Goa Board
Class IX Science
Term 2
Sample Paper – 10 Solution

SECTION A

1. A compressed or a stretched rubber band has potential energy due to change in its shape.

2. 1 mole of Al atom's weight = Gram atomic mass of Al = 27 g
So, 4 moles of Al atoms will weigh = $27 \times 4 = 108$ g

3. Greenhouses are enclosures where tropical plants are kept warm during the winters and in cold climate.
Heat is trapped by the glass and the temperature inside the glass enclosure remains higher than that of the surroundings.

4. Isobars are atoms of different elements with the same mass number but different atomic numbers.

For example, in the two elements calcium $^{40}_{20}Ca$ and argon $^{40}_{18}Ar$, the number of electrons in these atoms is different, but the mass number of both these elements is 40. That is, the total number of nucleons is the same in the atoms of this pair of elements.

5.

(a) **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. i.e.
Buoyant force acting on an object = Weight of the liquid displaced by that object

(b) The density of the cork is less than the density of water and hence, being lighter than water, it floats on water. On the other hand, the density of iron nail is greater than the density of water. So, it is heavier than water and thus, sinks in water.

6.

(a) Polymorphism is the existence of an organism in two or more than two different morphological forms.

(b) The Thallophytes, Bryophytes and Pteridophytes are included in Cryptogams as they have hidden reproductive organs.

7.

(a) The life supporting zone of the Earth where the atmosphere, the hydrosphere and the lithosphere interact and make life possible is known as the biosphere.

(b) Activities such as deforestation, urbanization, over hunting and industrialization are responsible for the changes in the environment.

8.

(a) The body with less mass (the lighter body) will have greater velocity.

(b) If the roads go straight up, the angle of the slope will increase due to which the frictional force will increase and the vehicles might slip. Also, more power is required to go up a large slope.

(c) 746 watt.

9.

(a) Reverberation is the phenomenon of persistence or prolongation of audible sound after the source has stopped emitting it.

It can be reduced by carpeting the floor, upholstering furniture and creating false ceilings with suitable sound absorbing material.

(b) The sounds of frequency lower than 20 Hz are called infrasonic sounds.

10.

(a) The object to be cleaned is placed in a cleaning solution and ultrasonic waves are passed through the solution. Due to high frequency of the ultrasonic waves, the particles of dust, dirt and grease stuck to the object vibrate and get detached and drop out in the solution. This way the unreachable portion of the object or machine gets cleaned.

(b) Crests are the elevations or hump in a transverse wave i.e. the position of the maximum displacement in the positive direction.

11.

(a) The energy possessed by an object due to its position or change in the shape or configuration is known as potential energy.

(b)

Given:

m = 1 kg

Potential energy, PE = 1 J

$g = 9.8\ m/s^2$, h =?

We know that. PE = mgh

$$h = \frac{PE}{mg}$$

$$\therefore h = \frac{1\ J}{1\ kg \times 9.8\ m/s^2} = 0.102\ m$$

12.

(a) The space where there is no matter or air is called vacuum. Sound cannot travel through vacuum because it requires a material medium for its propagation.

(b) The speed of sound in air is 344 m/s and that of light is 3×10^8 m/s. Thus, the speed of light is comparatively very high than the speed of sound. Hence, it is due to very high speed of light that we see the flash from the gunshot first and the sound is heard a little later.

13. Given weight of water = 3.6 g

Molecular weight of water = 16 + 2 = 18 g

$$\text{Moles of water} = \frac{3.6}{18} = 0.2$$

Given weight of carbon dioxide = 4.4 g

Molecular weight of carbon dioxide = $12 + 2 \times 16$

$= 44$ g

$$\text{Moles of carbon dioxide} = \frac{4.4}{44} = 0.1$$

$$\text{Hence, mole ratio of 3.6 g of water and 4.4 g of carbon dioxide} = \frac{0.2}{0.1} = 2:1.$$

14.

i. Monerans have prokaryotic cells.

ii. Prokaryotes do not have membrane bound organelles. They have naked genetic material called nucleoid. They can be autotrophic or heterotrophic.

15.

(a) The large or extra nuclear part of the atom contains electrons which have negligible mass. Heavier particles like protons and neutrons are contained in the nucleus. Hence, only nucleus is taken into account while calculating the mass of the atom.

(b) The atoms combine with other atoms to achieve the electronic configuration similar to the nearest noble gas and thus become more stable. Atoms complete their octets by sharing, accepting or donating electrons. We can determine the valency of an element from the number of electrons gained, lost or shared in order to complete the octet.

(c) In the notation of an atom, the atomic number, the mass number and the symbol of the element are to be written as:

$$\text{Mass number}\ \text{Atomic number}\ \text{Symbol of Element}$$

Atoms react with each other to achieve an octet in their valence shell.

16.

