Goa Board
Class IX Science
Term 1
Sample Paper – 4 Solution

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

SECTION A

1. **Ans.** The main objective of mixed cropping is to reduce the risk and insure against crop failure due to adverse weather.

2. **Ans.** Evaporation is called a surface phenomenon because some of the particles from the surface of the liquid gain enough energy to overcome the forces of attraction present between them and escape from the surface in the form of vapour.

3. **Ans.** When the particle completes 1 revolution, the displacement is zero. Now, in the next half revolution, the displacement is equal to the diameter of the circle. Thus, total displacement of the particle is 5 m.

4. **Ans.**

$F_1 = 100 \text{ N}$

$F_2 = 50 \text{ N}$

r_1 = original distance

r_2 = new distance

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

$$\frac{F_1}{F_2} = \left(\frac{r_2}{r_1}\right)^2$$

$$= \frac{100}{50} = \left(\frac{r_2}{r_1}\right)^2$$

$$\frac{r_2}{r_1} = \sqrt{2}$$

$$\therefore r_2 = \sqrt{2}\, r_1$$

5. **Ans.**

Name of the compound	Elements present
1. Baking soda ($NaHCO_3$)	1. Sodium, Hydrogen, Carbon and Oxygen
2. Sugar ($C_{12}H_{22}O_{11}$)	2. Carbon, Hydrogen and Oxygen

6. **Ans.** Advantages of organic farming:
   (i) It prevents pollution of any component of our environment because there is no use of chemical fertilisers.
   (ii) Besides providing nutrients, the use of biopesticides with a healthy cropping system helps in pest, insect and weed control.

7. **Ans.** The river lift system is one kind of irrigation system.
   It is used in areas where canal flow is irregular due to insufficient reservoir release.
   This type of irrigation is carried out for areas which are close to the river.
   Water is directly taken from the rivers to supplement the water requirement of the areas.

8. **Ans.** CO_2 has neither fixed volume nor fixed shape and is hence a gas. It exerts pressure due to collisions of the molecules.
   CO_2 may be liquefied by reducing the temperature or by increasing the pressure.
   Solid CO_2 gets converted directly into the gaseous state without coming into the liquid state and is hence called dry ice.

9. **Ans.** The possible reasons to justify this statement are
   1. The forces of attraction between the particles are maximum in solids and minimum in gases.
   2. The spaces between the constituent particles and kinetic energy of the particles are minimum in case of solids and maximum in case of gases.
   3. The solids have fixed shape and are not compressible. The arrangement of particles is most ordered in case of solids.

10. **Ans.**
    (a) Aerosol, e.g. clouds
    (b) Emulsion, e.g. butter
    (c) Gel, e.g. jelly

11. **Ans.**
    (a) Separating funnel.
    (b) It is used to separate a mixture of immiscible liquids.
    (c) Immiscible liquids separate out in layers depending on their densities.
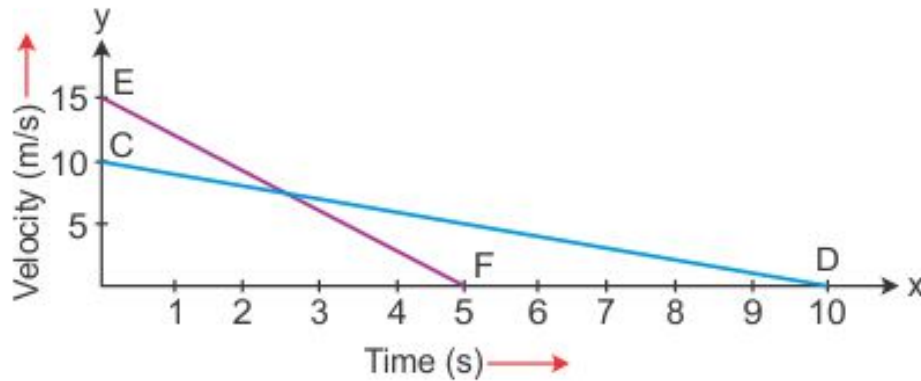
12. Ans.

