-2401}{-19.06} = 122.5$ m (1½ marks)

(b) Now, $v = u + gt$
$0 = 49 + (-9.8 \times t)$
or $-49 = -9.8 \times t$

or $t = \frac{-49}{-9.8} = 5$ s (1 mark)

Time taken to rise up is equal to the time taken for the fall. Therefore, the total time taken to return the surface of earth is 10 s. (½ mark)

12. Let us consider a body of mass m, which is moving with a velocity u, when a force F acts on it for a time t, its velocity becomes v. Then, by the definition of the momentum,

initial momentum of the body, $M_1 = mu$
final momentum of the body, $M_2 = mv$

Therefore, Change of momentum of the body in time,

t = final momentum – initial momentum
$= mu - mv = m(v - u)$ (1 mark)

As we know that the rate of change of momentum

$$\frac{\text{Change of momentum}}{\text{time}} = \frac{m(v-u)}{t}$$

We know that the rate of change of velocity is acceleration,

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

Or, rate of change of momentum
= mass (m) × acceleration (a). (2 marks)

13. The force exerted by a planet of mass M_p on another mass (m) on its surface is

$$F = \frac{GM_p m}{R^2}$$ (1 mark)

where R is the radius of the planet, which is the separation between the centre of mass (m) and the centre of the planet M_p. Also from Newton's second law of motion,

$F = ma$

Therefore,

$$ma = \frac{GM_p m}{R^2}$$

or $$a = \frac{GM_p}{R^2}$$

This is the acceleration due to gravitational force of the planet on any mass on its surface. (2 marks)

14. Amit's friend does not agree with the weight of gold bought. (½ mark)
Reason : The acceleration due to gravity on the surface of the earth is given by,

$$g = \frac{GM}{R^2}$$

Since G and M are constant

$$\therefore \quad g \propto \frac{1}{R^2}$$ (1 mark)

The radius (R) of the earth is not the same everywhere. This is because of the shape of the earth which is not perfectly spherical. It is slightly flattened at the poles and bulges at the equator. Therefore, the value of g on earth is maximum at the poles and minimum at the equator. Thus, the weight of gold will be greater at the poles than at the equator. (1½ marks)

15. (a) Mitochondria and Nucleus. (1 mark)

(b) Mitochondria are capable of self duplication. They are also able to synthesize some of their own proteins. Hence, they are regarded as semiautonomous organelles. (1 mark)

(c) Chlorophyll pigments are found in thylakoids of chloroplasts in a plant cell. (1 mark)

16. (a) Collenchyma (1 mark)

(b) Sclerenchyma (1 mark)

(c) Chlorenchyma (1 mark)

17. (a) Epithelial tissue (b) Tendon

(c) Phloem (d) Adipose tissue

(e) Blood (f) Nervous tissue.

(½ × 6 = 3 marks)

18.

	Manure		Fertilizers
1.	Manure is a natural substance that is prepared by decomposition of animal excreta and plant wastes.	1.	They are commercially available plant nutrients.
2.	They have large quantity of organic material and little amount of plant nutrients.	2.	They can be organic or inorganic in nature.
3.	They help in enriching the soil with organic matter matter and nutrients.	3.	They help in enriching the soil with organic matter and nutrients in concentrated form.
4.	It provide humus to the soil.	4.	It does not provide any humus to soil.
5.	It protects the environment and helps in recycling of waste.	5.	Its excessive use can cause pollution.
6.	It is slowly absorbed by the plants.	8.	It is readily absorbed by plants.
7.	The examples include animal excreta, plant waste, sewage waste *etc*.	7.	The examples include sodium nitrate, urea, ammonium sulphate *etc*.

(3 marks)

19. (a) Manure is partially decomposed organic material added to soil to increase its fertility as well as productivity of the crop. (1 mark)

(b) Advantages of using manures in the crop fields are:

(i) They improve fertility of the soil by providing mineral nutrients to the soil.

(ii) They improve soil texture by adding organic matter to the soil. Organic matter increases water-holding capacity of sandy soil. It improves drainage in clayey soil by preventing water logging.

(iii) Use of organic manure helps in recycling of farm waste, saving the environment from excessive use of fertilisers.

(iv) They provide food for soil organisms, which keep the soil in a healthy, balanced condition.

