Goa Board
Class IX Science
Term 2
Sample Paper – 7 Solution

SECTION A

1. Work done = m × g × h

2. The chemical formula is a symbolic representation of a molecule of an element or a compound. For example, the chemical formula of sodium carbonate is Na_2CO_3.

3. The ozone layer is present at a height of 15 Km to 60 Km.

4.
   (a) If a person stands only on one foot then the force of his weight acts on surface area of one foot only. Due to lesser surface area, the pressure on the foot will be more and the person will not be able to stand for a long time.
   (b) When a balloon is filled with hydrogen gas, the density of the balloon becomes less than the density of atmospheric air. Therefore, the buoyant force acting on the balloon is more than the weight of the balloon. Thus, the balloon floats and rises up in the air.

5.
   (a)
   - Because bats give birth to young ones.
   - Bats possess mammary glands.
   (b) The symbiotic association between fungal species and blue green algae leads   to life forms called lichens.

6.
   (a) Formula of Magnesium sulphate

	Magnesium	Sulphate
Symbols/Formula	Mg	SO_4
Valency	2+	2-
Formula	$Mg_2(SO_4)_2$ = **$MgSO_4$**	

   Therefore, the molecular formula of Magnesium sulphate is **$MgSO_4$**.

(b) Formula of Ammonium bicarbonate

	Ammonium	bicarbonate
Symbols/Formula	NH_4	HCO_3
Valency	1+	1-
Formula	**NH_4HCO_3**	

Therefore, the molecular formula of Ammonium bicarbonate is **NH_4HCO_3**

7.

(a) Biodegradable pollutants – cow dung and paper.

Non-biodegradable pollutants – polythene and plastic.

(b) Dissolved oxygen is used by plants and animals which live in water. Any change which reduces the amount of dissolved oxygen would adversely affect these aquatic organisms.

8.

(a) For hearing echoes, there should be at least a distance of 17.2 m between the source of sound and the object from which the sound is reflected. In big rooms and galleries, this condition is satisfied and hence, echoes are heard.

(b) Objects which travel through air faster than the speed of sound produce shock waves of tremendous amount of energy. Due to these shock waves, pressure variations are caused which produce a loud burst of sound known as 'sonic boom'.

9.

(a) When the boy strikes the iron pipe, sound is produced. The sound waves travel through the air and the pipe. The speed of sound in iron is greater than the speed of sound in air. So, sound travels faster through the iron pipe than air. Hence, the other boy standing near the other end of the pipe hears two sounds, one travelling through the iron pipe and the other travelling through the air.

(b) SONAR stands for Sound Navigation and Ranging.

10.

(a) Given that:

Mass of the object = 12 kg,

Potential energy, P.E. = 480 J

Height =?

Potential energy, P.E. = m × g × h

480 J = 12 × 10 × h

$h = \dfrac{480}{12 \times 10} = 4$ m

Thus, the object is placed at a height of 4 m from the ground level.

(b)

- Heat energy gets transformed into mechanical energy.
- Chemical energy gets transformed into sound and heat energy.

11.

(a) P.E. at point B when it is raised from point A to B = mgh

PE at point C when it is raised from B to C = mgh

(b) PE at C when it is raised directly from point A to C = m x g x (2h) = 2mgh

(c) Potential energy is the work done.

Work done in going from point A to B = mgh

Work done in going from point B to C = mgh

Work done in going from point A to C = 2mgh

Thus, we can infer that

$W_{A \rightarrow C} = 2W_{A \rightarrow B} = 2W_{B \rightarrow C}$

12. While flying, bats emit a series of high frequency ultrasonic squeaks and listen to the echoes produced by reflections of these high frequency squeaks from the obstacles in their path. So, the bats are able to sense the time taken by the echoes to be heard. Due to this, they can judge the distance between the obstacles in their path and avoid colliding with it by changing the direction. Thus, bats can move about freely even in complete darkness.

13. Number of moles of Mg = $\dfrac{\text{Given mass}}{\text{Molar mass}} = \dfrac{6\,g}{24\,g} = 0.25$

If Na and Mg have same number of atoms so, they will the have same number of moles also.

