

**Nagaland Board
Class IX Science
Sample Paper 1 – Solution**

1.

- (a) (iv) Like power stations, mitochondria releases energy (in the form of ATP) which is needed for various processes vital for life.
- (b) (iv) Phloem is responsible for the transport of food from the leaves to all the parts of the plant.
- (c) (iii) In Mollusca, the coelom is reduced and limited to the region around the heart.
- (d) (iii) HIV progressively attacks the human immune system and leaves individuals susceptible to many other infections.
- (e) (i) In 1932, J. Chadwick discovered neutrons, the neutral particles found in an atom.
- (f) (ii) The Modern Periodic Table contains 18 vertical columns known as groups and 7 horizontal rows known as periods.
- (g) (ii) 1 mole of water molecules has 2 moles of hydrogen atoms.
- (h) (i) The distance-time graph when object is at rest is a horizontal line and the slope of a horizontal line is zero.
- (i) (ii) Hydrometer is a direct reading instrument used for measuring the density or relative density of liquids.
- (j) (iv) Zero, because force acts in a direction perpendicular to the direction in which the object moves.

2. α -particles are doubly-charged helium ions. Since they have a mass of 4 u, the fast-moving α -particles have a considerable amount of energy.

3. 2O represent two atoms of oxygen and O₂ represents a molecule of oxygen.

4. The repeated reflection that results in the persistence of sound in a large hall is called reverberation.

5. The animals in which the developing embryo has three germinal layers are called triploblastic animals. The body of tapeworm consists of three germinal layers- ectoderm, endoderm and mesoderm

6. Jersey and Brown Swiss.

7. Hydrogen resembles both alkali metals and halogens. It can lose one electron like alkali metals and also gain one electron like halogens. Like halogens, it forms diatomic molecule and combines with metals and non-metals to form

covalent compounds. Therefore, position assigned to hydrogen in the periodic table is considered anomalous.

- 8.** Iron metal forms two types of ions, Fe^{2+} and Fe^{3+} .

The Fe^{2+} ion is known as iron (II) ion or ferrous ion and has valency of +2.

The Fe^{3+} ion is known as iron (III) ion or ferric ion and it has a valency of +3.

- 9.** Archimedes' principle: When an object is wholly (or partially) immersed in a liquid, it experiences a buoyant force (or upthrust) which is equal to the weight of liquid displaced by the object.

Buoyant force on an object = weight of liquid displaced by that object

Applications of Archimedes' principle:

1. In determining the relative density of a substance
2. In determining the density of liquids by a hydrometer

- 10.** In poultry farming, domestic fowls are raised to produce eggs and meat. The fowls are given animal feeds in the form of roughage which is rich in fibre. Thus, by feeding the poultry fibre-rich diet, they provide highly nutritious food in the form of eggs and meat.

- 11.** The tissue present in the hard covering of seeds is sclerenchyma tissue. Lignin is the chemical which is responsible for making the tissue hard.

- 12.** Uses of velocity-time graph:

(i) It enables us to know whether the motion is uniform or non-uniform. Graph for uniform motion is parallel to time axis. Graph of any other shape shows non-uniform motion.

(ii) The slope of velocity-time graph gives the value of acceleration.

(iii) The area enclosed by the velocity-time graph gives the value of distance travelled by the body in that time interval.

- 13.** Force (F) acting between the Earth (mass M) and the stone of mass (m) separated by the distance (r) by universal law of gravitation is given by the

equation
$$F = G \times \frac{M \cdot m}{r^2}.$$

The mass of stone is too less (negligible) when compared to the mass of the Earth which is 6×10^{24} kg. Thus, the stone falls on the Earth and the Earth does not rise towards the Sun.

- 14.** 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. $F = W$.

$$W = mg$$

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

$$\therefore W = 8 \times 10 = 80 \text{ N}$$

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

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

Assuming the surface of $50 \times 20 \text{ cm}$ to be in contact with the floor.

$$A = 50 \times 20 = 1000 \text{ cm}^2 = 0.1 \text{ m}^2$$

$$\therefore P = \frac{80}{0.1} = 800 \text{ N/m}^2$$

The pressure exerted by the block on the floors is 800 N/m^2 .