(v) Manures do not cost anything to the farmer as he prepares it from the farmyard wastes. (2 marks)

20. (a)

(i) **Crystallization:** This process is used to separate a pure solid in the form of its crystals from a solution. [**Note:** This technique is better than **evaporation** which can also be used to get sodium chloride from its solution in water.]

(ii) **Sublimation:** Ammonium chloride is a sublime substance and will be collected as sublimate whereas sodium chloride is **not** a sublime substance.

(iii) **Filtration:** Metal pieces will be collected on filter.

(iv) **Chromatography:** Pigments are coloured components and they can be separated by chromatographic technique.

(v) **Separating funnel:** Oil and water are immiscible liquids and can be separated using a separating funnel.

(vi) **Sedimentation:** During this process mud particles will settle down as precipitate which can then be separated by **filtration**.
(6 × ½ = 3 marks)

(b) A compound is a single substance with a fixed composition and so it fulfills the condition required for a pure substance. The m.p. or b.p. of a compound is fixed. These conditions are not fulfilled by a mixture so it is **not** considered as a pure substance. (1 mark)

(c) Homogeneous – mixture of salts and water only.
Heterogeneous – contains salts, water, mud, decayed plant etc. (1 mark)

OR

(a) (i) Chemical
(ii) Physical
(iii) Chemical
(iv) Chemical
(v) Physical
(vi) Physical (6 × ½ = 3 marks)

(b) Water is considered as a compound because

(i) Water cannot be separated into its constituents, hydrogen and oxygen, by the physical methods such as filtration, evaporation, distillation, sublimation, magnet, etc.

(ii) The properties of water are entirely different from those of its constituents, hydrogen and oxygen. For example, water is a liquid whereas hydrogen and oxygen and gases, water does not burn whereas hydrogen burns, water does not support combustion whereas oxygen supports combustion. (2 marks)

21. (a) In gases, the particles move randomly at high speed and they collide with each other and with walls of the container. Due to this collision with walls of the container, the gases exert more pressure than solids. (1 mark)

(b) This is due to diffusion. Some particles with high kinetic energy leave the coffee jar and spread out through the air in the room in a haphazard and random way. That's why we notice the smell of coffee in a room. (1 mark)

(c) This is because the forces of attraction between the particles of a solid state are very strong and there is very little space for the particles to move around. (1 mark)

(d) A–freezing, B–melting, C–condensation D–evaporation, E–sublimation, F-sublimation. (2 marks)

OR

(a) (i) **Similarity :** Liquid state changes into the gaseous state.
Difference :

EVAPORATION	BOILING
It is a surface phenomenon, i.e, water molecules at the surface gain energy to change their state	It is a bulk phenomenon. All (bulk) the water molecules of water gain energy to change their state
Can take place at all temperatures.	Take place at a fixed temperature. (or any other)

(1 + 1 = 2 marks)

(ii) Four factors :
1. Surface area of the liquid exposed to atmosphere.
2. Temperature of the liquid
3. Humidity
4. Wind velocity (4 × ½ = 2 marks)

(b) The rate of evaporation will be highest in case of C.
The rate of evaporation increases with an increase of surface area because evaporation is a surface phenomenon. Also, with the increase in air speed, the particles of water vapour will move away with the air, which will increase the rate of evaporation. (1 mark)

22. (i) **First equation of motion :** Suppose a body with an initial velocity 'u' and uniform acceleration 'a' acquires a velocity 'v' after time 't'.

$$\text{Acceleration} = \frac{\text{Change in Velocity}}{\text{Time}}$$

or $$a = \frac{v-u}{t}$$

or $$at = v-u$$

or $$v = u + at \quad \text{.... (i)}$$ (1 mark)

(ii). Second equation of motion : Average velocity during the first second = $\frac{u+a}{2}$

Average velocity during the last second = $\frac{v-a}{2}$

Therefore, the average for these two intervals = $\frac{v+u}{2}$

Similarly taking intervals fro the beginning and the end, that is for the whole journey, the average velocity is $\frac{v+u}{2}$.

$\therefore$ Distance travelled,

$$s = \frac{v+u}{2} \times t = \frac{u+at+u}{2} \times t$$

or $s = ut + \frac{1}{2}at^2$ .... (ii) (2 marks)

(iii) Third equation of motion : If the initial velocity 'u' and the acceleration 'a' is known, then with the help of equation (ii), the distance 's' travelled in time 't' can be calculated.