For train A :

$u = 54 \text{ km/h} = 54 \times \dfrac{5}{18} = 15 \text{ m/s}$

$v = 0; t = 5 \text{ s}$

For train B :

$u = 36 \text{ km/h} = 36 \times \dfrac{5}{18} = 10 \text{ m/s}$

$v = 0; t = 10 \text{ s}$

Distance travelled by A = Area under EF = $\dfrac{1}{2} \times 15 \times 5 = 37.5 \text{ m}$

Distance travelled by B = Area under CD = $\dfrac{1}{2} \times 10 \times 10 = 50 \text{ m}$

13. Ans.

  (i) As mass is the measure of inertia,

     Ratio of inertia of A to B = m: 2 m = 1:2

  (ii) Momentum P = m × v

$$P_1 : P_2$$
$$= (m \times 2v) : (2m \times v) = 1 : 1$$

  (iii) The force needed to stop the body is the rate of change of momentum. If the time is the same, then the ratio of force applied on both the bodies is 1:1.

14. Ans.

  (i) Average speed of Ram = Total distance/Total time taken = 200/25 = 8 m/s

  (ii) Shyam did not behave like a sportsman. He must be ashamed of his behaviour.

  (iii) Ram is a good sportsman. He did not like the behaviour of Shyam. He sided with his friend Anil to protect the interest of his friend. He is a good friend indeed.

15. Ans.

Let the acceleration due to gravity be 'g'.

$$g = \frac{Gm_e}{R^2} \rightarrow eq\ (1)$$

$$g' = \frac{Gm_e}{(R+h)^2} \rightarrow eq\ (2)$$

$h = height\ at\ which\ g' = \frac{1}{2}g$

From eq.(1) and (2)

$$\frac{g'}{g} = \left(\frac{Gm_e}{(R+h)^2}\right) \bigg/ \left(\frac{R^2}{Gm_e}\right) = \frac{R^2}{(R+h)^2}$$

$Let\ g' = 1/2\ g \therefore \frac{R^2}{(R+h)^2} = \frac{1}{2}$

$$2R^2 = (R+h)^2$$

$$R + h = R\sqrt{2}$$

$$\therefore h = R\left(\sqrt{2}-1\right)$$

At a height $h = R(\sqrt{2}-1)$, the value of acceleration due to gravity would be half of what it is on the surface.

16. Ans.

(i)

Diffusion	Osmosis
1. Diffusion is the movement of solid, liquid or gas molecules from the region of their high concentration to the region of their low concentration.	1. Osmosis is the movement of water or solvent molecules from the region of their high concentration to the region of their low concentration.
2. There is no membrane involved in this process. The movement occurs irrespective of any membrane.	2. Osmosis occurs through the semi-permeable membrane.

(ii) The cell membrane forms the outer boundary of the cell and keeps the cell contents intact within the cell. Thus, it forms a barrier to the outside. At the same time, it allows substances to enter and leave the cell. Thus, it keeps the cell connected with its surrounding.
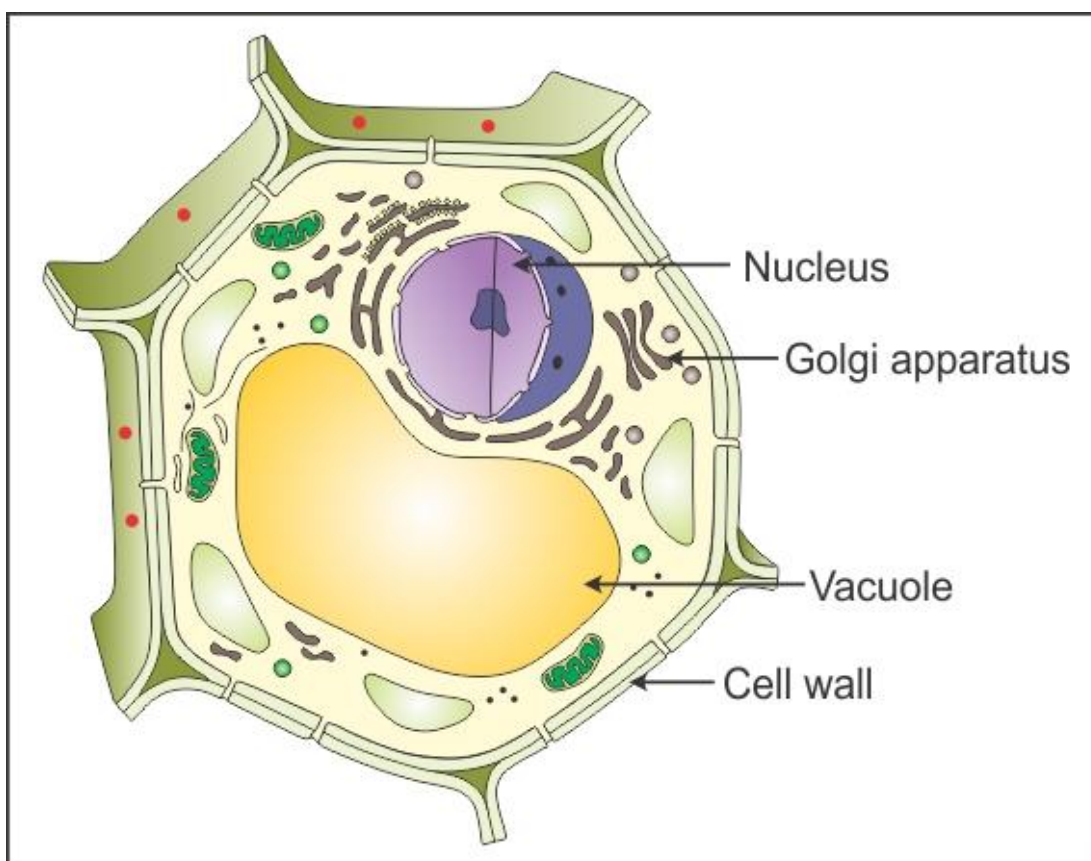
17. Ans.

