

Science Test 1

Subjective Test

(i) All questions are compulsory.

(ii) Questions 1 to 11 are very short answer type questions. These questions carry one mark each.

(iii) Questions 12 to 17 are short answer type questions. These questions carry two marks each.

(iv) Questions 18 to 26 are also short answer type questions. These questions carry three marks each.

(v) Questions 27 to 28 are long answer type questions and carry five marks each.

Question 1 (1.0 marks)

Give two examples of exhaustible natural resources?

Solution:

Two exhaustible natural resources are

i. Natural gas

ii. Petroleum

Question 2 (1.0 marks)

What causes acid rain?

Solution:

Industries produce air pollutants such as sulphur dioxide and nitrogen dioxide. When these gases react with the water vapour in the atmosphere, sulphuric and nitric acids are formed. These acids fall along with the rain. This is called acid rain.

Question 3 (1.0 marks)

Define the term weeding with respect to agriculture.

Solution:

The process of the removal of undesirable plants called weeds that grow along with the crops in the field is known as weeding.

Question 4 (1.0 marks)

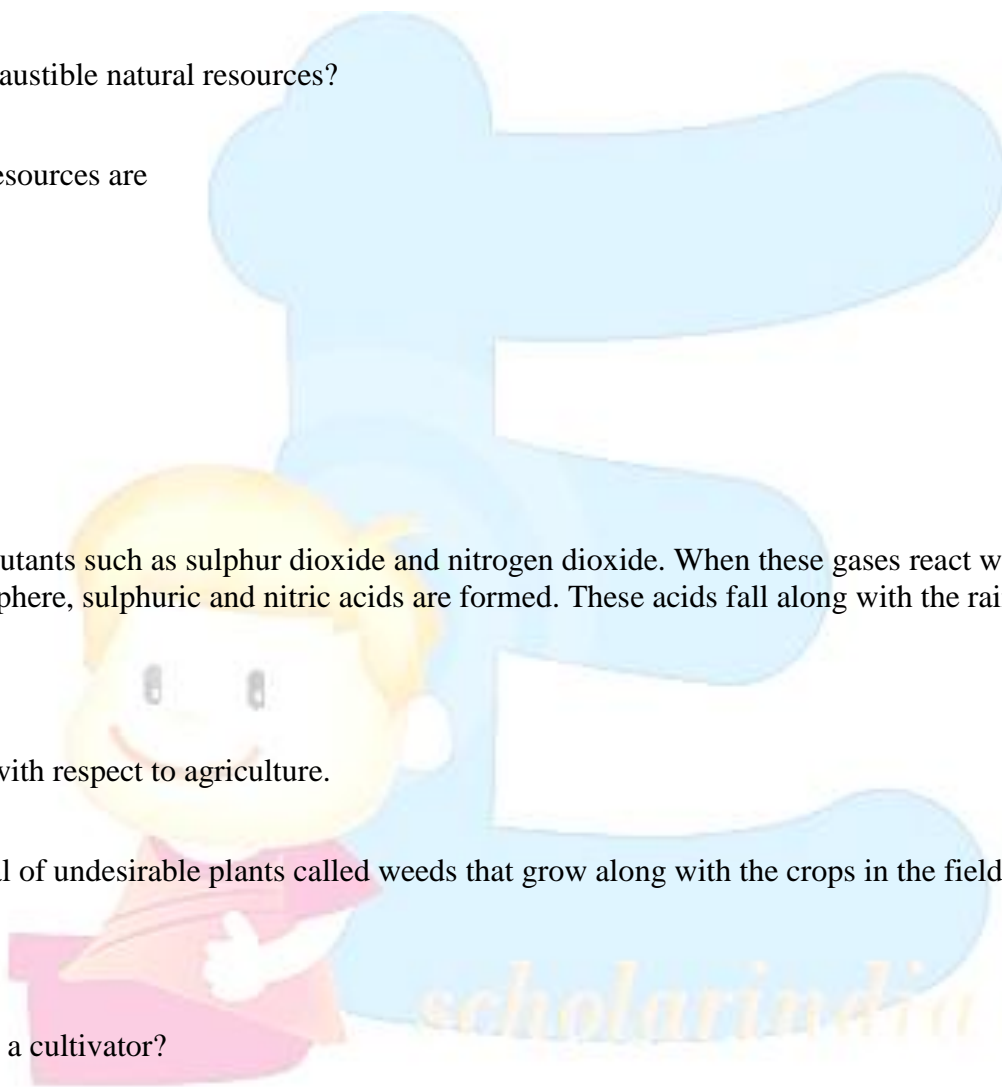
What is the role played by a cultivator?

