Goa Board
Class IX Science
Term 1
Sample Paper – 5 Solution

Time: 3 hrs **Total Marks: 90**

SECTION A

1. **Ans.** Dry ice is stored under high pressure because on decreasing the pressure on dry ice, it gets converted directly into carbon dioxide gas.

2. **Ans.** The slope of the distance–time graph for car B makes a larger angle with the time axis. Thus, its slope is larger than the slope of the distance–time graph for car A. Hence, the speed of car B is greater than that of car A.

3. **Ans.** The deeply folded inner membrane of mitochondria provides a large surface area for ATP-generating chemical reactions.

4. **Ans.**

(i)

$$F \propto \frac{1}{r^2}$$

$$\therefore F_{new} \propto \frac{1}{r_{new}^2}$$

$$\Rightarrow \frac{F_{new}}{F} = \frac{r^2}{r_{new}^2} = \frac{r^2}{\left(r/2\right)^2} = 4$$

$$\therefore F_{new} = 4F$$

That is, the force increases 4 times when the distance between two objects is reduced to half.

(ii)

$$F \propto m_1 m_2$$

$$\therefore F_{new} \propto m_{1,new} m_2$$

$$\Rightarrow \frac{F_{new}}{F} = \frac{m_{1,new} m_2}{m_1 m_2} = \frac{4m_1 m_2}{m_1 m_2} = 4$$

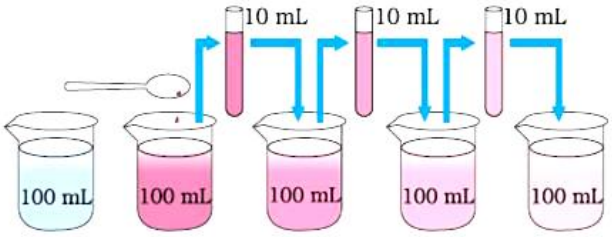
$$\therefore F_{new} = 4F$$

That is, the force increases 4 times when the mass of one object is increased to 4 times.

5. Ans. Mercury, oil and water are immiscible liquids and have different densities. The mixture of mercury, oil and water will be put in a separating funnel and allowed to stand for some time. The mixture separates into three layers according to the densities of mercury, oil and water. On opening the stop cock of the separating funnel, the lower layer formed by mercury comes out first and is collected in a beaker leaving behind the other two layers. Similarly, again on opening the stop cock of the separating funnel, the lower layer of water comes out first and is collected in the beaker leaving behind the oil in the funnel.

6. Ans. Species of cattle reared in India are
(i) Cow - *Bos indicus*
(ii) Buffalo - *Bubalus bubalis*

7. Ans. Activity:
1. Take 2–3 crystals of potassium permanganate and dissolve them in 100 ml of water.
2. Take out approximately 10 ml of this solution and put it into 90 ml of clear water.
3. Take out 10 ml of this solution and put it into another 90 ml of clear water.
4. Keep diluting the solution like this for 5 to 8 times.



This experiment shows that only a few crystals of potassium permanganate can colour a large volume of water (about 1000 L). So, we conclude that there must be millions of tiny particles in just one crystal of potassium permanganate which keep on dividing themselves into smaller and smaller particles. Ultimately, a stage is reached when the particles cannot divide further into smaller particles.

8. Ans.
I.
(a) Fluidity: It is the property of liquids and gases by which they have a tendency to flow.
(b) Density: It is the property of a matter defined as mass per unit volume.

II. We should wear pure cotton clothes and preferably of white colour in summers, because cotton fibres absorb perspiration which causes the cooling effect. Also, white clothes are poor absorbers of heat.

III. Gases diffuse faster in gases because of the high speed of particles and the large space between them.

9. Ans.

(i) Metals: Iron

They are lustrous and good conductors of electricity.

(ii) Non-metals: Oxygen

They are non-lustrous and poor conductors of electricity.

(iii) Metalloids: Germanium

They show intermediate properties between those of metals and non-metals and are semiconductors.

10. Ans. Centrifugation is used for separating the components of a mixture in which the solid particles in a liquid are so small that they cannot be separated by the filtration process.

Principle: Denser particles are forced to the bottom and lighter particles stay at the top when spun rapidly.

Applications:

1. Used in diagnostic laboratories for blood and urine tests.
2. Used in dairies and homes to separate the butter from the cream.