So, the number of moles of Na = 0.25

Number of moles of Na = $\dfrac{\text{Given mass}}{\text{Molar mass}}$

$0.25 = \dfrac{\text{Mass of Sodium}}{23}$

Hence, mass of Sodium = 23 × 0.25 = 5.75 g

14.

(a) 23 g of Na atoms contain = 6.022×10^{23} atoms

∴ 46 g of Na atoms will contain = $\dfrac{6.022 \times 10^{23} \times 46}{23}$ particles

$= 1.2044 \times 10^{24}$ atoms.

(b) 32 g of O$_2$ molecules contain = 6.022×10^{23} atoms

∴ 8 g of O$_2$ molecules will contain = $\dfrac{6.022 \times 10^{23} \times 8}{32}$ molecules

$= 1.5055 \times 10^{23}$ molecules

(c) 1 mole of carbon atoms = 6.022×10^{23} atoms

∴ 0.1 mole of carbon atoms = $6.022 \times 10^{23} \times 0.1$

$= 6.022 \times 10^{22}$ atoms

15.

Bilateral Symmetry	Radial Symmetry
(i) Limbs and organs are paired.	(i) Limbs and organs occur all around the central axis.
(ii) Cephalisation is present.	(ii) Cephalisation is absent.
(iii) The animal's body can be divided into two equal halves by one plane.	(iii) The animal's body can be divided into two equal halves by any vertical plane passing through the central axis.

16. Soil is a mixture of small particles of rocks and decayed organic matter. Soil is formed by the weathering of rocks. The major factor that decides the structure of soil is humus. It makes the soil more porous so that water penetrates deep under the ground.

17.

(a) Penicillin and tetracycline.

(b) The main symptom of jaundice is a loss of appetite with a feeling of nausea and vomiting.

(c) Rabies is caused due to the bite of a dog or a monkey.

18.

(a) BCG vaccine is given against tuberculosis.

(b) Cancer and Diabetes are two non-communicable diseases.

(c) Quinine is administered to treat malarial fever.

19. If we do not wear clean clothes, or if clothes are not washed regularly, microorganisms grow on them. So, to prevent the growth of microorganisms, clothes are washed regularly.

Symptoms of T.B - Continuous fever, cough and paining chest.

Symptoms of typhoid - continuous fever and slow pulse rate.

20.

(a) **Kinetic energy of a body:**

Consider a body of mass, 'm' moving with initial velocity, 'u'. Let it be displaced through a distance 's' when a csonstant force 'F' acts on it in the direction of its displacement. The work done is

$$W = F \times s$$

The work done on the body will cause a change in its velocity. Let its velocity change from 'u' to 'v'. Let 'a' be the acceleration produced.

We know that

$$v^2 - u^2 = 2as$$

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

We also know that F = ma

Thus, work done is

$$W = ma \times \frac{v^2 - u^2}{2a}$$

$$= \frac{1}{2}m\left(v^2 - u^2\right)$$

Thus, we can say that work done is equal to the change in the kinetic energy of the body.

If the object starts from rest, then u = 0. Thus, we have

$$W = \frac{1}{2}mv^2 = K.E.$$

This is the expression for the kinetic energy of the body.

(b) The kinetic energy of a body depends on its mass and velocity.

(c) When a freely falling body hits the ground, its kinetic energy changes to sound and heat energy and gets dissipated in the air.

21.

(a)

	Sound Waves	**Light Waves**
1.	Sound waves need a material medium for their propagation.	Light waves do not need a material medium for their propagation. They can travel even through vacuum.
2.	Sound waves are longitudinal.	Light waves are transverse.
3.	Sound waves have a very low speed of about 350 m/s in air at room temperature.	Light waves have a very high speed of 3×10^8 m/s in vacuum or air.
4.	Sound waves are sensed by our ears.	Light waves are sensed by our eyes.