Solution:

The cultivator is a tractor-driven machine that helps in loosening and upturning of the soil (soil preparation) before the sowing of seeds.

Question 5 (1.0 marks)

Define internal fertilization.



Solution:

The process of fertilization involves a fusion of the male and the female gametes to form zygote. When the process of fertilization takes place inside the body, it is called internal fertilization. Internal fertilization occurs in cows, dogs, and rabbits etc.

Question 6 (1.0 marks)

Define the term menarche.

Solution:

In the female, the production and release of ova or the egg follows a cyclic process every 28-30 days. This cycle is governed by hormones and is called the menstrual cycle. The first menstruation is called menarche. Menarche occurs during puberty.

Question 7 (1.0 marks)

Give two forces that are non-contact forces?

Solution:

Electrostatic force and gravitational force are examples of non-contact forces. They act at a distance.

Question 8 (1.0 marks)

What is a drag?

Solution:

The frictional force exerted by fluids such as gases and liquids on an object moving in a fluid is called a drag.

Question 9 (1.0 marks)

What are the respective parameters on which loudness and pitch of a sound depend?

Solution:

Loudness of sound depends on the amplitude of vibration whereas the pitch of a sound depends on its frequency.

Question 10 (1.0 marks)

What is electroplating?

Solution:

Electroplating is the process of depositing a layer of a certain metal over another metal by the means of electricity. It protects the electroplated metal from corrosion and rusting, thereby giving it a shiny appearance.

Question 11 (1.0 marks)

Which of the following substances is malleable: copper or sulphur?

Solution:

Copper is a metal and sulphur is a non-metal. Malleability is a property of metals. Hence, copper is malleable since it can be easily beaten down into thin sheets.

Question 12 (2.0 marks)

(i) What are fossil fuels?

(ii) How are they formed?

Solution:

(i) Fuel that is obtained from fossils such as dead sea organisms, dead plants and animals, etc is known as fossil fuel. Coal, petroleum, and natural gas are fossil fuels.

(ii) They are formed from the dead remains of living organisms, both aquatic and terrestrial, which have been buried for millions of years under the ground.

Question 13 (2.0 marks)

Name the products that are obtained by the process of petroleum refining.

Solution:

Petroleum refining separates various constituents of petroleum. Petroleum gas, petrol, kerosene, diesel, lubrication oil, paraffin wax, and bitumen are obtained from refining.

Question 14 (2.0 marks)

List the traditional methods of irrigation.

Solution:

Irrigation refers to the supplying of water to the crops. In traditional methods of irrigation, the water available in the wells and lakes are lifted from the source to irrigate the fields. The traditional methods of irrigation are chain pumps, *moat* or the pulley system, *rahat* or the lever system, and the *dhekli*.

Question 15 (2.0 marks)

What is nitrogen fixation?

Solution:

Nitrogen fixation refers to conversion of atmospheric free nitrogen into nitrogen compounds, which can be utilized by plants. The fixation of nitrogen can occur in two ways- *Rhizobium* bacteria present in the root nodules of leguminous plants help in the fixation of atmospheric free nitrogen into compounds of nitrogen in soil. The other way by which nitrogen gets fixed is by the action of lightning.

Question 16 (2.0 marks)

How does deforestation of an area lead to drought?

Solution:

Deforestation refers to the clearing of the forest area and using it for different purposes. Deforestation has a long term effect on the environment. Plants use carbon dioxide during the process of photosynthesis. As a result of deforestation, the amount of carbon dioxide increases in the atmosphere. This carbon dioxide traps the solar rays reflected by the Earth in the atmosphere resulting in warming up of the atmosphere. This disrupts the water cycle and causes reduced rainfall, eventually leading to droughts.

Question 17 (2.0 marks)

List some methods by which friction can be reduced?

Solution:

Friction can be reduced by

1. greasing machines, hinges of doors, etc.
2. employing air cushions between moving parts
3. spreading a fine powder on the surface

Question 18 (3.0 marks)

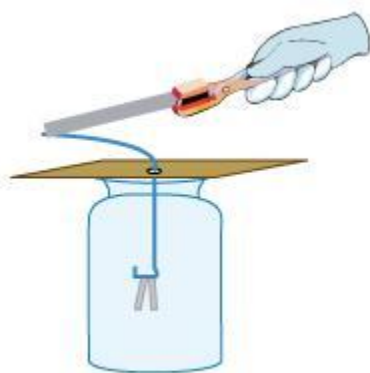
What is an electroscope? Describe its construction in brief?

Solution:

An electroscope is a device that is used to detect whether an object is charged or not.

