CBSE

Class IX Science

Sample Paper - 11

Time: 3 hrs **Total Marks: 80**

General Instructions:

- The question paper comprises five sections – A, B, C, D and E. You are to attempt all the sections.
- All questions are compulsory.
- Internal choice is given in sections B, C, D and E.
- Question numbers 1 and 2 in Section A are one mark questions. They are to be answered in one word or in one sentence.
- Question numbers 3 to 5 in Section B are two marks questions. These are to be answered in about 30 words each.
- Question numbers 6 to 15 in Section C are three marks questions. These are to be answered in about 50 words each.
- Question numbers 16 to 21 in Section D are five marks questions. These are to be answered in about 70 words each.
- Question numbers 22 to 27 in Section E are based on practical skills. Each question is a two marks question. These are to be answered in brief.

Section A

1. What is the objective of mixed cropping? (1)

2. Who showed that oxygen evolved during photosynthesis comes from water and not carbon dioxide? (1)

Section B

3. How do forests influence the quality of soil? (2)

4. State any two of Newton's laws of motion. (2)

OR

On which law of motion and principle do rockets work on? (2)

5. How does wind speed affect the rate of evaporation? Elaborate.

Section C

6. (3)

(a) Define radioactive isotopes.

(b) Give any two examples and uses of radioactive isotopes.

(c) An element X contains two naturally occurring isotopes $^{35}X_{17}$ and $^{37}X_{17}$. If the average atomic mass of this element is 35.5 u, calculate the percentage of two isotopes.

7. Explain any three methods of weed control. (3)

OR

What is green manuring? List two commonly used green manure crops and name two macronutrients provided by green manure.

8. Compare the following properties of solids, liquids and gases in the tabular form: (3)

(a) Shape and volume

(b) Compressibility

(c) Density

9. Define: (3)

(a) Acceleration

(b) Average speed

(c) Uniform speed

10. A cricket ball is dropped from a height of 80 metres.

a) Calculate the speed of the ball when it hits the ground.

b) Calculate the time it takes to fall through this height. ($g = 10\ m/s^2$) (3)

11. A wooden cuboid has a mass of 10 kg. The length, breadth and height of this wooden cuboid are 50 cm, 30 cm and 20 cm, respectively. Find the pressure if the length and breadth of the block is kept in contact with the floor. (3)

OR

State and explain the principle of flotation.

An object of mass 20 g has a volume of 10 cm^3. Calculate the density of the object. (3)

12. Convert to mole: (3)

(a) 12 g of oxygen

(b) 20 g of water

(c) 22 g of carbon dioxide

OR

Write the chemical formula of the following using the criss-cross method: (3)

a. Magnesium chloride
b. Magnesium bicarbonate
c. Copper nitrate

13. The doctor diagnosed that Lata has lost the power of fighting any infection. (3)

(a) Name the disease Lata is suffering from.
(b) Name the pathogen responsible for the cause of the disease.
(c) Mention any two modes of transmission of the disease from one person to another.

14. How can we examine a small piece of onion peel under a microscope? (3)

15. What are the effects of biodegradable substances and non-biodegradable substances? (3)

Section D

16. (a) Define the terms and give one example of each: (5)

(i) Radial symmetry
(ii) Coelom
(iii) Triploblastic

(b) Identify the group of animals with

(i) Spiny body and radial body symmetry
(ii) Four pairs of jointed legs and no wings

17. (5)

(a) Define work. State the SI unit and CGS unit of work. Write the conversion of SI unit of work to its CGS unit.

(b) A wheel barrow filled with a load is pulled through a distance of 20 metres on a smooth horizontal surface. The arm of the wheel barrow makes an angle of 60° with the horizontal surface. If force applied to pull the wheel barrow is 50 N, find the work done while pulling it.

OR

(a) What kind of work is done in the following cases:

i. When force acts in the direction of motion.
ii. A bird flying in the sky.
iii. When a person is moving, holding the suitcase in his hands.

