CBSE SAMPLE PAPER – 02
SUMMATIVE ASSESSMENT – I
Class-IX SCIENCE

Time: 3 Hrs   **MM: 90**

General Instructions

(i)   The question paper comprises of two Sections, A and B. You are to attempt both the sections.
(ii)   All questions are compulsory.
(iii)   Question numbers 1 to 3 in Section-A are one mark questions. These are to be answered in one word or in one sentence.
(iv)   Question numbers 4 to 6 in Sections-A are two marks questions. These are to be answered in about 30 words each.
(v)   Question numbers 7 to 18 in Section-A are three marks questions. These are to be answered in about 50 words each.
(vi)   Question numbers 19 to 24 in Section-A are five marks questions. These are to be answered in about 70 words each.
(vii)   Question numbers 25 to 36 in Section-B are multiple choice questions based on practical skills. Each question is a one mark question. You are to select one most appropriate response out of the four provided to you.

Section – A

1.   What is dry ice? Write its chemical formula.

2.   Which tissue makes up the husk of coconut?

3.   Define 1 newton force.

4.   Differentiate the following activities on the basis of voluntary or involuntary

     (a) Jumping of frog

     (b) Pumping of the heart

     (c) writing with hand

     (d) Moving of chocolate in stomach

5.   Why is the plasma membrane called a selectively permeable membrane?

6.   What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface?

     (Mass of the earth is 6×10^{24} kg and radius of the earth is 6.4×10^{6}.)

7.   Are the three state of matter inter-convertible? How can they interconnect?

8.   Mention the characteristics features of connective tissue.

9.   Differentiate between meristmatic and permanent tissue.

10. Why does a person while firing a bullet holds the gun tightly to his shoulders?

11. Why should preventive measures and biological control methods be preferred for protecting crops?

12. A solution of H_2SO_4 acid is labeled is 95%. What is the mass of this that must be diluted with water to get 5L of solution containing 10g of H_2SO_4 per litre?

13. Fractional distillation is suitable for separation of miscible liquids with a boiling point difference of about 25 K or less. What part of fractional distillation apparatus makes it efficient and possess an advantage over a simple distillation process? Explain using a diagram.

14. How does the weight of an object vary with respect to mass and radius of the earth? In a hypothetical case, if the diameter of the earth becomes half of its present value and its mass becomes four times of its present value, then how would the weight of any object on the surface of the earth be affected?

15. Two objects, each of mass 1.5 kg, are moving in the same straight line but in opposite directions. The velocity of each object is 2.5 m s^{-1} before the collision during which they stick together. What will be the velocity of the combined object after collision?

16. Derive the third equation of motion - $v^2 - u^2 = 2as$ graphically?

17. Give reasons why:

    (a) A gas fills completely the vessel in which it is kept.

    (b) A gas exerts pressure on the walls of the container.

    (c) A wooden table should be called a solid.

18. Ram Avataris a farmer residing on the outskirts of Delhi. Upon a visit to a fertilizer shop, the salesmen inquired of Ram Avatar of the crop he anticipated to cultivate in the coming season. During the conversation, the crop concerned was conveyed. The salesman suggested that urea and other nitrogenous fertilizer be used. Shreshth, quietly but keenly listening the conversation intervened and told Ram Avatar that 13 for the concerned crop nitrogenous fertilizers shall not be required. Respond to the following questions using the information provided above:

    (i) What values are shown by Shreshth?

    (ii) What can be the concerned crop possibly?

    (iii) What can be the reason for Shreshth's suggestion?

19. What is chromatography? What are its various applications and underline the basic principle involved?

20. What is active transport? Differentiate between active and passive transport.

21. Differentiate between a true solution and a colloid.

22. Show that the weight of an object on the moon is $\frac{1}{6}th$ of its weight on the earth.

23. (a) Give any three preventive measures for pest control.

(b) How does storage of grains lead to losses? What preventive and control measures are used before grains are stored for future use?

24. State which of the following situations are possible and give an example for each of these:

(a) an object with a constant acceleration but with zero velocity

(b) an object moving in a certain direction with an acceleration in the perpendicular direction.