OR

The force of gravitation is calculated by using the equation

$$F = G \times \frac{M.m}{r^2}$$

$$\text{Gravitation constant } G = 6.7 \times 10^{-11} \text{ Nm}^2 / \text{kg}^2$$

$$\text{Mass of the Earth} = 6 \times 10^{24} \text{ kg}$$

$$\text{Mass of ball} = 2 \text{ kg}$$

As the ball is lying on the floor, the distance between the ball and the Earth is equal to the radius of the Earth.

Substituting all the relevant values in the above equation

$$F = 6.7 \times 10^{-11} \times \frac{6 \times 10^{24} \times 2}{(6400)^2}$$

$$F = 19.6 \text{ N}$$

$$\therefore F = 19.6 \text{ N}$$

15.

Work (W) done by a force (F) is given by

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

The range of angle ' θ ' in simple trigonometry is from 0° to 90°

$$\cos 0 = 1 \text{ and } \cos 90 = 0$$

Therefore, as the angle between direction of force and direction of motion increases, the work done by a force reduces.

- 16.** Let t_1 be the time taken by stone to reach the water surface in the well and t_2 the time taken by sound of splash to travel upward from water surface in well to outer edge of the well.

$$\text{Then total time } t = t_1 + t_2 = 3.13 \text{ s}$$

Given that the depth of water in well $h = 44.1 \text{ m}$

We assume, buoyancy of water on stone is zero.

- 17.** Mass of silver in the ornament = m gram

$$\text{Mass of gold in the ornament} = m \times \frac{1}{100} = 0.01m \text{ gram}$$

108 g of Ag contains 6.022×10^{23} atoms

m gram of Ag contains $(6.022 \times 10^{23} / 108) \times m / 100$ atoms

ratio of number of atoms of gold and silver = Au:Ag

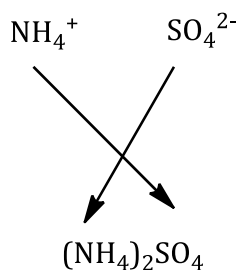
$$= (6.022 \times 10^{23} / 197) \times m / 100 : (6.022 \times 10^{23} \times m) / 108$$

$$= 108 : 19700$$

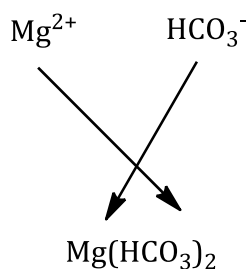
$$= 1 : 182.41$$

OR

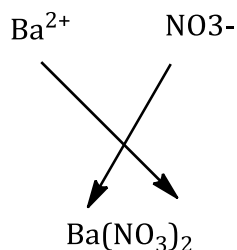
(a)



(b)



(c)



18. Rules for writing the chemical formulae

Step 1: Write the symbol of a basic radical (element with a positive valency) on the left hand side and that of the acidic radical (element with a negative valency) on the right hand side.

Step 2: Write the valency number/charge of each of the respective ions at the bottom of its symbol.

Step 3: Interchange the valency number. Ignore the (+) and (-) sign.

Step 4: Write the interchanged number.

Step 5: Write the compound's formula.

Step 6: Cross the reduced valencies. If 1 appears, ignore it. And if a group of atoms receives a valency number more than 1, enclose it within brackets.

19. 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.

20.

- (a) Carbon dioxide is required by plants to make food by photosynthesis.
- (b) It is also a greenhouse gas which traps the heat reflected by the Earth's surface and keeps the atmosphere warm.
- (c) However, when the concentration of CO_2 rises above normal levels, it traps more heat resulting in heating of the Earth's atmosphere and an increase in the Earth's temperature causing global warming.
- (d) Global warming is dangerous because it tends to melt polar ice and glaciers on mountains. This causes a rise in the water level of oceans and submerges several coastal areas and islands.

- (e) Therefore, although carbon dioxide is essential for plants, it can act as a pollutant in case of excess concentrations.

21.