(b) A certain household has consumed 30 units of energy per day in February 2016. How much will it cost for that month if the rate of electrical energy is 2.46 per kWh?

18. Distinguish between mixture and compound. (5)

OR

(a) What is an octet? How does an element reach an octet state?

(b) Draw a schematic atomic structure of sodium and calcium (Number of protons of sodium = 11, calcium = 20).

19. (5)

(a) A man weighs 600 N on the surface of the Earth. If he were taken to the Moon, his weight would be 100 N. Calculate the mass of this man on the Moon ($g = 10\ m/s^2$).

(b) A man hears a clap of thunder 4 seconds after lightning strikes. Calculate the distance of lightning from the man (Speed of sound in air = 340 m/s).

20. (5)

(a) Name the tissue present in the hard covering of seeds. Which chemical is responsible for making the tissue hard?

(b) Draw a diagram of collenchyma tissue and label any four of its parts.

OR

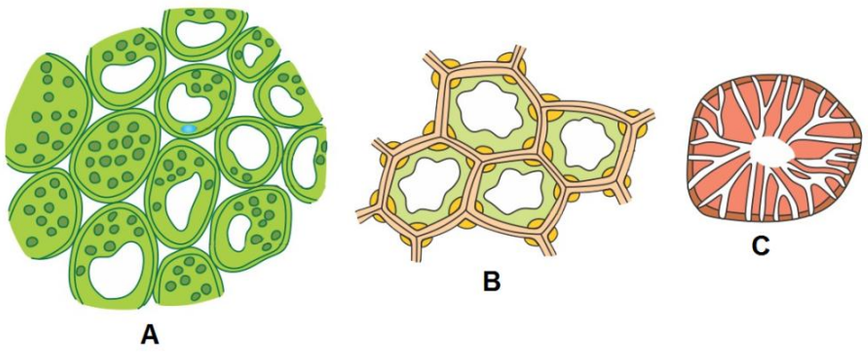
(a) What is a connective tissue? State any two of its basic components. Differentiate between ligament and tendon.

(b) Name the type of tissue whose cells are filled with fat globules. State its function.

21. What happens when sugar is dissolved in water? Where does the sugar go? What information do you get about the nature of matter from the dissolution of sugar in water? (5)

Section E

22. Observe the figures A, B and C. (2)



(a) Which of these tissues provide both mechanical strength and flexibility?

(b) Which of these tissues can be modified to form air cavities in aquatic plants?

23. Rishi observed a permanent slide of *Spirogyra*. (2)

(a) Which cell organelles can be clearly seen and labelled from this slide?
(b) To which group of plants does *Spirogyra* belong?

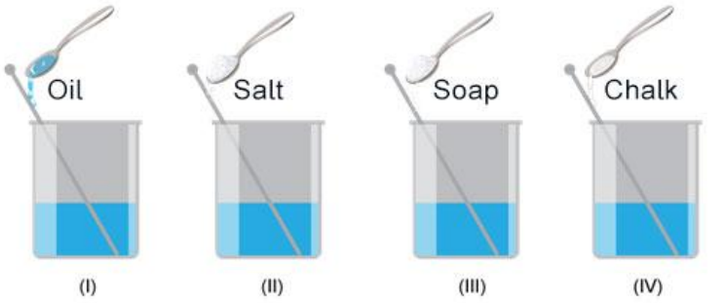
OR

(a) What is the role of fins in fish?
(b) Cockroach is an insect. It belongs to Phylum Arthropoda. List any one main characteristic of this phylum.

24. Identify two clear and transparent solutions from the following:
(a) Milk and water
(b) Sugar and water
(c) Starch and water
(d) Alum in water
(e) Egg albumin and water
(f) Chalk powder and water

OR

The following substances are added to water in a beaker as shown below. The mixture is stirred well. Which beaker will contain a true solution? (2)



25. What happens when solutions of sodium sulphate and barium chloride are mixed? Give the reaction. (2)

26. Material A of 6 kg occupies 50 cm^3, whereas material B of 10 kg occupies 30 cm^3. Which material has greater density? (2)

27. When a stone is dropped in water, ripples are formed. What is this type of waves? In which form does sound travel in air? (2)

OR

Which part vibrates in the following musical instruments?
a) Sitar
b) Flute

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Class IX Science
Sample Paper – 11 Solution

Section A

1. The main objective of mixed cropping is to reduce risk and ensure against crop failure due to adverse weather conditions.