Construction:

An empty glass is covered with a cardboard. A hole is pierced in the cardboard. A metal string is inserted through the hole. At one end of the string, two aluminium strips are attached. At the other end, the string is free. When a charged body is brought in contact with the open end of the metal string, charges get transferred to the foils. Hence, the foils become charged having the same nature of charges. Since like charges repel, the foils fly apart. This shows that the body has some charge on it.



Question 19 (3.0 marks)

What is the solar system? List the inner and outer planets of the solar system.

Solution:

Solar system consists of the Sun and other celestial bodies that revolve around it. The celestial bodies constitute the eight planets, comets, asteroids, and meteors.

The given table lists the names of the inner and outer planets.

Inner Planets	Outer Planets
Mercury	Jupiter
Venus	Saturn
Earth	Uranus
Mars	Neptune

Question 20 (3.0 marks)

Explain the greenhouse effect?

Solution:

When sunlight falls on the Earth, a part of the radiation is absorbed by the Earth and the remaining is reflected back into space. Some part of the reflected radiation is trapped by certain gases (greenhouse gases) present in the atmosphere. This causes the atmosphere to warm up. This is called the greenhouse effect.

The greenhouse gases are carbon dioxide, methane, nitrous oxide and water vapour.

Question 21 (3.0 marks)

Give the difference between eukaryotic and prokaryotic cells.

Solution:

In prokaryotic cells, the nuclear material is found in the cytoplasm. It lacks the well defined nuclear membrane around it. The cell organelles are absent in prokaryotic cells. A bacterial cell is an example of a prokaryotic cell. The eukaryotic organisms have a well defined nucleus along with the nuclear envelope. The cell organelles are present in a eukaryotic cell. The examples include cells of plants, animals etc.

Question 22 (3.0 marks)

What are contact forces and non-contact forces? Give examples.

Solution:

Contact forces act when an object is in contact to the force-causing agent. Muscular force and frictional force are examples of contact forces.

Non-contact forces act at a distance from the object and the force-causing agent. Magnetic force, electrostatic force, and gravitational force are examples of non-contact forces.

Question 23 (3.0 marks)

How do we hear sound?

Solution:

Sound enters through the outer part of the ear. It travels through the ear canal and reaches the other end, called the eardrum. The eardrum is like a stretched membrane. It vibrates in response to the sound waves. The eardrum sends these vibrations to the brain through the middle ear and the inner ear respectively. The brain recognizes the vibrations as sound, which we are able to hear.

Question 24 (3.0 marks)

(a) In an experiment 3.2 kg of a fuel was burnt completely to produce 64000 kJ of energy. Compare the calorific value of this fuel with that of diesel (45000 kJ/kg).

(b) What is global warming?

Solution:

(a) Calorific value of the given fuel:

$$= \frac{64000 \text{ kJ}}{3.2 \text{ kg}} = 20000 \text{ kJ/kg}$$

The calorific value of a fuel is the measure of its efficiency. The higher the value, the greater will be the efficiency of the fuel. Hence, diesel is more efficient than the given fuel.

(b) Global warming is the rise in temperature of the Earth's atmosphere due to an increased concentration of carbon dioxide in the air.

Question 25 (3.0 marks)

(a) What is polyester? Give examples.

(b) Plastic is a material of choice. Why?

Solution:

(a) Polyester is a synthetic fibre made of repeating units of esters. Terylene, PET, polywool, and terrycot are common examples of polyester.

(b) Plastics are materials of choice because of the following reasons:

(i) They are non-reactive with water and air. Hence, they are used to store various materials including chemicals.

(ii) They are very light, strong, durable, and can be moulded into different shapes and sizes for various purposes.

(iii) They are cheaper than metals.

(iv) They are poor conductors of heat and electricity. Hence, they are used for making coverings of various electrical appliances.

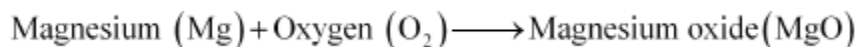
Question 26 (3.0 marks)

(a) Write the reaction of magnesium with oxygen and sulphuric acid.

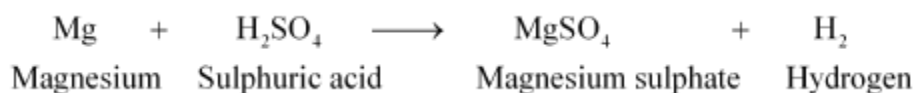
(b) Explain the nature of the product formed by the reaction of magnesium with oxygen.