The structural features of bone tissue are

(i) The matrix of the bone tissue is in the form of thin concentric rings called lamellae.

(ii) Osteocytes are present between the lamellae in fluid-filled spaces called lacunae.

(iii) All lacunae communicate with each other by a network of fine canals called canaliculi.

18. Ans.

(a) Plant Cell:

(b) Adenosine triphosphate (ATP) is the energy currency of the cell. Mitochondrion releases the energy.

19. Ans.

Characteristics:

		True solution	**Suspension**	**Colloidal solution**
a	Appearance	Clear and transparent	Opaque	Translucent
b	Visibility	Particles not visible	Particles are visible to the naked eye	Particles are visible only under electron microscope
c	Filterability	Can pass through filter paper and animal membrane	Do not pass through filter paper or animal membrane	Can pass through filter paper but not through animal membrane
d	Tyndall effect	Do not show Tyndall effect	Show Tyndall effect	Show Tyndall effect
e	Particle size	Less than 1 nm	More than 1 nm	Between 100 nm

20. Ans.

(a) Solids: (i) Have maximum intermolecular forces of attraction.
(ii) The molecules are closely packed.

Liquids: (i) Have lesser intermolecular forces of attraction.
(ii) The molecules are less closely packed.

Gases: (i) Have least intermolecular forces of attraction.
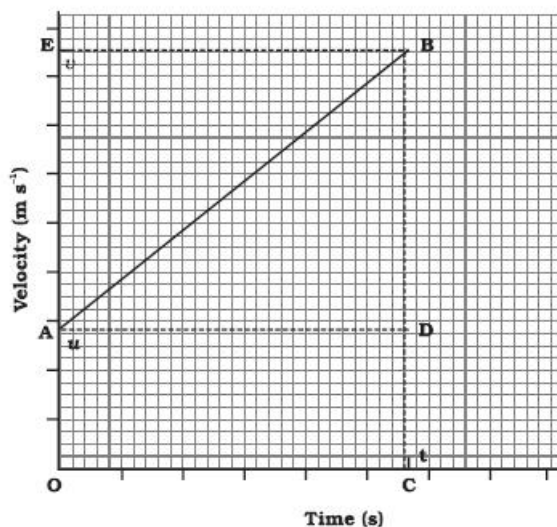(ii) The molecules are far away from each other.

(b) When water freezes to form ice, its volume increases, and hence, its density decreases. Now as ice has lower density than water, it floats on water.