Section B

25. Which of the following statement is correct?

(a) boiling is a bulk phenomenon and evaporation is a surface phenomenon

(b) boiling is a surface phenomenon and evaporation is a bulk phenomenon

(c) boiling and evaporation both are surface phenomenon

(d) boiling and surface both are bulk phenomenon

26. Which of the following methods would you use to separate cream from milk?

(a) fractional distillation   (b) distillation

(c) centrifugation   (d) filtration

27. Which of the following human cells lack nuecleus?

(a) WBC   (b) RBC

(c) Muscle cell   (d) Nerve cell

28. A long tree has several branches. The tissue that helps in the sideways conduction of water in the branches is:

(a) collenchymas   (b) xylem parenchyma

(c) parenchyma   (d) xylem vessels

29. What is the slope of the body when it moves with uniform velocity?

(a) positive   (b) zero

(c) negative   (d) may be positive or negative

30. What is the momentum of an object of mass m, moving with a velocity 'v'?

(a) $\left(mv\right)^2$ (b) mv^2

(c) $\dfrac{1}{2}mv^2$ (d) mv

31. Which one of the following includes only Micronutrients:

(a) Iron, Copper, manganese   (b) Iron, Zinc, calcium

(c) Boron, copper and potassium   (d) Molybdenum, Copper, Sulphur

32. The enrichment of water bodies with nutrients leading to excessive growth of phytoplankton is known as:

(a) Nitrification   (b) Ammonification

(c) Eutrophication   (d) Phyto – enrichment

33. If a moving body comes to rest, then its acceleration is:

(a) Positive   (b) negative

(c) Zero   (d) All of these depending upon initial velocity

34. A large truck and a car, both moving with a velocity of magnitude v, have a head-on collision and both of them come to a halt after that. If the collision lasts for 1 s:

(a) Which vehicle experiences the greater force of impact?

(b) Which vehicle experiences the greater change in momentum?

35. Out of sugar solution, salt solution, muddy water ans milk, chooses the colloidal solution. What kind of colloidal solution is it?

36. In experiment to determine the melting point of ice in laboratory, what form of ice should be used? When should the reading of thermometer be noted?

Time: 3 Hrs   **MM: 90**

Answers

Section A

1.   Dry ice is solid carbon dioxide. Its chemical formula is CO_2.

2.   Sclerenchymatous tissue.

3.   1newton is the magnitude of force which produces an acceleration of $1m/s^2$ in a body of mass 1 kg.

4.   (a) Voluntary

      (b) Involuntary

      (c) Voluntary

      (d) Involuntary

5.   Plasma membrane is a highly specific structure. It is made up of lipids and proteins who selectively allow the entry of substance into cell and exit of some other substances from the cell i.e. selectively permeable.

6. $F = G \dfrac{Mm}{d^2}$

      $= \dfrac{6.6 \times 10^{-11} \times 6 \times 10^{24} \times 1}{\left(6.4 \times 10^6\right)^2}$

      $= \dfrac{6.7 \times 6 \times 10}{6.4 \times 6.4}$

      = 9.81N

7.   Yes, three states of matter are inter-convertible.

      (a) Solid can be changed into liquid by boiling and liquid can be changed to solid by cooling it i.e. by solidification.

      (b) Liquid can be changed to gas by vaporization by heating it and gas can be changed to liquid by condensation i.e. subjecting it to low temperature.

      (c) Solid can be changed to gaseous form/state by sublimation and liquid can be changed to solid by condensation.

8.   Characteristics of connective tissue:

   (a) The cells are living and are embedded in a non – living intercellular matrix

(b) It is composed of cells and numerous, thick structures called fibres.

(c) It binds the cells of other tissue in due body.

(d) It gives rigidity and support.

9.

Meristmatic tissue	Permanent tissue
cells are small	Cells are large
cells are thin walled	Cells are thin or thick walled
cells are rich in cytoplasm	Cytoplasm is present as a layer along the cell wall
Intercellular spaces are absent	Intercellular spaces often present

10. A person while firing a bullet holds the gun tightly to his shoulder because while firing the bullet, the bullet moves in the forward direction with a greater force and as a reaction by Newton's third law the gun will also move with the same force in the backward direction, so to prevent the shoulder of the person getting injured he must hold the gun tightly so that the force is not felt that strongly.

11. Prevention is better than cure so is true for plants also. Such preventions involve spraying of herbicides, weedicides, insecticides, pesticides, fungicides etc in the crop field.

Since their excessive use can harm the crop plants and cause pollution so proper seed bed preparation, timelysowing of crops, intercropping and croprotation are additionally applicable. Other than these biological control methods like use of resistant varieties is highly useful.

