

## Section A

**Answer 1:** In solids, the particles are arranged in an organized manner as the attraction between the particles is strong while in liquids the particles are loosely arranged and can move about freely whereas in gases there is no such order due to random movement of particles.

**Answer 2:** Nitrogen cycle is a process by which nitrogen in the atmosphere is converted into usable compounds to further support different biological processes. It consists of four main stages; nitrogen fixation, decomposition, nitrification and denitrification

## Section B

**Answer 3:** Plastids are present only in plant cells and are absent in animal cells. The two types of plastids are chromoplasts and leucoplasts.

OR

**Ans:** A solution is a mixture that is homogeneous in nature and it basically contains particles which are distributed in even ratio. The two main components of a solution are solvent and a solute.

**Answer 4:** Yes it is possible to have zero displacements. If an object travels for some distance and then comes back to its original starting point then the distance covered will be let's say 10 meters. However, there will be zero displacements as the object comes back to the same position.

OR

**Ans:** Sir Issac Newton formulated the law of gravitation. The law states that an object attracts every other object with a force that is directly proportional to the product of the masses of the two objects. However, the magnitude of the force is inversely proportional to the square of the distance between them.

**Answer 5:** The two essential conditions are;

- Physical surroundings
- Economic status

## Section C

**Answer 6:** The three postulates are;

- Every matter is made up of atoms that take part in chemical reactions.
- Atoms can be neither created nor destroyed.
- Each element is made up of atoms with different masses and chemical properties.

OR

**Ans:** The three models are;

- Thomson's model of an atom. It was formulated by J.J. Thomson.
- Rutherford model of an atom. It was formulated by Ernest Rutherford.
- Bohr's model of an atom. It was formulated by Neils Bohr.

**Answer 7:** Yes, blood is a type of fluid connective tissue as it connects every part of the body and it also develops from the mesoderm of an embryo. The two important functions of blood are;

- It helps in the transport of important nutrients, hormones, gases and also eliminates waste materials.
- Blood contains white blood cells that help in fighting viruses and diseases.

**Answer 8:** When a falling object reaches the ground usually there is a dissipation of energy. Additionally, there is;

- Generation of heat when the object collides with the ground.
- Production of sound due to impact.
- Kinetic energy is ultimately lost in the process.

**Answer 9:** The three characters of sound are frequency, amplitude and speed.

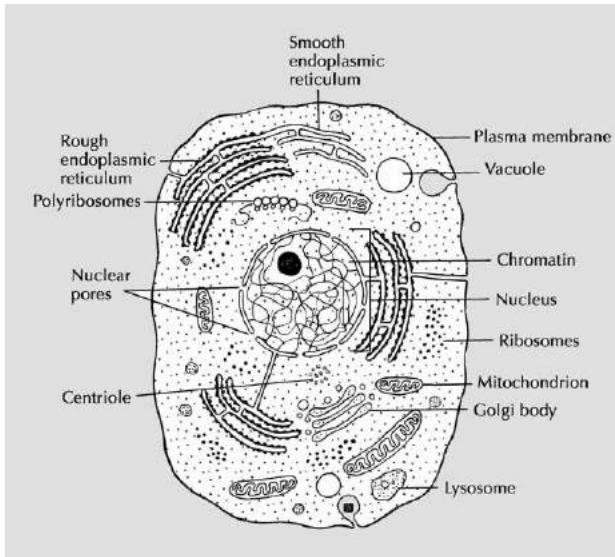
- Frequency is the rate at which sound vibrates or the speed of the vibration.
- Amplitude basically refers to how big or small the vibration is.
- The speed of sound is defined as the distance travelled by a wave per unit time.

**Answer 10:** The mixture of two miscible liquids are normally separated by the process of distillation. The process is used when the two liquids in a mixture have different boiling points. We add the mixture in a distillation flask which is attached to a condenser outlet. The mixture is heated slowly and the liquid with lower boiling point vaporizes. Then, it condenses in the condenser and the separated liquid is collected in another flask.

**Answer 11:**

- Valency is commonly defined as the combining capacity of an element and is usually measured by the number of hydrogen atoms combined or displaced.
- The atomic number is defined as the number of protons present in the nucleus of the element's atom.
- The mass number is the number of nucleons present in the nucleus.

**Answer 12:**



**Answer13:** Diseases can be spread by;

- It is transferred through the air where disease-causing microbes are usually transferred as a result of people sneezing or coughing. Example common cold.
- It can spread through water where cholera-causing microbes enter water supplies and infect the human body. Example, diarrhoea and dehydration.
- Physical contact between two organisms which involve activities like a handshake, kissing, even sexual intercourse or transfer through insects and animals. For example, AIDS or malaria.

OR

**Ans:** Mass of the dumbbell,  $m = 10 \text{ kg}$

Displacement,  $s = 2 \text{ m}$

According to the given formula,

$$\begin{aligned}
 \text{Work done, } W &= F \times s = mg \times s \\
 &= 10 \text{ kg} \times 10 \text{ ms}^{-2} \times 2 \text{ m} \\
 &= 200 \text{ kg ms}^{-2} \text{ m} \\
 &= 200 \text{ N m} = 200 \text{ J}
 \end{aligned}$$

Therefore work done is 200 J.

**Answer 14:** The three reasons why the atmosphere is important for life are;

- The atmosphere helps in maintaining the temperature of the Earth.
- It acts as a protective layer and helps in reducing the effects of UV radiation.

**Answer 15:** Genetic manipulation in crops refers to the process of scientifically developing better varieties of crops that will produce a good yield. Genetic manipulation

can happen through hybridisation or by introducing a new gene between dissimilar crops. Some of the benefits include;

- Higher yield of crops.
- Better quality.
- Crops have wider adaptability.