By eliminating 't' from equations (i) and (ii), a third equation connecting the distance travelled with the final and initial velocities can be obtained.

Distance travelled = Average velocity × time

$$s = \frac{u+v}{2} \times t$$

From equation (i),

$$v = u + at$$

or $$t = \frac{u-v}{a}$$

$\therefore$ $$s = \frac{u+v}{2} \times \frac{u-v}{a}$$

or $$s = \frac{v^2-u^2}{2a}$$

or $$v^2 - u^2 = 2as$$

or $$v^2 = u^2 + 2as$$ ...(iii) (2 marks)

OR

22. Total distance of race = 100 m

Total time taken for race = 10 s

(a) Average velocity of the sprinter

$$= \frac{\text{Total distance}}{\text{Total time taken}} = \frac{100\,\text{m}}{10\,\text{s}} = 10\ \text{ms}^{-1}$$

(1 mark)

(b) Average velocity in the time interval (0 – 1) s = 4 ms^{-1}

Average velocity in the time interval (1 – 5) s = (30/4) = 7.5 ms^{-1}

Average velocity in the time interval (5 – 9) s = (52/4) = 13 ms^{-1}

Average velocity in the time interval

(9 – 10) s = $\frac{100-86}{1}$ = 14 ms^{-1}

Hence, in last second i.e. (9 – 10) s time, average velocity maximum.

Appropriate unit = ms^{-1}

So average velocity = 14 ms^{-1}

(1½ marks)

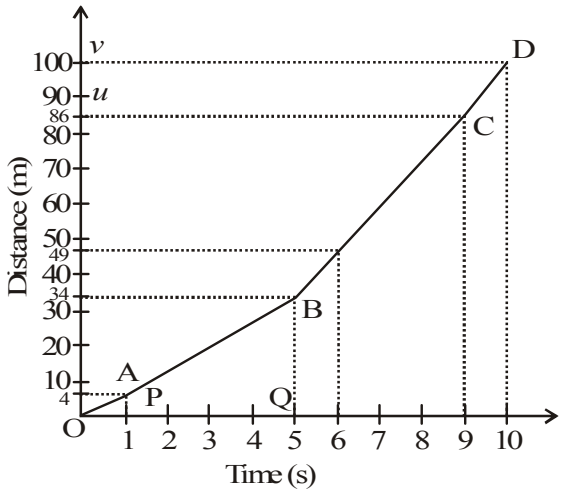
(c) Distance-time graph :

Time	0	1	5	9	10
Distance	0	4	34	86	100

Scale - 1 cm ⇒ 10 m on Y-axis

1 cm ⇒ 1 second on X-axis.

Distance-time graph



(1½ marks)

(d) From distance-time graph, the distance moved by the sprinter at the end of 6 s = 49 m. (1 mark)

23. The initial velocity of the ball = 20 cms^{-1}
Due to friction force exerted by the table, velocity of the ball decreases down to zero in 10 s.
Thus, u = 20 cms^{-1}
v = 0 cms^{-1} and t = 10s (1 mark)
Since the velocity-time graph is a straight line, it is clear that the ball moves with a constant accelerating force. The acceleration a is

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

$$= \frac{(0\,cm^{-1} - 20\,cm^{-1})}{10\,s}$$

$$= -2\ cms^{-2} = -0.02\ ms^{-2} \quad (1½ \text{ marks})$$

The force exerted on the ball F.

$$F = ma$$

$$= \left(\frac{20}{1000}\right) kg \times (-0.02\,ms^{-2})$$

$$= -0.0004\ N$$

(1½ marks)

Negative sign means that the friction force exerted by the table is opposite to the direction of motion of the ball. (1 mark)

OR

Given m = 10 g = $\frac{10}{1000}$ kg = 0.01 kg

u = 50 ms^{-1}, t = 2.0s, v = 70 ms^{-1}.

(a) Initial momentum of ball
= mass × initial velocity = mu = 0.01 kg × 50 ms^{-1}
= 0.5 kg ms^{-1}.

