

CBSE
Class X Science
Sample Paper – 15 Solution

Section A

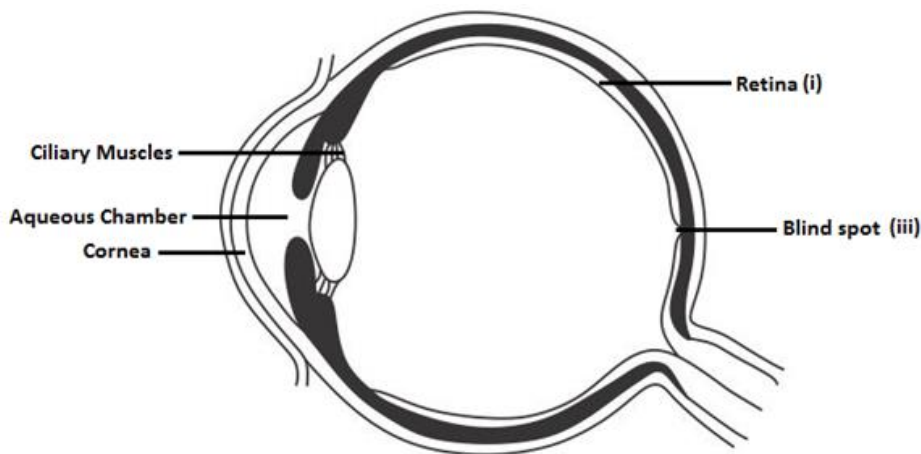
1. The sources of energy which are being produced continuously in nature and are inexhaustible are called renewable sources of energy.
Hydro-energy, wind energy and solar energy are examples of renewable sources of energy.
2. The object is placed at 15 cm; this means that the object is placed between the focus and the centre of curvature of the concave mirror. When the object is placed between the focus and the centre of curvature of a concave mirror, the image formed is real, inverted and magnified.

3.

(a)

- (i) 1. Seminiferous tubules: Produce sperm by the process of spermatogenesis.
3. Epididymis: Stores sperm for some days during which they mature and become motile.
- (ii) The production and survival of sperm require a temperature which is lower than the normal body temperature. So, the testes are located in the scrotal sac which is outside the abdomen to maintain the temperature at 3°C below the normal body temperature.

(b) Vertical section of the human eye



4.

- (a) A will have a larger atom.
- (b) K has higher valency.

(c) I is more metallic than K.

(d) B and J

5. (A) Ampere

The unit used to measure the current is Ampere (A).

OR

(B) increases on increasing the temperature and decreases on lowering the temperature

The resistance of all metals increases on increasing the temperature and decreases on lowering the temperature.

6. (D) Silver

A magnet cannot attract silver. It can attract objects made from cobalt, iron, nickel and steel.

7. (D) less than 1, more than 1 or equal to 1

Linear magnification produced by a concave mirror may be less than 1, more than 1 or equal to 1.

8. (C) Each ovule is attached to the placenta by a stalk called the funicle which provides nourishment to the ovule.

OR

(C) Sexual reproduction promotes diversity in the character of the offspring.

9. (C) Montreal Protocol was designed to prevent the depletion of the ozone layer.

10. (D) When hydrocarbons are burned in oxygen, they produce light, heat and water.

11. (A) Al and Br will form the ionic compound AlBr_3 ; an ionic compound is formed by a positively charged metal and a negatively charged non-metal.

12. (A) The fight or flight response of the body is possible because of the hormone adrenaline secreted by the adrenal glands.

OR

(A) Motor neurons communicate with the muscle fibres through the neurotransmitter at the neuromuscular junction.

13. Both A and R are true, but R is not the correct explanation of the assertion. Food chains are limited to 4–5 trophic levels because energy losses between trophic levels restrict the length of food chains and the biomass of higher trophic levels. As we pass from one trophic level to the next, only 10% of energy is transferred from the first trophic level to the next. This is because a lot of energy is lost to the surroundings and the rest is utilised by the organism.

14. A is false, but R is true.

Hypermetropia is the defect of vision in which the person cannot see nearby objects clearly. Hence, it is called long-sightedness. The near point of a person with hypermetropia is more than 25 cm.

Section B

15. Blood in the arteries moves because of the pressure of blood from the heart. Each time the heart pumps, it pushes the blood a little further. Veins do not rely on the heart to move blood. Veins have a system of valves to keep the blood from not moving backward, and muscles contract the veins to move the blood.

16. In a food chain, trophic levels are consecutive steps followed in the process of energy flow, and each step or level is dependent on the other for food. Different trophic levels are

- Producers: They form the first trophic level and are able to manufacture their own food (green plants).
- Primary consumers: They form the second trophic level and are generally plant eaters (herbivores).
- Secondary consumers: They form the third trophic level and are flesh eaters (carnivores).
- Tertiary consumers: They form the fourth trophic level and feed on secondary consumers.