21. Ans.

(a) The velocity–time graph of uniformly accelerated motion of a body is
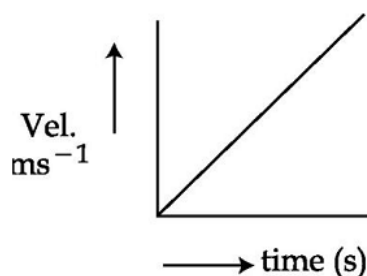
(b)

The distance s travelled by the object in time t is given by

s = area of the trapezium OABC

$$= \frac{1}{2}(OA + BC) \times OC$$

But OA = u, BC = v and OC = t

$$s = \frac{1}{2}(v + u) t \qquad \qquad (1)$$

From velocity – time relation v = u + at,

We have

$$t = \frac{v - u}{a} \qquad \qquad (2)$$

Substiting value of time t from equation (2) into (1) we get

$$s = \frac{1}{2}(v + u)\left[\frac{v - u}{a}\right] = \frac{v^2 - u^2}{2a}$$

$$\therefore \; 2\,as = v^2 - u^2$$

22. Ans.

(a) m = 10 kg

u = 0

a = g = 10 ms^{-2}

s = 0.8 m

Using v^2 = u^2 + 2 as

= 0 + 2 × 10 × 0.8

v^2 = 16

v = 4 m/s

Using p = mv

p = 10 × 4

= 40 kg ms^{-1}

Momentum transferred = 40 kg ms^{-1}

(b) It is difficult for a fireman to hold the hose which ejects a large amount of water at a high velocity because
- A larger force is involved with ejection of water from the hose.
- According to Newton's III law, if this force is an action by the fireman on the hose, then the hose also applies an equal and opposite reaction on the fireman, who therefore has to hold it with a large force.

23. Ans.

(a) Animal husbandry is the scientific management of animal livestock.

The various aspects to be followed for animal husbandry are feeding, breeding, disease control and weeding.

(b) Shelters of animals should be well-ventilated and should protect them from rain, heat and cold.

The floor should be sloping so that it remains dry and facilitates training.

(c) Jersey and Brown Swiss breeds are selected for the long lactation period.

24. Ans.

(a)

Skeletal muscles	Smooth muscles
Skeletal muscles are striated and voluntary.	Smooth muscles are non-striated and involuntary.

(b)

Bone	Cartilage
It is a strong, non-flexible tissue and has a matrix made of calcium and phosphorus.	It is a strong, flexible tissue and has a matrix made of proteins and sugars.

(c)

Tendon	Ligament
Tendons are the fibrous tissues which are less flexible but possess great strength and connect bones to muscles.	Ligaments are highly elastic tissue with a considerable strength which connects bone to bone.

(d)

Areolar tissue	Adipose tissue
It is found between the skin and the muscles. It is involved in the repair of tissues.	It is present below the skin between the internal organs. It contains fat globules and acts as an insulator.

(e)

Xylem	Phloem
Xylem is made of dead cells and conducts water and minerals.	Phloem has living cells and conducts food from the leaves to other parts of the plant.

SECTION B

25. **Ans.** C. Gases are highly compressible; therefore, a large volume of gas can be filled in small cylinders.

26. **Ans.** C. Colloids are big enough to scatter a beam of light passing through it.

27. **Ans.** B. The total force which pulls each of the springs should be equal to the weight of the pan and the weights put in the pan.

28. **Ans.** A. Yes. The action and reaction forces are interchangeable on the two springs.

29. **Ans.** B. Among the given materials, glass offers least friction.

30. **Ans.** B. 10X gives an idea of the location of a good area for observation.

31. **Ans.** B.
    1 – Dendrites which are hair-like structures arising from the cell body.
    2 – Cell body which contains the granular cytoplasm.
    3 – Axon which is long, single, tube-like structure.
    4 – Nucleus present in the cell body.

32. **Ans.** C. Metanil yellow is a synthetic organic dye which is used in the textile and leather industries. Its use as a food colour is not permitted.

33. **Ans.** B. Anit dropped iodine solution. Potato contains starch. Iodine when reacts with starch forms starch–iodine complex which is blue–black in colour.

34. **Ans.** Reena must have observed the following features:
    (i)   Cells are loosely packed.
    (ii) Cells contain large intercellular spaces.
    (iii) Presence of vacuole in the centre.
    (iv) Presence of cytoplasm; plasma membrane surrounded by cell wall.

35. Ans. The following steps should be taken to separate the given mixture:

1. Sublimation
2. Addition of water
3. Filtration
4. Evaporation

Sublimation separates ammonium chloride, filtration removes sand and then the salt is separated by evaporation.

36. Ans. The applied force in the spring balance observed is more for the cuboid placed on sand paper because rough surfaces offer more friction. The working of a spring balance is based on the elasticity of metals.