2. Cornelius van Niel showed that oxygen evolved in photosynthesis is from water and not from carbon dioxide.

Section B

3.

(i) Plants in a forest hold the soil preventing soil erosion.
(ii) It holds the soil which helps in increasing the groundwater level.

4. a) Newton's first law states that an object at rest will remain at rest and a body in motion will continue to be in motion in a straight line unless it is compelled by an external force to change its state of rest or of uniform motion.

b) Newton's second law of motion states that the rate of change of momentum of a body is proportional to the applied force and takes place in the direction in which the force acts.

OR

When the rocket takes off from the ground, it exerts a force on the ground to lift its mass above the ground, and the ground exerts an equal and opposite force on the rocket. Thus, the rocket obeys Newton's third law of motion and is based on the principle of conservation of momentum.

5. The rate of evaporation of a liquid increases with increasing wind speed. When the speed of wind increases, the particles of water vapour move away with the wind, decreasing the amount of water vapour in the surroundings. This increases the rate of evaporation of water.

6.

(a) Isotopes which are unstable due to the presence of extra neutrons in their nuclei and emit various types of radiations are called radioactive isotopes or radioisotopes.

(b) Examples of radioactive isotopes: Carbon-14, Arsenic-74

Uses of isotopes:

(i) They are used in the treatment of cancer.

(ii) Radioactive isotopes are used as **'tracers'** in medicine to detect the presence of tumours and blood clots in the human body.

(c) Average atomic mass = 35.5 u

Let % amount of $^{35}X_{17}$ be y, then the amount of $^{37}X_{17}$ is (100 – x).

Then

$$35\times\frac{x}{100}+37\frac{(100-x)}{100}=35.5$$

$$\text{So, } 35x+3700-37x=3550$$

$$\text{Hence, } y=75$$

Thus the amount of $^{35}_{17}X$ is 75% and amount of $^{37}_{17}X$ is 25%.

7. Methods of weed control:

(a) **Mechanical method**: It involves methods such as uprooting weeds manually, weeding with a trowel, hand hoeing, ploughing and burning.

(b) **Chemical method**: It involves the use of chemical weed killers called herbicides or weedicides to kill or destroy weeds.

(c) **Biological method**: It involves the deliberate use of insects or some other organisms which consume and specifically destroy weed plants.

OR

Green manuring is the practice of ploughing green plants into the soil for improving its fertility. Green manure provides organic matter and nutrients such as nitrogen and phosphorus to the soil.

Commonly used green manure crops: Guar and Sunn hemp

Macronutrients provided by green manure: Nitrogen and phosphorus

8.

Property	Solids	Liquids	Gases
Shape and volume	Solids have a fixed shape and volume.	Liquids have a fixed volume but no fixed shape.	Gases have neither a fixed shape nor a fixed volume.
Compressibility	Solids cannot be compressed much.	Liquids cannot be compressed much.	Gases can be compressed easily.
Density	Solids have high density.	Liquids have moderate to high densities.	Gases have very low densities.

9. a) Acceleration: The rate of change of velocity is called acceleration.
b) Average speed: The average speed of a body is the total distance travelled divided by the total time taken to cover the distance.
c) Uniform speed: If a body travels equal distances in equal intervals of time, then the body is said to be moving with uniform speed.

10. a) Initial speed, u = 0
$g = 10 m/s^2$
To find: Final speed, v
h = 80 m
For a freely falling body:
$v^2 = u^2 + 2gh$
$v^2 = (0) + 2 \times (10) \times 80$
$v = \sqrt{1600} = 40$ m/s

b) To find: Time, t

$v = u + gt$
$40 = 0 + 10 \times t$
$t = 4$ s

11. The pressure is the ratio of force (F) exerted by a body to the area (A) upon which the body is exerting the force. Also, weight (W) is the force exerted by a body due to the Earth's gravitational pull, i.e. F = W.