OR

The tongue detects tastes through tiny organs called taste buds, containing gustatory receptors. Particular chemicals in food dissolve in the saliva and stimulate gustatory receptors in specific taste buds. Since the chemicals dissolve in the saliva, they spread throughout the surface of the tongue.

17.

(i) Total resistance in arm CE

$$R_s = 6 + 6 = 12 \, \Omega$$

(ii) Current in arm AB

$$I = \frac{5 \, \text{V}}{17 \, \Omega} = 0.29 \, \text{A}$$

(iii) Current in arm AB = 0.29 A

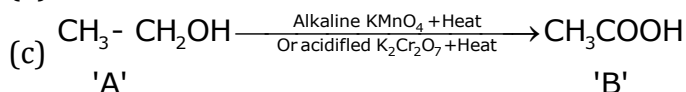
So, the potential difference across the resistor

$$= 8 \, \Omega \times 0.29 \, \text{A} = 2.32 \, \text{V}$$

18.

(a) A = Ethyl alcohol, C_2H_5OH

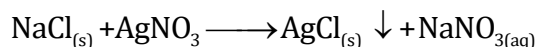
(b) B = Ethanoic acid, CH_3COOH



19.

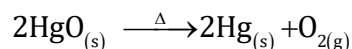
(a) Double decomposition reaction:

This is a type of chemical reaction in which two compounds in a solution react to form two new compounds by the mutual exchange of radicals.



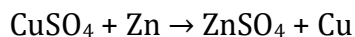
(b) Thermal decomposition reaction:

A decomposition reaction brought about by heat is known as thermal decomposition.



(c) Displacement reaction:

It is a chemical reaction in which a more active element displaces a less active element from its salt solution.



20.

(a) Two characters.

They are shape of seed and colour of seed.

(b) A dominant trait is a genetic trait which is considered dominant if it is expressed in a person who has only one copy of that gene.

A recessive trait is a genetic trait which is expressed only when two copies of the same gene are present.

21.

(a) It will not undergo any colour change because the solution of Na_2SO_4 in water is almost neutral.

(b) In the acidic solution, the colour of methyl orange will change to reddish.

(c) $FeCl_3$ solution on reacting with water will form ferric hydroxide and hydrochloric acid. Since the acid is strong, the solution will be acidic. Therefore, the colour of blue litmus will change to red.

OR

(a) Calcium sulphate dihydrate, commonly known as gypsum, has the formula $CaSO_4 \cdot 2H_2O$.

(b) Copper sulphate pentahydrate, commonly known as blue vitriol, has the formula $CuSO_4 \cdot 5H_2O$.

- (c) Sodium carbonate decahydrate, commonly known as washing soda, has the formula $\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$.

22.

- (a) The circular loops carrying current forms concentric circular patterns of the magnetic field due to electric current.
- (b) The direction of the magnetic field of the loop carrying current can be determined by the clock face rule.
- (c) The strength of the magnetic field due to current depends on the
- i) number of turns of wire in the coil
 - ii) radius of the coil
 - iii) current flowing in the coil

OR

(a)

Bar magnet	Electromagnet
1. A bar magnet is a permanent magnet.	1. An electromagnet is a temporary magnet.
2. A permanent magnet produces a comparatively weak force of attraction.	2. An electromagnet can produce a very strong magnetic force.
3. The strength of a permanent magnet cannot be changed.	3. The strength of an electromagnet can be changed by changing the number of turns in the coil or changing the current passing through it.
4. The polarity of a permanent magnet is fixed and cannot be changed.	4. The polarity of an electromagnet can be changed by changing the direction of current.

- (b) According to Fleming's left-hand rule, hold the forefinger, the middle finger and the thumb of your left hand at right angles to one another. Adjust your hand in such a way that the forefinger points in the direction of the magnetic field and the middle finger points in the direction of current. The direction in which the thumb points gives the direction of force acting on the conductor.
- (c) As the positively charged particles are moving towards the west, the direction of current will be towards the west. It is given that the deflection is towards the north. Thus, according to Fleming's left-hand rule, holding the middle finger towards the west (direction of current) and the thumb towards the north (in the direction of force), the forefinger points in the upward direction. Hence, the direction of the magnetic field is in the upward direction.

23. Skin: Excretes excess salts and water in the form of sweat

Lungs: Expel carbon dioxide during exhalation

Intestines: Throw out undigested food in the form of faeces through the anus

24.