Solution:

(a) Magnesium reacts with oxygen to form a white powdery mass, i.e., magnesium oxide. The chemical equation involved in the reaction can be represented as:



Magnesium reacts with sulphuric acid to produce magnesium sulphate and liberate hydrogen gas. The chemical equation involved in the reaction can be represented as:



(b) All metal oxides are basic in nature. When magnesium oxide is added to water and tested with litmus paper, it is observed that red litmus turns blue (due to the formation of magnesium hydroxide, Mg(OH)_2). Hence, it is basic in nature.

Question 27 (5.0 marks)

(i) State the laws of reflection?

(ii) What is the phenomenon of lateral inversion?

(iii) A light is incident on a plane mirror in such a way that it makes an angle of 32° with the normal. Calculate the angle made by the reflected light ray with the mirror plane.

Solution:

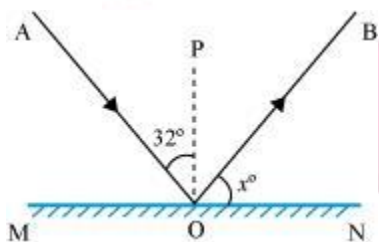
(i) There are two laws of reflection:

(a) The angle of incidence is always equal to the angle of reflection.

(b) The incident ray, the normal on the surface at the point of incidence, and the reflected ray all lie in the same plane.

(ii) A plane mirror forms images such that the left of an object appears on the right of the image and vice-versa. This phenomenon is known as lateral inversion.

(iii) The situation is shown in the given ray diagram:



Let the angle made by the reflected light ray with the mirror be x° .

The angle made by the incident ray AO with the normal PO i.e., $\angle AOP = 32^\circ$. From the law of reflection, the angle of incidence is always equal to the angle of reflection.

$\therefore \angle AOP = \angle BOP = 32^\circ$ (OB is the reflected ray)

But $\angle BOP + \angle BON = 90^\circ$

$$32^\circ + x = 90^\circ$$

$$\therefore x = 90^\circ - 32^\circ = 58^\circ$$

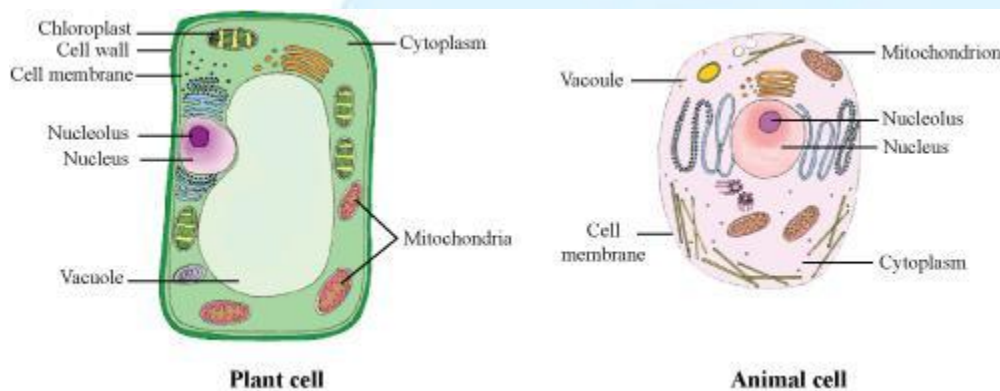
Question 28 (5.0 marks)

Explain the difference between a plant cell and an animal cell with the help of labelled diagrams.

OR

Explain two methods of asexual reproduction in animals.

Solution:



Cell wall: In a plant cell, a well defined cell wall is present that covers the cell membrane and protects the plant cell from various environmental factors. Cell wall is absent in an animal cell.

Chloroplast: The plant cell contains chloroplast that contains a green-coloured pigment called chlorophyll. Chlorophyll helps in trapping sunlight that is essential for photosynthesis. All animals are heterotrophs and cannot prepare their own food. Chloroplast is absent in an animal cell.

Vacuole: A plant cell contains a large centrally located vacuole while the animal cell has many small-sized vacuoles.

Nucleus: In plants cells, the nucleus is displaced to the corner or to the periphery of the cell because of the presence of a large vacuole; most animal cells have a centrally located nucleus.

OR

The type of reproduction that does not involve the formation or fusion of gametes and wherein, a new individual is produced from a single parent is called asexual reproduction. The most common method of asexual reproduction in animals is budding and fission.

In *Hydra*, a small outgrowth called the bud appears on the surface of the cell. This bud increases in size and matures into an adult before breaking off from the parent to live an independent life. This method of reproduction is called budding.

In *Amoeba*, reproduction occurs by the process of binary fission. During binary fission, the parent cell divides into two daughter cells. The nucleus divides first followed by the division of cytoplasm. Finally, two new individual organisms are formed.