$W = mg$

Acceleration due to gravity $(g) = 10\ m/s^2$

$\therefore W = 10 \times 10 = 100\ N$

$$\text{Pressure (P)} = \frac{\text{Force (F)}}{\text{Area (A)}}$$

Area of the surface of the cuboid (A)= $\ell \times b$

Assuming the surface of 50 cm $\times$30 cm to be in contact with the floor.

$A = 50 \times 30 = 1500\ cm^2 = 0.15\ m^2$

$$\therefore P = \frac{100}{0.15} = 666.6\ N/m^2$$

Pressure exerted by the block on the floor is 666.6 N/m^2.

OR

<u>According to the principle of flotation:</u>

An object will float in a liquid if the weight of the object is equal to the weight of the liquid displaced by it.

If a floating object is partly or totally submerged in the liquid, then the liquid is displaced by that portion of the object which is submerged under the liquid.

Thus, weight of the object = weight of the liquid displaced by it.

Density = Mass of the object / volume of the object

Here, the mass of the object = 20 g

Volume = 10 cm^3

Substituting the values of mass and volume of the object in the above formula, we get

Density = 20 g/ 10 cm^3 = 2 g/cm^3

12.

$\text{Mass of oxygen in gm} = 32g$

(a) $32g \text{ of oxygen} = \text{one mole of oxygen gas}$

$$\text{Thus, 12g of oxygen} = \frac{1}{32} \times 12 = 0.375 \text{ moles}$$

$\text{Molecular mass of water in gm} = 18g$

(b) $18g \text{ of water} = \text{one mole of water}$

$$\text{Thus, 20g of water} = \frac{1}{18} \times 20 = 1.11 \text{ moles of water}$$

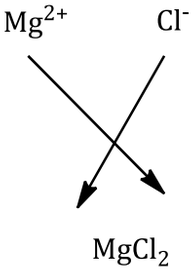
Molecular mass of CO_2 in gm $= 44g$

(c) $44\,g$ of CO_2 = one mole of CO_2

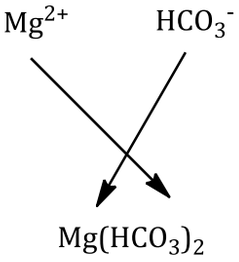
Thus, $22g$ of $CO_2 = \frac{1}{44} \times 22 = 0.5$ moles of CO_2

OR

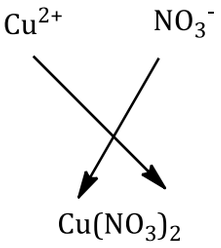
(a)



(b)



(c)



13.

(a) AIDS (acquired immunodeficiency syndrome)

(b) Retrovirus called HIV (human immunodeficiency virus)

(c) Modes of transmission of the disease:

(i) Unprotected sexual contact with an HIV-infected person

(ii) Transfusion of blood contaminated with HIV

14.

(a) Take an onion and cut it into four pieces (length-wise).

(b) With the help of forceps, take a thin strip of the peel from the inner concave side of the onion.

(c) Cut a square of thin peel and mount it in few drops of water on a slide or stain with iodine or eosin solution.

(d) Mount a cover slip carefully over the sample specimen and observe the slide under microscope.

(e) You will observe that the cells are firmly bound together.

(f) The nucleus is placed towards one side which is usually the case in plant cells.

15. Effects of biodegradable substances:

(i) Stagnant biodegradable wastes expel foul smell which is very harmful to the environment.

(ii) These wastes also emit some greenhouse gases such as methane and carbon dioxide and solids such as ammonia.

Effects of non-biodegradable substances:

(i) They pollute water and harm aquatic life.