- (b) When an object is placed between the pole and infinity, the image formed is virtual, erect and diminished.
- (b) When light rays are incident on the rough surface, they are reflected in different directions. This type of reflection is called diffused reflection or irregular reflection.
- (c) A convex mirror always produces an erect, virtual and diminished image. This enables a driver to view a much larger area behind him. Hence, a convex mirror is suitable as a rear-view mirror.

Section C

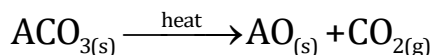
25.

- (i) Mercury
- (ii) Graphite
- (iii) Aluminum
- (iv) A pure metal is always deposited at the cathode.
- (v) Zinc oxide (ZnO) is an amphoteric oxide.

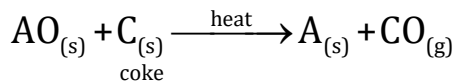
OR

Since ore 'A' of the metal gives CO₂ upon heating, it is some metal carbonate (ACO₃). It can be converted to the metallic form as follows:

(a) Calcination:

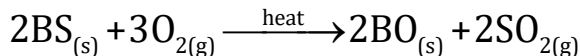


(b) Smelting:

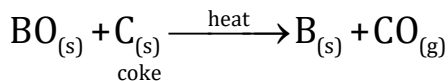


Since ore 'B' of the metal gives SO₂ upon heating, it can be some metal sulphide (BS). It can be converted to the metallic form as follows:

(c) Roasting:

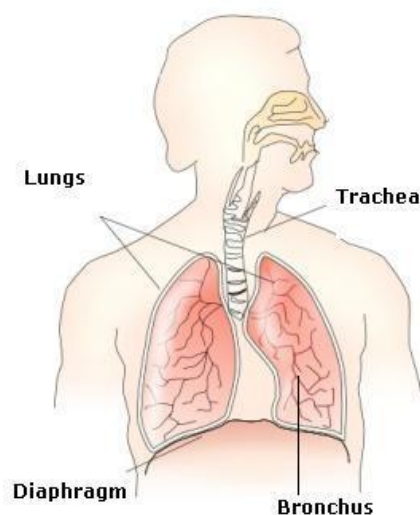


(d) Reduction:



26.

(a) Respiratory system:



(b) Haemoglobin

Role of haemoglobin → It is an iron-protein compound in red blood cells which gives blood its red colour and transports oxygen and carbon dioxide.

(c) The rate of breathing in aquatic organisms is much faster than that in terrestrial organisms because the amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air.

OR

(a) Copper-T

(b) The reason for declining females in India is sex-selective abortions of the female foetus through surgeries (female foeticides). This can be avoided by banning pre-natal sex determination. Everyone in society needs to be educated about the equality of gender and the health of women.

27.

(a) Incineration is the process of disposing of domestic and industrial (chemical) wastes safely without polluting the environment. It is considered a safe method of waste disposal because waste materials are burnt at a very high temperature of 1000°C so that they can be converted to gases and water vapour. The ash thus left behind is also devoid of any harmful particles.

(b) Different components of food are changed to simpler substances by digestive enzymes and these enzymes are specific. Similarly, substances are broken down by bacteria and saprophytes. They are also very specific in action and break down a particular substance. Therefore, some substances are biodegradable and others are non-biodegradable.

28.

- (a) An electric generator works on the principle that when a straight conductor is moved in a magnetic field, then current is induced in the conductor. The electric generator converts mechanical energy to electrical energy. It is also known as a dynamo.
- (b)
- i) Commutator: The function of the commutator ring is to reverse the direction of current flowing through the coil each time it just passes the vertical position during a revolution.
 - ii) Carbon brushes: The function of carbon brushes is to make contact with the rotating rings of the commutator and supply current to the coil.

29.

- (a) Element E will form only covalent compounds.
- (b) Element D is a metal with valency 2.
- (c) Element B is a non-metal with valency 3.
- (d) D, because the atomic size decreases along a period.
- (e) Noble gases

30. Suppose 'n' bulbs can be used safely.

Power of 'n' bulbs, $P = 110 \times n$ Watt

Potential difference, $V = 220$ V

Current, $I = 5$ A

Power, $P = V \times I$

$$110 \times n = 220 \times 5$$

$$n = \frac{220 \times 5}{110} = 10$$

Thus, the maximum number of bulbs which can be connected safely in the circuit is 10.

OR

a) The SI unit of electrical energy is Joule (J). The expression for electrical energy consumed by the electrical appliances is $E = P \times t$.

b) Commercial unit of electrical energy is kilowatt-hour (kWh).

For converting commercial unit to SI unit of electrical energy,

1 Watt = 1 Joule/1 second

and 1 kW = 1000 Watt

1 kWh = 1000 Joule/second for 1 hour

1 hour = 60 x 60 seconds

1 kWh = 1000 (Joule/second) x 60 x 60

Thus, 1 kWh = 3.6×10^6 J