11. Ans. Differences between manures and fertilisers:

Manures	Fertilisers
i. Manure is a natural substance obtained by the decomposition of plant residues and animal wastes.	i. Fertiliser is an inorganic salt or an organic compound, based on the source from where it has been made.
ii. The amount of essential nutrients such as nitrogen, phosphorus and potassium is less in manures.	ii. Fertilisers are rich in essential nutrients which are required for the growth of plants.
iii. Manures add large amount of organic matter to the soil.	iii. Fertilisers add large amount of chemicals to the soil, instead of organic matter.
iv. Absorption of manures is slow in plants as manures are not soluble in water.	iv. Absorption of fertilisers is fast as they are soluble in water.
v. Manures remove the general deficiency of nutrients in the soil.	v. Fertilisers remove the specific deficiency of nutrients in the soil.
vi. They are cheap and can be made at home.	vi. They are costly and cannot be made at home.

12. Ans.

Time of ascent = Time of descent = 6/2 = 3 s

(a) $v = 0, a = -g = -9.8 \text{ m/s}^2$

According to the first equation of motion, we have

$v = u + at$

$0 = u - 9.8 \times 3$

$u = 29.4 \text{ m/s}$

Hence, the ball was thrown up with a speed of 29.4 m/s.

(b) According to the second equation of motion, we have

$v^2 = u^2 + 2as$

$0 = 29.4^2 - 2 \times 9.8 \times h$

$h = \frac{29.4^2}{19.6} = 44.1 \text{ m}$

Hence, the ball reaches a maximum height of 44.1 m.

(c) After the first three seconds, the ball is moving downwards.

Hence, 4 s after launch means 1 s after reaching the maximum height.

Thus, according to the third equation of motion, we have

$s = ut + \frac{1}{2}at^2$

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

$h = 4.9 \text{ m}$

Hence, its position after 4 s is 44.1 – 4.9 = 39.2 m from the ground.

13. Ans. Assume that there is no external unbalanced force working in the horizontal direction.

The momentum of the girl and the cart before the jump is equal to the momentum of the girl and the cart after the jump. After the jump, the cart and girl travel with the same velocity v.

$m_1u_1 + m_2u_2 = (m_1 + m_2)v$

$40 \times 5 + 0 = (40 + 3) \times v$

$\therefore v = \frac{200}{43} = 4.65 \text{ m/s}$

14. Ans.

(i) When a person gets down from a moving bus, he may fall. This is because the foot of the person comes to rest as soon as it touches the ground, but the upper part of the body remains in motion due to inertia of motion, and hence, the person falls down. However, if a person starts running in the direction of the moving bus, the body does not come to rest at once, and the person does not fall. So, Shyam asked Ram to run in the direction of the moving bus as soon as his foot touches the road.

(ii) Shyam is concerned about Ram. He is aware of the fact that getting down from a moving bus is a dangerous act.

15. Ans.

(i) The source of centripetal force is the gravitational force between the planet and the Sun.

(ii) Gravitational force depends on the mass of the planet, the mass of the Sun and the distance between the Sun and that planet.

(iii) The planet will begin to move in a straight line tangential to the point of the circle in which it was moving at the instant the force became zero.

16. Ans.

(a) When salt is applied to mango pieces, more water molecules leave the cells due to exosmosis. This causes the mango pieces to shrink in size and thereby helps in their preservation.

(b) When dried raisins are kept in water for few hours, they gain water due to osmosis. The raisins swell up because the surrounding medium has a higher concentration of water than the inside of the cell.

17. Ans.

(a) Parenchyma:

i. It serves as a packing tissue to fill the spaces between other tissues and maintains the shape and firmness of the plant.

ii. It stores food, performs photosynthesis and carries out secretion in plants.

(b) Collenchyma:

i. It provides mechanical support to the growing parts of plants.

ii. Chlorenchyma, collenchyma cells which contain chloroplasts, performs photosynthesis in plants.

(c) Sclerenchyma:

i. It provides mechanical support to plants.

ii. It provides strength, rigidity, flexibility and elasticity to plants.

18. Ans. Composite fish culture is a technique in which fish with different feeding habits are kept together for increased production at the same cost. Fast-growing compatible species are selected so that there is little competition between them and all ecological zones are exploited to achieve maximum yield.

Conditions necessary for composite fish culture technique:

(i) Fast-growing compatible fish should be selected.

(ii) Selected fish should have different feeding habits so that all the available food is effectively consumed with little competition between them.