(ii) Non-biodegradable substances like radioactive wastes and lead accumulate in the environment and cause diseases in humans and other living beings.

(iii) Substances like plastics enter the food chain and harm organisms.

Section D

16. (a)

(i) **Radial symmetry**: The animal's body can be divided into halves by any vertical plane passing through the central axis.
Example: Hydra

(ii) **Coelom**: The body cavity lined with an epithelium derived from the mesoderm is called coelom.
Example: Spider

(iii) **Triploblastic**: Animals which have three germ layers—outer ectoderm, mesoderm and inner endoderm—in the embryo are said to be diploblastic.
Example: *Hydra*

(b)

(i) Echinodermata

(ii) Arachnida

17.

(a) Work done in moving an object is equal to the product of the force exerted on the object and the distance moved by the object in the direction of the force.
SI unit of work is joule.
CGS unit of work is erg.
Conversion of joule to erg:
1 joule = 10^7 ergs

(b)

$W = F\ s\ \cos\theta$

$W = (50) \times 20 \times \cos 60^{\circ}$

$W = 500\ J$

Therefore, work done in pulling the wheel barrow is 500 J.

OR

(a)

i. When a force acts in the direction of motion of an object, work done is positive.

ii. When a bird is flying in the sky, its wings applies a force perpendicular to the direction of its motion. Hence, the work done is zero.
Therefore, $\theta = 90°$
Since $W = F \times s \cos\theta$
$W = F \times s \cos 90^{\circ} = 0$
Hence, the work done is zero.

iii. When a person is moving holding the suitcase in his hand, he applies force in the upward direction and the displacement of the suitcase is in the forward direction, i.e. perpendicular to the direction of the force applied.
Therefore, $\theta = 90°$
Since $W = F \times s \cos\theta$
$W = F \times s \cos 90^{\circ} = 0$
Hence, work done on the suitcase is zero.

(b) Energy consumed per day = 30 units = 30 kWh
2016 is exactly divisible by 4; hence, 2016 was a leap year.
∴ Cost per kWh = Rs 2.46
Cost of 30 kWh of electricity for February 2016
= 30 x 29 x 2.46 = Rs 2140.2

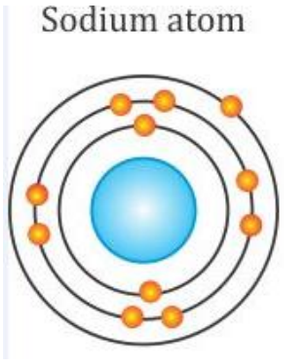
18.

MIXTURES	COMPOUNDS
1. A mixture can be separated into its constituents by physical processes. 2. A mixture shows the properties of its constituents. 3. Energy is usually neither given out nor absorbed in the preparation of a mixture. 4. The composition of a mixture is variable. 5. A mixture does not have a fixed melting or boiling point.	1. A compound cannot be separated into its constituents by physical processes. 2. The properties of a compound are entirely different from those of its constituents. 3. Energy is usually given out or absorbed during the preparation of a compound. 4. The composition of a compound is fixed. 5. A compound has a fixed melting or boiling point.

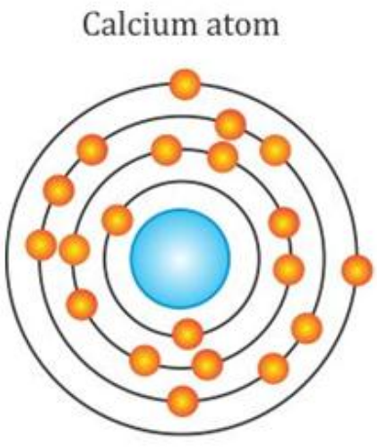
OR

(a) An atom has an octet when it has 8 electrons in the outermost shell. An element can attain its octet by losing, gaining or sharing electrons.