12. 1L of the diluted solution must contain 10g of H_2SO_4.

Therefore, 5L of the diluted solution must contain 50g of H_2SO_4.

The concentration of the acid in the bottle is 95%.

This means that

95g of H_2SO_4 is present in 100g of the acid solution

50g of H_2SO_4 will be present in

$\dfrac{50 \times 100}{95}$ *of the solution*

52.64g of the solution

13. The fractionating column packed with glass beads provides a surface for the vapours to collide and lose energy so that they can be quickly condensed and distilled. Also, length of the column would increase the efficiency of separation.
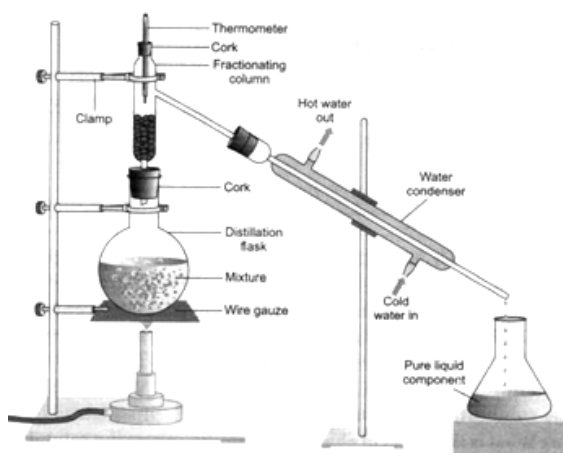
14. Weight of an object is directly proportional to the mass of the earth and inversely proportional to the square of the radius of the earth, i.e.,

Weight of a body $\propto \dfrac{M}{R^2}$

Original weight $W_0 = mg = mG\dfrac{m}{R^2}$

When hypothetically M becomes $4M$ and R becomes $\dfrac{R}{2}$

Then weight becomes $W_n = mG\dfrac{4M}{\left(\dfrac{R}{2}\right)^2} = (16mG)\dfrac{M}{R^2} = 16 \times W_0$

The weight will become 16 times.

15. Momentum before collision took place = $m_1 v_1 + m_2 v_2$

$= 1.5 \times 2.5 + 1.5 \times (-2.5)$

$= 0$

Since the objects stick together after collision

Hence, momentum after collision = $(m_1 + m_2) \times v$

$= (1.5 + 1.5) \times v$

$= 3v$
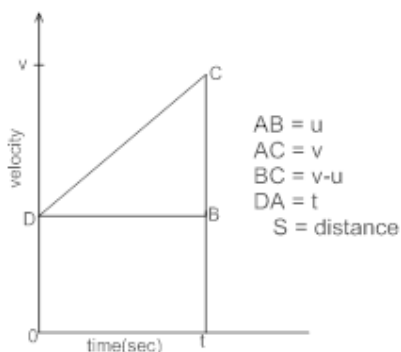
momentum before collision = momentum after collision

$0 = 3v,$

$v = \dfrac{0}{3} = 0$

the velocity of the combined object after collision (v)= 0

16. Let at time t=0, body moves with initial velocity u and time at 't' has final velocity 'v' and in time 't' covers a distance 's'

Area under v-t graph gives displacement

S = Area of ΔDBC + Area of rectangle OABD

$$S = \frac{1}{2} \times base \times height + length \times breadth$$

$$S = \frac{1}{2} \times DB \times BC + OA \times AB$$

$$S = \frac{1}{2} \times t \times (v-u) + t \times u \qquad \text{.................. (i)}$$

Now, v – u = at

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

put the value of 't' in equation (i)

$$S = \frac{1}{2} \times (v-u)\frac{(v-u)}{a} + u \times \left(\frac{(v-u)}{a}\right)$$

$$S = \frac{(v-u)^2 \, 2u(v-u)}{2a}$$

$$S = \frac{v^2 + u^2 - 2uv + 2uv - 2u^2}{2a}$$

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

$$2as = v^2 - u^2 \quad \Rightarrow \qquad \textit{third equation of motion}$$

17. (a) Since the attraction force between particles of a gas is negligible i.e. extremely less hence particles freely move/flow in all possible directions as a result gas fills completely the vessel in which it is kept.

(b) Freely moving particles of gas hit the walls of its container continuously and randomly therefore such random and erratic motion of gas particles exerts pressure on the walls of the container.