## Section D

**Answer 16:** Since the body of plants and animals are constructed in a different manner and as they carry out activities in different ways the tissues found in them are totally different. Animal tissues include connective tissue, epithelial tissue, muscular tissue and nervous tissue.

- Connective tissues are responsible for connecting the different parts of the body as well as providing support.
- Epithelial tissues help in protecting the organs as well as in exchanging materials between the body and the external environment.
- Muscular tissues which contain elongated cells or muscle fibres help in the movement of the body.
- Nervous tissues are responsible for transmitting stimulus from one part of the body to another.

OR

**Ans:**

Plant Cell	Animal Cell
They have a fixed shape and are mostly rectangular.	They are irregular in shape but are usually somewhat round.
Contains chloroplasts.	Chloroplasts are absent.
Stores energy in the form of starch.	Energy is stored in the form of glycogen.
Contains both cell wall and cell membrane.	Consists only of a cell membrane.
Plastids are absent.	Plastids are present.

**Answer 17:** The different divisions of kingdom Plantae are Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms.

- Thallophyta is a category which includes plants that do not have a well structured or differentiated body and are commonly aquatic. Example, Spirogyra.
- Bryophyta includes a specific group of plants that are non-vascular and leafy. There are no specialized tissues as such. Example, Mosses.
- Pteridophyta includes plants that are seedless and comprising of vascular cryptogams where they reproduce via spores. Example, fern.

- Gymnosperms are plants which bear naked seeds. They are usually evergreen, perennial and woody. Example, Pine
- Angiosperms consists of plants that develop seeds inside the fruit. Example, apple, mango.

**Answer 18:** Let velocity =  $v$ .

The total momenta of the boy and the board before the interaction

$$= 60 \text{ kg} \times 5 \text{ ms}^{-1} + 4 \text{ kg} \times 0 \text{ ms}^{-1}$$

$$= 300 \text{ kg m s}^{-1}.$$

$$\text{Total momenta after the interaction} = (60 + 4) \text{ kg} \times v \text{ ms}^{-1}$$

$$= 64 v \text{ kg ms}^{-1}.$$

When we take the concept of “law of conservation of momentum,” the total momentum is conserved during the activity.

So,  $64 v = 300$

$$\Rightarrow v = 300/64 = + 4.68 \text{ ms}^{-1}.$$

Therefore the boy on the skateboard will move with a velocity of  $4.68 \text{ ms}^{-1}$ .

**Answer 19:** The law applies to objects anywhere in the universe. Such a law is said to be universal.

It is represented by the formula;  $F = G \frac{m_1 m_2}{r^2}$

where  $F$  is the gravitational force,  $m_1$  and  $m_2$  are the masses of the objects,  $r$  is the distance between the centres of their masses, and  $G$  is the gravitational constant.

The universal law of gravitation is quite significant in understanding several phenomena that occur in our universe:

- (i) The law explains the force that binds the earth.
- (ii) It explains the movement of the moon around the earth.
- (iii) It reveals details about the movement of planets around the sun.
- (iv) It justifies the occurrence of tides due to the attracting force of the moon and the sun.

**Answer 20:** Greenhouse effect is the process by which the atmosphere traps heat radiating from Earth toward space. It results in an increase in temperature in the lower levels of the atmosphere. The main causes of the greenhouse effect are;

- The emission of greenhouse gases to the atmosphere via human activities.

- Changes in land use patterns including deforestation, use of fertilizers and pesticides.
- The burning of fossil fuels.
- Increase in population.
- Industrial waste.

Some of the ways to prevent the greenhouse effect.

- Using energy efficient products.
- Buy products with less packaging.
- Decrease the emission of CFC gases.
- Plant more trees.
- Make less use of AC.

**Answer 21:** The five major differences are;

<b>Atom</b>	<b>Molecule</b>
The smallest or tiny particle of an element.	Molecules are made up of a group of atoms held together by a chemical bond.
Does not exist in a free state.	Can exist in a free or independent state.
Are usually spherical in shape.	They are either linear, angular or triangular.
Highly reactive and is not stable by itself.	Less reactive and stable in nature.
Cannot be divided into sub-atomic particles	Can be divided into atoms via chemical reactions.

## Section E

**Answer 22:** One of the common methods of separating oil and water is by the process of freezing. We can take the mixed solution and put it in the freezer for some time. Take out the bowl after some time and you will see that the oil is at the bottom beneath the frozen water. You can now easily separate the water and the oil.

**Answers 23:** In a bark of a tree, the outer layer consists mostly of dead tissues however the inner layer consists of the phloem tissue. Bone consists of different types of tissues like cartilage, bone marrow, nerves, blood vessels, endosteum, and periosteum.

**Answer 24:** During solid state, the particles in water are tightly packed and they cannot move freely. When water from a solid state turns to liquid the particles due to heat vibrate with great speed and they start leaving their fixed position to move freely. As for the gaseous state, the particles acquire enough energy from the heat source at some point that they are able to break free from the forces of attraction and move in all directions.

OR

**Ans:** The seed which consists of only one cotyledon or seed leaf inside the seed coat is categorized as a monocot seed. Seeds which have two cotyledons or seed leaf are said to

a dicot seed.

**Answer 25:** a. Car gaining speed when the accelerator is pressed.

b. A ball rolling down an inclined plane.

**Answer 26:** When the rubber band is stretched it gains elastic potential energy. When it is released the potential energy is lost and the rubber band acquires its own stored kinetic energy.

**Answer 27:** The chirping of the sparrow is of higher pitch than the roar of a tiger. The reason behind this is that the chirping of the sparrow has a higher frequency than the roar of the tiger which has low frequency. Besides, higher frequency means higher pitch.