(b) Final momentum of the ball = mass × final velocity
= mv = 0.01 kg × 70 ms^{-1} = 0.7 kg ms^{-1}.

(c) Rate of change of momentum

$$= \frac{\text{Final momentum} - \text{Initial momentum}}{\text{Time int erval}}$$

$$= \frac{(0.7-0.5)\,kg\,ms^{-1}}{2.0s} = 0.1\,kg\,ms^{-2} \text{ (or 0.1 N)}$$

(d) Acceleration $a = \frac{v-u}{t} = \frac{70-50}{2} = 10\ ms^{-2}$

(e) Force = mass × acceleration = ma = 0.01 kg × 10ms^{-2} = 0.1N (1 × 5 = marks)

24. (a) Different patterns of growing crops are:
(i) Mixed Cropping: It is a method in which two or more crops grow simultaneously on the same piece of land.
Example : Wheat + grain, Wheat + mustard or groundnut + sunflower. This helps in the reduction of risk factor and provides insurance against failure of one of the crops.
(ii) Inter-Cropping: It is growing two or more crops simultaneously on the same field in a definite pattern. A few row of one crop alternate with a few rows of second crop
Example : soyabean + maize or bajra + lobia
(iii) Crop-rotation: The growing of different crops on a piece of land in a pre-planned succession is known as crop-rotation.
Generally a leguminous crop like pulses, beans and peas, is rotated with non-leguminous crop such as wheat, maize etc.
The availability of moisture and irrigation facilities decides the choice of crop to be cultivated after one harvest. (1 × 3 = 3 marks)

(b) Legumes are preferred in mixed cropping and intercropping because they can fix atmospheric nitrogen in their root nodules with the help of bacteria. They replenish the soil by adding nitrates to the soil and help the other crops. (2 marks)

OR

(a) The process of supplying water to the crop plants by means of wells, tanks, ponds, lakes, reservoirs, canals etc. is called irrigation. (2 marks)

(b) Different kinds of irrigation systems are adopted to supply water to agricultural lands. The resources are

- **Wells:** Dug wells-water is collected from bearing strata.
- **Tubewells:** They can tap water from deeper strata.
- **Canals:** Most extensive irrigation system. They receive water from reservoirs or

rivers. The main canal is divided into branch canals having further distributories to irrigate fields.

- **River lift system:** Water is directly drawn from the river for supplementing irrigation in areas close to rivers.
- **Tanks:** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas. (3 marks)

SECTION – B

25. (d) Filtrate will be a solution of common salt in water. On heating water will evaporate and salt will remain in the dish. (1 mark)

26. (c) The water level remains the same (1 mark)

27. (d) Detergent is soluble in water. (1 mark)

28. (a) (1 mark)

29. (d) (1 mark)

30. (d) (1 mark)

31. (c) (1 mark)

32. (b) The time taken for increasing the temperature–10°C to 0°C will be very less. Also the flat portion has to be small for ice to water than for water to steam. (1 mark)

33. (c) (1 mark)

34. (a) Mixture becomes black due to formation of FeS. (1 mark)

35. (d) (1 mark)

36. (b) Here , $u = 5 ms^{-1}$

As the acceleration acts in the opposite direction of initial velocity, so it is negative.

$a = -10\ ms^{-2}$

At the highest point, $v = 0$

Using, $v^2 - u^2 = 2as$, we get

$0^2 - 5^2 = 2 \times (-10) \times s$

$$s = \frac{25}{20} = 1.25 \text{ m}$$

$\therefore$ Height attained by the stone = 1.25 m.

Again, $v = u + at$

$0 = 5 - 10 \times t$

or $$t = \frac{5}{10} = 0.5 \text{s}$$

$\therefore$ Time taken by the stone to reach the highest point = 0.5 s. (1 mark)

37. (c) Plant cells (Onion peel) in addition to the plasma membrane have another rigid outer covering called the cell wall. The plant cell wall is mainly composed by cellulose. (1 mark)

38. (a) (1 mark)

39. (b) Sclerenchyma fibres are elongated, spindle shaped, thick-walled dead cells. They provide mechanical strength. (1 mark)

40. (a) In the given diagrams A represents transverse section of sclerenchyma while B represents longitudinal section of sclerenchyma. (1 mark)

41. (a) (1 mark)

42. (d) (1 mark)