- (a) Clothes are washed with soap or detergent solution. This solution is hypertonic because it contains low water concentration as compared to the osmotic concentration of our skin cells.
- (b) Therefore, when skin cells come in contact with the detergent solution, they begin to lose more water by exosmosis after some time.
As a result, the skin over the fingers shrinks while washing clothes for a long time

22.

- (a)
- (i) **Bilateral symmetry:** The type of body symmetry in which the two sides of the body are mirror images of one another is called bilateral symmetry.
Example: Earthworm
- (ii) **Coelom:** Body cavity lined with an epithelium derived from the mesoderm is called coelom. Example: Spider
- (iii) **Diploblastic:** Animals which have two germ layers—outer ectoderm and inner endoderm—in the embryo are said to be diploblastic. Example: *Hydra*
- (b)
- (i) Echinodermata
- (ii) Arachnida

23.

- (a)
- Work (W) done by a force (F) is given by

$$W = F \times s \cos\theta$$
 The range of angle ' θ ' in simple trigonometry is from 0° to 90°
 $\cos 0 = 1$ and $\cos 90 = 0$
 Therefore, as the angle between direction of force and direction of motion increases, the work done by a force reduces.

(b)

Work (W) = Force (F) × Displacement (s) ... (1)

Force (F) = 5×10^{10} N

In this case of motion, the displacement of the car is equal to the distance travelled by the car.

Speed (s) = $\frac{\text{Distance}}{\text{time}} = \frac{\text{Displacement}}{\text{time}}$

Speed (s) = 10 m/s

Time of motion (t) = 2 min = 120 secs

∴ Displacement (s) = 1200 m

Substituting the above value of displacement in equation (1)

Work done = $5 \times 10^{10} \times 1200 = 6 \times 10^{13}$ J

Therefore, work done by the car to reach the river side is 6×10^{13} joules.

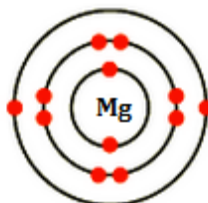
24.

True Solution	Colloid
1. A true solution is a homogeneous mixture of two or more substances.	1. A colloidal solution is a heterogeneous mixture of two substances.
2. Size of the particles is less than one nanometre.	2. Range of particle size is from 1 to 100 nanometre.
3. It is always transparent.	3. It is translucent.
4. Particles cannot be seen even with a microscope.	4. Particles of a colloidal solution can be seen with a microscope.
5. It does not show Tyndall effect.	5. It shows Tyndall effect.

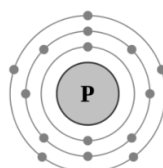
OR

(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) Magnesium atom: 12 n, 12 p, 12 e



Phosphorus atom: 16 n, 15 p, 15 e



25.

(a)

Weight of man on the Earth (W_{Earth}) = 300 N

acceleration due to gravity (g_{Earth}) = 10 m/s²

Weight $\propto$ acceleration due to gravity

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

$$\therefore m_{\text{Earth}} = \frac{300}{10} = 30 \text{ kg}$$

Weight of man on the moon (W_{moon}) = 50 N

$$\therefore \frac{W_{\text{Moon}}}{W_{\text{Earth}}} = \frac{50}{300} = \frac{1}{6}$$

$$\therefore \frac{m_{\text{moon}}}{m_{\text{Earth}}} = \frac{1}{6}$$

$$\frac{m_{\text{moon}}}{30} = \frac{1}{6}$$

$$\therefore m_{\text{moon}} = 5 \text{ kg}$$

Therefore, the mass of the man on the Moon is 5 kg.

(b) We know that

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

$$330 = \frac{\text{Distance}}{2}$$

$$\therefore \text{Distance} = 660 \text{ m}$$

Therefore, the distance between the man and the point of lightning is 660 m.

26.

(a)

- (i) Cork cells are dead and compactly arranged without intercellular spaces.
- (ii) Cell walls are coated with an organic substance called suberin which makes these cells impermeable to water and gases.
- (iii) As a result, the cork cells prevent desiccation, infection and mechanical injury to the plant body.
- (iv) Cork is light and does not catch fire easily because of which it is used as an insulator, shock absorber, in linoleum and in making of sports goods.

(b) A – Apical meristem; B – Intercalary meristem

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