(b)

- When an object vibrates, it sets the particles of the medium around it vibrating.
- In transmission of sound through air, the air particles do not actually move from the air to our ear. The layer of air in contact with the vibrating object first gets displaced from its mean position and vibrates back and forth.
- Then, it transfers the sound energy to the adjacent air particles. Due to this, the adjacent particles get displaced from their position of rest.
- After displacing the adjacent particles, the layer of particles returns back to its original position of rest. This process continues till the vibrations (sound) reach our ears. In this way, the sound produced by a vibrating object in a medium reaches our ears.

22. **Electrovalency**
   - According to the Electronic theory of valency, we can classify compounds on the basis of the manner of formation of the bond between them.
   - When one atom transfers one or more electrons to another atom, the bond formed between them is known as an electrovalent bond.
   - The compounds thus formed, are known as electrovalent compounds.

Formation of an Electrovalent Bond
   - When one atom loses electrons, it acquires a positive charge. Conversely, when an atom accepts electrons, it acquires a negative charge.
   - An atom possessing electrical charge is known as an ion.
   - A positively charged ion is known as a cation while a negatively charged ion is called an anion.
   - Being oppositely charged, the cation and the anion are attracted towards each other and form a bond held together by electrostatic attraction.
   Let us consider the example of formation of the compound sodium chloride to understand this better.

Formation of sodium chloride molecule
   - When a sodium atom and a chlorine atom combine, the sodium atom loses an electron and forms a sodium ion.
   - The sodium ion is a cation i.e. it carries a positive charge.
   - The chlorine atom which already has seven electrons in its outermost orbit accepts the electron lost by the sodium atom and gets converted to a chloride ion.
   - The chloride ion is an anion i.e. it carries a negative charge.
   - The Sodium ion and the Chloride ion being oppositely charged are attracted towards each other. The linkage or the bond formed between these ions will be the electrovalent or ionic bond.
   - The compound, thus formed, NaCl or Sodium chloride is known as the electrovalent compound.
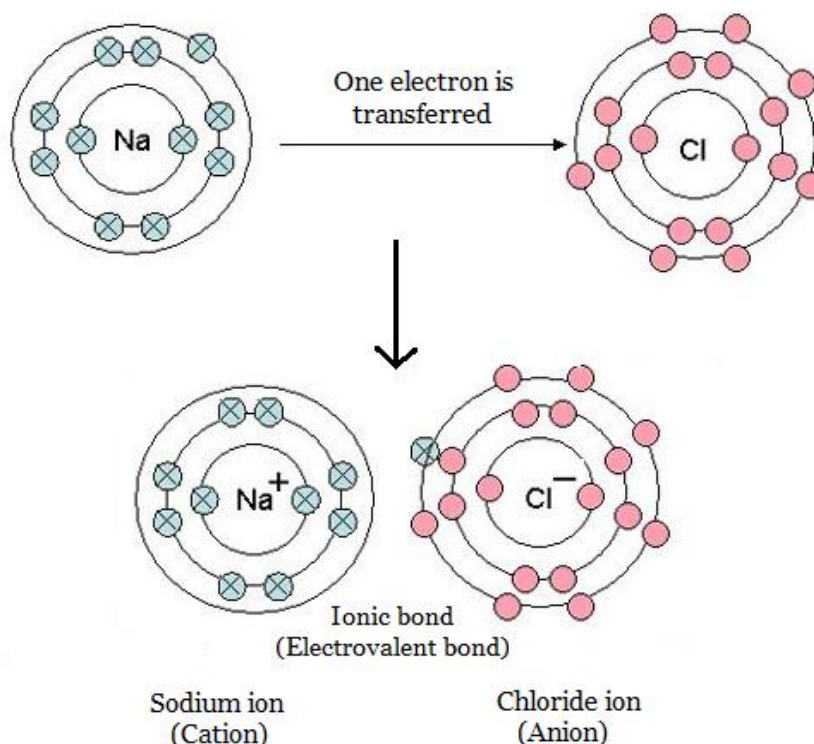
Formation of Sodium chloride Molecule

- The formation of electrovalent bonds is mainly observed between metals and non-metals.
- Metals generally have up to three electrons in their valence orbit while non-metals generally have five to seven electrons in their valence shell.

23.