(a)

i. Though malaria parasite enters in the blood, it first infects the liver and after maturation infects the RBC's. Thus, it is tissue specific.

ii. Protozoa and bacteria have similar biochemical pathways. Malaria is caused by plasmodium which is a protozoan and so, it can be cured by antibiotics.

(b) The diseases which are present from birth and are due to genetic disorders are called congenital diseases.
Example - sickle cell anemia, hemophilia (any one)

17. Panchayat or Municipal Corporation is responsible for maintaining the community health.
Community health is maintained in the following ways:

- Supply of clean and safe drinking water.
- Provision for proper sewage and disposal of garbage.
- Provision for preventive vaccinations against a number of diseases.

18. Chronic diseases last a long time and hence, they damage body parts and tissues to a greater extent than an acute disease, which lasts for a very short duration. Therefore, a patient suffering from a chronic disease endures more agony than a patient suffering from an acute disease.

19.

(a) Examples of antibiotics - Penicillin and Ampicillin.

(b) BCG - Bacillus Calmette Guerin.

(c) It is difficult to make antiviral medicines than making antibiotics because viruses have few biochemical mechanisms of their own. They enter the host cells and use their machinery for their life processes. So, antiviral medicines will work against the host body. Antibiotics block bacterial synthesis and pathways without affecting the body because bacteria use its own metabolic pathway machinery so, it will not affect the host body.

20.

(a) As the man is applying force in order to produce relative motion between the boat and the stream, he is doing work with respect to the stream. However, the man is at rest with respect to the shore, so, the displacement of the boat with respect to the shore is zero. Hence, no work is done by the man with respect to the shore.

(b) Change in the velocity of the body will cause greater change in its kinetic energy.

(c) Let the mass of the car be 'm'.

Given that the mass of the truck is ten times the mass of the car.

So, the mass of the truck M= 10 m

The velocity of the car and truck is the same. So, let their velocity be 'v'.

$$\text{K.E. of the car} = \frac{1}{2}mv^2$$

$$\text{K.E. of the truck} = \frac{1}{2}Mv^2 = \frac{1}{2} \times 10mv^2$$

$$\text{K.E. of the car} : \text{K.E. of the truck} = \frac{1}{2}mv^2 : \frac{10}{2}mv^2$$

$$\text{Or, K.E. of the car} : \text{K.E. of the truck} = 1:10$$

21.

(a) The three characteristics of sound are:

i. Loudness: The sensation produced in the ear which enables us to distinguish between a loud and a faint sound is called loudness. The loudness of sound depends on the amplitude of the sound waves. The greater the amplitude of the sound waves the louder will be the sound.

ii. Pitch:
It is that characteristic of sound which helps in differentiating between different sounds of the same loudness. The pitch of sound depends on the frequency of vibration. The greater the frequency of sound, the higher will be the pitch of the sound produced.

iii. Quality or Timbre: This characteristic of sound enables us to distinguish between the sounds of same loudness and pitch produced by different musical instruments or sung by different singers. The quality of a sound depends on the shape of the sound wave produced.

(b) Given: Frequency, f = 2 kHz =2000 Hz, Distance traveled = 1.5 km = 1500m
Wavelength, λ = 35 cm = 0.35 m
The relationship between velocity, frequency and wavelength is given as:
$v = \lambda \times f$
Or, v = 0.35 m × 2000 Hz = 700 m/s
The time taken by the wave to travel a distance of 1. 5 km can be calculated as:

$$\text{Time} = \frac{\text{Distance}}{\text{Velocity}}$$

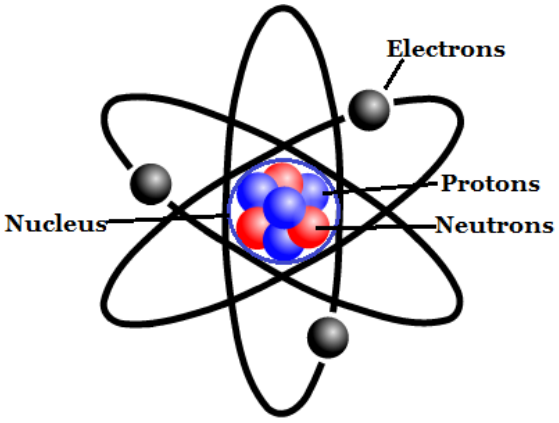
$$\therefore \text{Time} = \frac{1500\ \text{m}}{700\ \text{ms}^{-1}} = 2.1\ \text{s}$$

Thus, the sound will take 2.1 s to travel a distance of 1.5 km.

22.