(b) Sodium atom: 12 n, 11 p, 11 e



Calcium atom: 20 n, 20 p, 20 e



19. (a)

Weight of man on the Earth (W_{Earth}) = 600 N

acceleration due to gravity (g_{Earth})= 10 m/s^2

Weight α acceleration due to gravity

$W_{Earth} = m_{Earth} \times g_{Earth}$

$\therefore m_{Earth} = \frac{600}{10} = 60$ kg

As the mass of the body remains the same,
the mass of the man on the Moon is = the mass of the man on the Earth = 60 kg

(b) We know that

$$\text{Speed of sound in air (v)} = \frac{\text{Distance}}{\text{time}}$$

$$340 = \frac{\text{Distance}}{4}$$

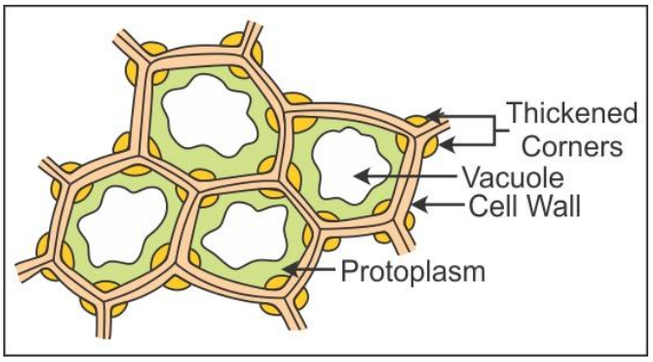
$\therefore \text{Distance} = 1360$ m

Therefore, the distance between the man and the point of lightning is 1360 m.

20.

(a) The tissue present in the hard covering of seeds is sclerenchyma. Lignin is the chemical which is responsible for making the tissue hard.

(b)



OR

(a) Connective tissue is a fibrous tissue which forms the framework of the skeleton and connects different organs of the body.
The basic components of the connective tissues are cells and matrix.

Differences between ligament and tendon:

Ligament	Tendon
• This tissue is very elastic and flexible.	• This tissue is less elastic and has limited flexibility.
• It connects one bone to the other bone.	• It connects muscles to bones.

(b) Adipose tissue is filled with fat globules. It acts as an insulator in the body.

21. When sugar is dissolved in water, its crystals break down into tiny particles. The sugar particles go into the spaces between the particles of water and mix with them to form a sugar solution. Sugar particles occupy the space between water particles.
From the dissolution of sugar in water, we can infer
(i) Matter (consisting of sugar and water) is made of small particles.
(ii) Particles of matter have spaces between them.

Section E

22. A – Parenchyma, B – Collenchyma, C – Sclerenchyma
(a) Tissue B or collenchyma provides both mechanical strength and flexibility.
(b) Tissue A or parenchyma can be modified into aerenchyma with air cavities in aquatic plants.

23.
(a) A permanent slide of *Spirogyra* shows a nucleus, ribbon-shaped chloroplast, cell wall and pyrenoids.
(b) *Spirogyra* belongs to Division Thallophyta.

OR

(a) Fins help the fish in swimming, balancing and changing direction while swimming.
(b) Jointed appendages is one of the main characteristic of Phylum Arthropoda.

24. Two clear and transparent solutions are (b) sugar and water, (d) alum and water.

OR

Beaker II contains a true solution.

A true solution is a homogeneous mixture in which two or more substances are dissolved in a solvent. When salt is added to water, it forms a homogeneous mixture, i.e. the solute and solvent particles cannot be distinguished.

25. When solutions of sodium sulphate and barium chloride are mixed, a white-coloured precipitate of barium sulphate is formed along with sodium chloride solution.

$Na_2SO_4 + BaCl_2 \rightarrow 2NaCl + BaSO_4\downarrow$

26. Density = mass/volume

For material A, density = 6/50 = 0.12 kg/m^3

For material B, density = 10/30 = 0.33 kg/m^3

Thus, density of material B is greater than material A.

27. The molecules of water move up and down in the vertical direction due to the stone dropped in water when the wave travels in the horizontal direction along the water surface. Hence, these are transverse waves. Sound waves travel in the form of longitudinal waves in air.

OR

a) Strings

b) Air column or air