(a) Dust remains present in air and the suspended particles can cause allergy and other respiratory diseases. It also affects plant growth by covering the stomata on the leaf's surface. It acts as the carrier of toxic compounds such as heavy metals.

(b) Increasing concentration of carbon dioxide is harmful and considered as a pollutant. Higher concentration of carbon dioxide is one of the causes of green house effect or global warming.

(c) Earth is the only planet on which life is possible. The living organisms get their food from the soil. The soil is not only a mixture of minerals but also contains living things. A large number of organisms present in the soil include earthworms, ants, termites, bacteria, fungi etc.

24.

(a) Whales can swim in water like fishes but are not fish as they respire with lungs and have a four chambered heart and mammary glands; so, they are mammals.

(b) When the body of an organism can be cut into two similar halves which are a mirror image of each other only by one plane then the organism is said to have bilateral symmetry.

(c)

   i. Notochord is the chordate character which has evolved as vertebral column in higher vertebrates. Notochord is an elastic, solid flexible rod like structure lying below the nerve cord and above the alimentary canal. It is found in all the embryos of chordates which forms the supporting axis of the body.

   ii.

- Body is unsegmented and is covered with calcareous spines.
- Sexes are separate.

   iii. In diploblastic organisms, two germ layers are present - endoderm and ectoderm. The mesoderm is absent. So they do not have coelom.

SECTION B

25. (a)

Intensity of sound is maximum when $\angle i = \angle r$

26. (a)

Volume = 38 mL - 24 mL = 14 mL

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{110}{14} = 7.85 \text{ gcm}^{-3}$$

27. (b)

Density of salty water > Density of tap water > Density of air

The more the density of the fluid in which the solid is immersed, the more is the upthrust and the lesser is the apparent weight. So, the solid weighs the least in salty water and the most in air.

28. (d)

All these are the features of dicot angiosperms.

29. (a)

Monocot leaves have parallel venation.

30. (c)

String should be thick (so, it can withstand jerks), long, soft and flexible. The time taken by the pulse to propagate can be measured more accurately using a stop clock.

31.(a)

Apparent weight = Actual weight - upthrust

Apparent weight = Actual weight - Weight of the liquid displaced

Weight of liquid displaced = Actual weight - Apparent weight = Loss of the weight

32.(a)

For perfect reflection, angle of incidence = angle of reflection.

33.(b)

According to the law of conservation of mass, the total mass of the reactants must equal the total mass of the products.

34. The layers of air in between Rajiv and the loudspeaker vibrate with a frequency of 250 Hz. The sound waves directly coming from the loudspeaker fall on one ear of Rajiv through air, due to which he is able to listen to the sound. He receives sound in the other ear from the sound waves which get reflected from the wall.

35.(a)

(i)Protista, (ii) Monera, (iii) Pteridophyta, (iv) Thallophyta is a correct option. (i)Amoeba and (ii) Paramecium belong to Kingdom Protista, (iii) Fern belongs to Pteridophytes and (iv) Spirogyra is a Thallophyta.

36. According to the law of conservation of mass, total mass of the reactants (chemical takes part in the reaction) is equal to the total mass of the products (chemical produced).

For example: In a chemical reaction, 4.2 g of sodium hydrogen carbonate reacted with 3.0 g of ethanoic acid. The products obtained were 4.1 g of sodium ethanoate, 0.9 g of water and 2.2 g of carbon dioxide.

Sodium hydrogen carbonate + Ethanoic acid → Sodium ethanoate + Water + Carbon dioxide gas

$NaHCO_3$ + CH_3COOH → CH_3COONa + H_2O + CO_2
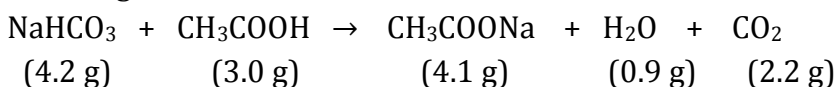
 (4.2 g)   (3.0 g)   (4.1 g)   (0.9 g)   (2.2 g)

 i.e. 4.2 g + 3.0 g → 4.1 g + 0.9 g + 2.2 g

 L.H.S. 7.2 g = R.H.S. 7.2 g