(c) A wooden table particles are quite rigid, have a fixed location and also possess a definite shape and volume. Due to all these properties we should call a wooden table a solid substance.

18. (i) Shreshth is aware how unusual use of nitrogenous fertilizers is dangerous for environment thus he showed his concern towards environment.

(ii) The concerned crop possibly will be a leguminous plant.

(iii) According to Shreshth the nitrogenous fertilizer is not required as leguminous crop was grown due to which atmospheric nitrogen is already present in the soil.

19. Chromatography is a technique used for separation of those components whose solubility in the same solvent is different.

Its various applications are:-

(a) It is used to separate different colours in dye.

(b) It is used to separate pigments from natural colours.

(c) It is used to separate drugs from blood.

The basic principle in chromatography is the different solutes have different solubility in the same solvent. For e.g. if we take a spot of ink on a paper and dip it in water than that coloured component which is more soluble in water rises faster and the other which is less soluble remains at the bottom and hence the two component can be separated.

20. The process in which the molecules are moved uphill against the concentration gradient. Active transport always involves the expenditure of energy because the materials are pumped against the concentration gradient.

Active transport	Passive transport
It involves movement of molecules against the concentration gradient.	It involves movement of molecules along the concentration gradient.
It requires energy in the form of ATP molecules.	No energy is required
It is a rapid movement.	It is a slow movement.
Movement of large molecules occur by active transport.	Small molecules or water molecules only are transported passively.

21.

True solution	Colloid
A true solution is a homogeneous mixture of two or more substances.	A colloidal solution is a heterogeneous mixture of two substances.
The size of the particles is less than one nanometer.	The range of particle size is between one nanometer to 100 nanometer.
It is always transparent.	It is translucent.
The particles cannot be seen even with microscope.	The particles of a colloidal solution can be seen with microscope.
It does not show Tyndall effect.	It shows Tyndall effect.

22. Suppose the mass of the moon is M_m and its radius is R_m. If a body of mass m is placed on the surface of moon, then weight of the body on the moon is

$$W_m = \frac{GM_m m}{R_e^2} \qquad \dots (1)$$

Weight of the same body on the earth's surface will be

$$W_e = \frac{GM_e m}{R_e^2} \qquad \dots (2)$$

where M_e = mass of earth and R_e = radius of earth.

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

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

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

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

radius of the earth, $R_e = 6400$ km

and radius of the moon, $R_m = 1740$ km

Thus, equation (3) becomes,

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

or $\quad \dfrac{W_m}{W_e} \approx \dfrac{1}{6} \qquad$ or $\qquad W_m \approx \dfrac{W_e}{6}$

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

23. (a) The three important preventive measures for pest control are:

   (i) Employing crop rotation.

   (ii) Use of pest-resistant varieties.

   (ii) Employing optimum time of sowing the crops.

   (b) Due to biotic factors, i.e., insects, rodents, fungi, mites and bacteria and abiotic factors like inappropriate moisture and temperature in the place of storage, there is degradation in quality, loss in weight, poor germinability and discolouration of produce, all leading to poor marketability and hence, loss.

   So, preventive and control measures are used before grains are stored for future use, which include strict cleaning of the produce before storage, proper drying of the produce first in sunlight and then in shade, and fumigations by using chemicals that kill pests.

24. (a) An object with a constant acceleration can still have the zero velocity. For example an object which is at rest on the surface of earth will have zero velocity but still being acted upon by the gravitational force of earth with an acceleration of 9.81 ms⁻² towards the center of earth.

   Hence when an object starts falling freely can have contant acceleration but with zero velocity.

   (b) When an athlete moves with a velocity of constant magnitude along the circular path, the only change in his velocity is due to the change in the direction of motion. Here, the motion of the athlete moving along a circular path is, therefore, an example of an accelerated motion where acceleration is always perpendicular to direction of motion of an object at a given instance. Hence it is possible when an object moves on a circular path.

Section - B

25. (a)
26. (c)
27. (b)
28. (d)
29. (b)
30. (d)
31. (a)

32. (c)
33. (b)
34. (a) Impact force will be same since time and momentum changes are the same.
    (b) Change in momentum should be same, since it is to be conserved.
35. Milk, milk is a colloid of liquid in liquid.
36. Pure crushed ice should be used so that the thermometer can be immersed into it. Reading should be noted as soon as ice starts melting.