(a) A parallel beam of the particle was made to strike on a thin gold foil. It was observed that:

- The atom must contain large empty spaces as most of the α-particles passed through it without getting deflected.
- The α-particles, being positively charged, could only be deflected by positive charges present inside the atom.
- As very few α-particles were deflected, Rutherford concluded that the positively charged particles in an atom must be concentrated in a very small space.
- An even smaller fraction of α-particles were deflected through an angle of 180°.
- Thus, Rutherford came to the conclusion that all the positive charge of the atom and most of the mass of the atom is concentrated in a very small volume within the atom.
- Rutherford named this small space inside the atom as the "nucleus of the atom" or the 'atomic nucleus'. When the thickness of the gold foil was doubled, the number of α-particles reflecting back was also doubled.
- On the basis of these observations, Rutherford calculated that the atomic nucleus is 10^5 times smaller than the total area of the atom.
- The radius of the atom is 10^{-8} centimeter while the radius of the nucleus is 10^{-13} centimeter.
- Thus, we can say that the atom is relatively hollow with a heavy nucleus at its centre. The electrons arranged around the nucleus possess negligible mass.
- Based on his observations, he formulated his '**Theory of atom**'.



Rutherford's Atomic Model

This large deflection shows that:

- There is a central part in the atom with very high mass called the nucleus. The whole mass of an atom is concentrated in the nucleus.
- Since positively charged α-particles are repelled by the central part of the atom, this shows that the central part of the atom is positively charged.
- Electrons of the atom revolve around the nucleus in fixed, circular orbits.
- The size of the nucleus is many times smaller than the size of the atom. The nucleus of an atom is 10,000 times smaller than the atom.
- If we consider that an atom is equal to the size of a football stadium, then the nucleus would be the size of a pea!

(b) Valency is the combining capacity of an atom. The number of electrons which are present in the last shell and take part in a chemical bond formation are known as valence electrons. The number of electrons which an atom has in its last orbits can be found out by writing the electronic configuration of the atom. So, electronic configuration expresses the valence electrons which are related to the valency of an atom.

(c) Atomic numbers and electronic configuration.

Atomic numbers	Electronic configuration			
	K	L	M	N
5	2	3		
7	2	5		
17	2	8	7	
19	2	8	8	1

23.

(a) The organisms which decompose the dead remains of plants and animals are called decomposers.

(b)

- Decomposers help in the cycling of nutrients in the biosphere.
- Decomposers convert the nutrients available in the usable form
- Decomposers help in complete disposal of dead animals or living things.

(Any two points)

(c) Rhizobium bacteria.

(d) Carbon in elemental form occurs as diamond and graphite. Carbon in combined state occurs as carbon dioxide, carbonates and hydrogen carbonate salts in various minerals. It occurs in carbon containing molecules like carbohydrates, fats, proteins, nucleic acids and vitamins etc.

24.

(a) Characteristics possessed by chordates.

- They have notochord which is replaced by vertebral column in adults.
- They have a dorsal nerve cord.
- They are triploblastic.

(b) Fungi and bacteria lack chlorophyll and are heterotrophic, still they are considered as plants because of the presence of the cell wall and the absence of centrioles. They absorb the food in solution form.

(c) The notochord is a long rod–like support structure that runs along the back of the animals, separating the nervous tissue from the gut. It provides a place for muscles to attach for the ease of movement.

SECTION B

25. (d)

Ear should be placed close to the pipe so that the reflected sound is heard clearly.

26. (a)

Volume = 38-24 = 14 ml

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{110}{14} = 7.85 \text{ g / cm}^3$$

27. (d)

Adding salt to tap water increases its density. The more the density of the liquid, the more is the upthrust and hence, the greater is the loss of weight.

28. (c)

Lesser the area of contact, more is the pressure exerted (i.e. more is the depression).

29. (b)

This is because the decrease in the potential energy of the freely falling object at any point in its path appears as an equal increase in its kinetic energy. Thus, the energy remains conserved.

30. (a)

Negative work is done when the force acts in the opposite direction of the motion of the object, that is, the angle between them is of 180°.

31. (c)

While writing the chemical formula for hydrogen sulphide, first write the constituent elements and their valencies, after this, cross over the valencies of the combining atoms.

	Hydrogen	Sulphur
Symbols	H	S
Valency	1+	2-
Interchanging Valency	2	1
Formula	H_2S	

32. (c)

Both honey bee and cockroach have joint appendages.

33. (a)

Mosquito belongs to phylum Arthropoda.

34. (a)

Eggs of a mosquito can be round, oval or bead like. These can be found in clusters or single and the size of the egg also varies. Eggs are not oblong shaped or clamped.

35. Law of Conservation of Mass is illustrated by the given data.

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**

Thus, observations are in agreement with the law of conservation of mass as the total mass of the reactants is equal to the total mass of the products.

36.

(a) The green plants do not perform any work when they carry out the process of photosynthesis. This is because the force and the displacement are zero.

(b) The bullock cart carrying load does work. This is because as the bullocks apply force and the cart moves.

(c) No work is done when harvested crops are dried in the Sun. This is because no force is applied and no displacement takes place.

(d) Work is done when the paper boat moves in the pond. This is because of the force applied by the moving wind due to which the paper is displaced.