Limitations of composite fish culture technique:

Many fish of composite fish culture breed only during the monsoon season. It is difficult to get good quality of fish seed as it could be mixed with that of other species as well, even if the fish seed is collected from the wild.

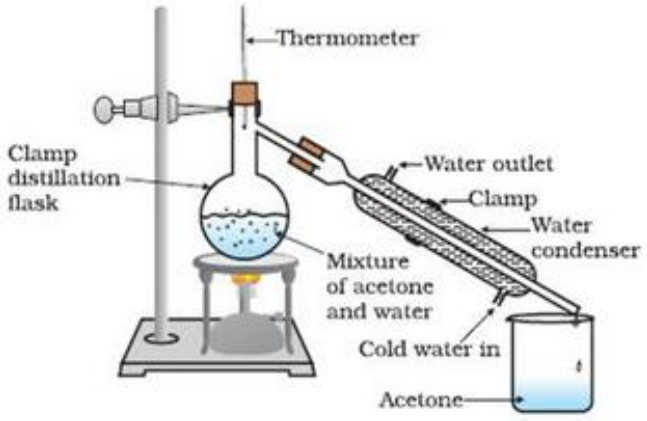
19. Ans.

(a) Fractional distillation is the method used for the separation of components of a mixture containing two miscible liquids which boil without decomposition and have sufficient difference in their boiling points.

Two conditions essential for using this method are

1. The two liquids must be miscible which is they totally mix with each other.
2. The difference between the boiling points of the liquids should be greater than 25 K.

(b) Apparatus used for fractional distillation:



(c) A mixture of two immiscible liquids can be separated by using a separating funnel.

The separation of two immiscible liquids by using a separating funnel depends on the difference in their densities.

20. Ans.

(a) (i) Bromine

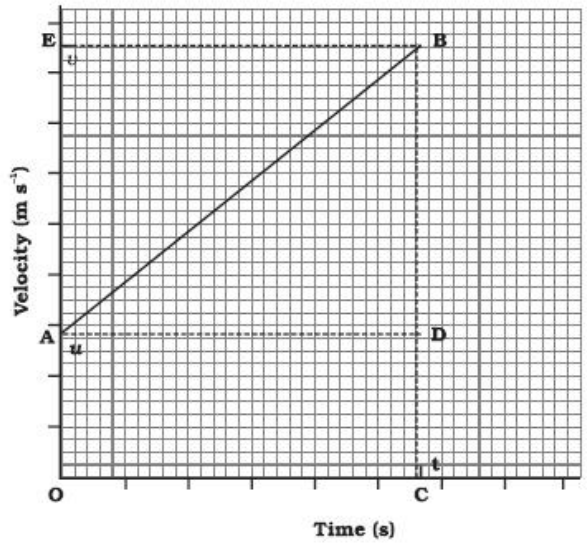
(ii) Oxygen

(b) Metalloid: Silicon

(c) Malleability and ductility are properties which enable us to give metals the desired shape.

(d) Mercury is liquid at room temperature.

21. Ans.



At t = 0, initial velocity is u. It then increases to v (at point B) in time t.

Draw perpendicular lines BC and BE from point B on the time and velocity axes, respectively, so the OA = u, OE = BC = v. Also draw a line AD parallel to the time axis so that OC = AD = t.

Then, the change in velocity in time t is = BC – OA = BC – CD = BD

However, BC = v and CD = OA = u

Hence, BD = v – u

From the velocity–time graph, the acceleration of the object is given by

$$a = \frac{\text{Change in velocity}}{\text{Time taken}} = \frac{BD}{AD} = \frac{BD}{OC} = \frac{v-u}{t}$$

$$\therefore at = v - u$$

$$\Rightarrow v = u + at$$

22. Ans.

(a) Second law of motion: The rate of change of linear momentum of a body is directly proportional to the external force applied on the body, and this change takes place always in the direction of the applied force.

$$F \propto \frac{m(v-u)}{t}$$

$$F \propto ma$$

$$F = kma$$

$$\text{If, } k = 1$$

$$F = ma$$

In terms of units, the above equation can be written as

$$1\ N = 1\ kg \times 1\ m/s^2$$

Hence, we define the unit of force, i.e. newton, as 'one newton force is the force which produces an acceleration of 1 m/s^2 in a body of mass one kilogram'.

(b) Law of conservation of momentum: The sum of momentum of the two objects before collision is equal to the sum of momentum after collision provided there is no external unbalanced force acting on them.

Recoil of a gun:

Let m_1 = mass of shell, m_2 = mass of gun

Before firing, both the gun and the shell are at rest; therefore, the total momentum of the bullet and the shell = 0

On firing, let v_1 = velocity of shell, v_2 = velocity of gun

Total momentum on firing = $m_1v_1 + m_2v_2$

Applying the law of conservation of momentum, we get

$$m_1v_1 + m_2v_2 = 0$$

$$\therefore v_2 = \frac{-m_1v_1}{m_2}$$

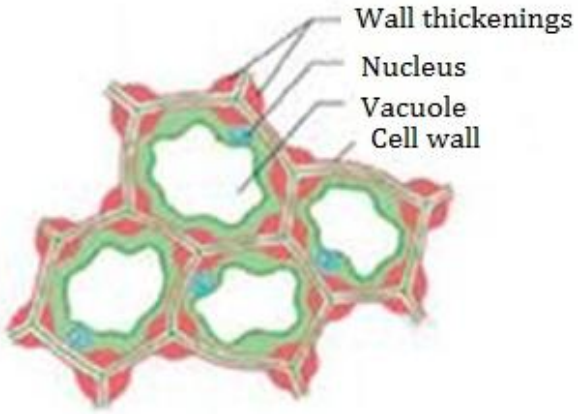
The negative sign shows that v_2 is in a direction opposite to v_1, i.e. the gun recoils when the shell moves forward.

As $m_2 >> m_1$; therefore, $v_2 << v_1$, i.e. as the gun is much heavier than the bullet, the recoil velocity of the gun is much smaller than the velocity of the bullet.

23. Ans.

(a) Location of collenchyma: In the leaf stalk and below epidermis.
Function of collenchyma: It allows easy bending in various parts of the plant without breaking (provides flexibility to plants).

(b)



Collenchyma tissue

(c) 'A' is pith. The simple permanent tissue shown in the diagram is parenchyma tissue.

(d) Characteristic features of parenchyma tissue:
(i) Cells are thin walled and loosely packed.
(ii) These are living cells and help in storage.

24. Ans.

(i) Management practices to enhance broiler production:
(a) Maintenance of appropriate temperature
(b) Provision of hygienic conditions in housing and poultry feed
(c) Prevention and control of diseases and pests

(ii) The broiler's feed must be rich in proteins, fats, vitamin A and vitamin K. This type of feed increases the growth rate, helps to develop more muscles and maintains feathering and carcass quality.

(iii) Pasturage is the flowers available for nectar and pollen collection. It helps the honeybees to collect plenty of honey.

SECTION B

25. Ans. C. Colloidal solution. Egg albumin is insoluble in water and forms a stable solution in water.

26. Ans. C. Chemical change, because a new compound is formed.

27. Ans. B. LC = 0.5°C, BP = 98.5°C
Because the thermometer has 20 divisions between 10°C, the least point will be 10/20 = 0.5, and because the level of mercury is only 3 divisions below 100, the BP is 100 – 1.5 = 98.5°C.

28. Ans. A. The correction which needs to be applied to the reading of the erroneous spring balance is 10 gwt, because the pointer was initially at the 1st division and each division equals 10 gwt.

29. Ans. C. Because of the extensible spring, the force experienced by each of the spring balances could be different from what is externally applied.

30. Ans. A. Parenchyma cells. These cells are unspecialised cells with thin cell walls. They have large vacuoles which are of different shapes.

31. Ans. C. Methylene blue is used to stain animal cells and can be used to observe human cheek cells.

32. Ans. C. Ribosomes and mitochondria are very small and so cannot be observed under a compound microscope. An electron microscope is required to observe these structures.

33. Ans. C. Striated muscle fibres. They have long, cylindrical and unbranched cells with dark and light bands.

34. Ans. The last apparatus is the correct setup for sublimation, because it has a flask, burner, wire gauze, China dish and cotton plug.

35. Ans.

Initial weight of raisins = 5g

Weight of soaked raisins = 7g

Water absorbed by the raisins = 7-5

= 2g

The percentage of water absorbed by the raisins = $\frac{\text{Final weight - Initial weight}}{\text{Initial weight}} \times 100$

$= \frac{2}{5} \times 100$

= 40%

36. Ans. The applied force in the spring balance observed is more on sand paper than on wood mica because rough surfaces offer more friction, and sand paper has more friction than wood mica.