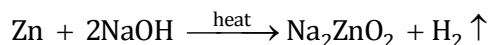


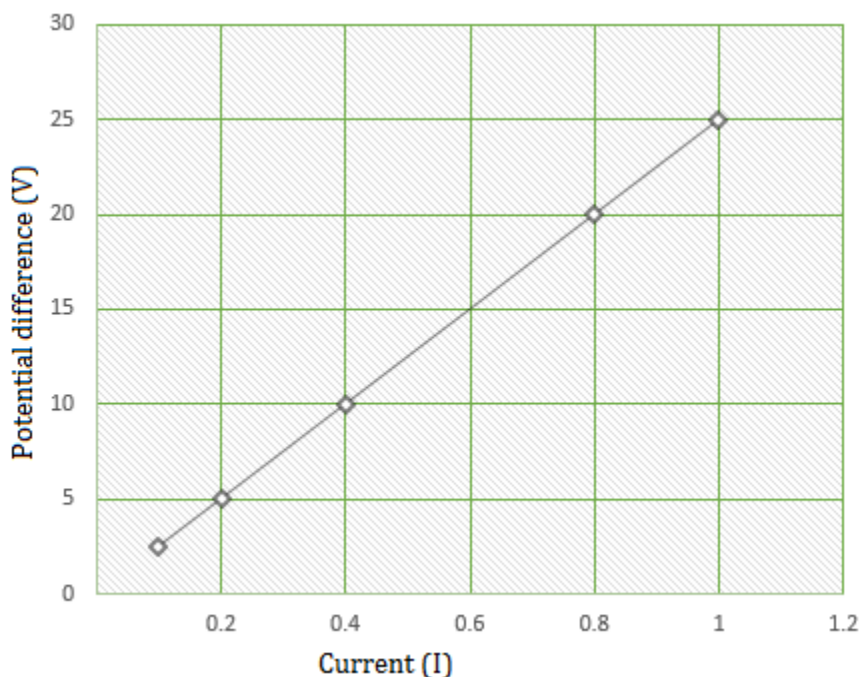
CBSE
Class X Science
Sample Paper 8 – Solution

Section A

1. Sources of energy which have accumulated in nature over a very long time and which cannot be quickly replaced when exhausted are called conventional sources or non-renewable sources of energy.
2. The intestinal juice succus entericus completes the process of digestion in human beings.
3.
 - (a) If we place zinc dust instead of zinc granules, then the reaction will take place at a greater speed as zinc dust provides more surface area than zinc granules.
 - (b) There will be no hydrogen gas produced when nitric acid is used in place of dilute sulphuric acid, because being a strong oxidising agent, nitric acid oxidises hydrogen to water.
 - (c) Copper does not react with any dilute acid; hence, no gas will evolve.
 - (d) On heating zinc and sodium hydroxide, hydrogen gas is evolved as zinc reacts with both acids and bases.



4.
 - (a)



(b) Resistance of the conductor is

$$R = \frac{V}{I} = \frac{10}{0.4} = 25 \Omega$$

(c) It is a straight line graph.

(d) From the graph, when potential difference is 15 V, current is 0.6 A.

5. (i) a) and b)

A concave mirror is used as a shaving mirror and head mirror.

OR

iv) a), b) and c)

A convex lens can produce the image of magnification less than 1, more than 1 or equal to 1.

6. (iii) Ωm

The SI unit of resistivity is Ωm .

7. iii) Left ventricle \rightarrow Aorta \rightarrow Superior vena cava \rightarrow Right atrium

Oxygenated blood flows from the left ventricle to the aorta. The aorta splits into arteries which deliver oxygenated blood to the body tissues. The deoxygenated blood from the tissues is collected by veins which open into the superior and inferior vena cavae which pour blood into the right atrium.

8. i) Hypothalamus

If the secretions of the pituitary gland are under the control of the hypothalamus, then this gland is supposed to be the super master gland.

OR

i) Less iodine \rightarrow less thyroxine \rightarrow goitre

Less iodine in the diet causes less secretion of thyroxine resulting in the development of goitre.

9. ii) Gene flow

Since beetles of one sub-population were dropped by a crow into beetles of another sub-population, there will be gene flow between the two sub-populations. The migrant population will reproduce with the local population, and hence, no new species will be formed.

10. ii) The IUPAC name of isomer C_4H_{10} which has a branched chain is 2-methyl propane.

11. i) Solder alloy is an alloy of lead and tin.

12. iv) All of these

Steps such as breeding animals in captivity and then releasing them into their natural habitat as well as the establishment of nature parks and sanctuaries help in the conservation of wildlife.

OR

iv) Producers are usually eaten by many different consumers, and most consumers are eaten by more than one predator.

A food web is more significant than a food chain because producers are usually eaten by many different consumers, and consumers are eaten by more than one predator.

13. i) Both A and R are true, and R is the correct explanation of the assertion.

CFCs are broken up by ultraviolet radiation, releasing chlorine atoms, which are able to destroy ozone molecules.

14. (iv) A is false, but R is true.

The compass when placed near the current-carrying wire gets deflected because the current flowing through the wire always gives rise to a magnetic field.

Section B

15. Homologous organs, analogous organs and vestigial organs help to identify the evolutionary relationships among organisms.

- Homologous organs have a similar basic structure but have been modified to perform different functions in different organisms.

Example: Forelimbs of reptiles, birds, amphibians and mammals are homologous organs. Such homologous characteristics help to identify an evolutionary relationship between apparently different species.

- Analogous organs are different in basic structure but perform the same function in different organisms.

Example: Wings of birds and wings of bats

- Vestigial organs are certain reduced and non-functional organs present in some organisms.

Example: Vermiform appendix in the human body

OR

(a) Differences between autotrophs and heterotrophs:

Autotrophs	Heterotrophs
1. They can prepare their own food using inorganic materials from the environment.	1. They cannot prepare their own food and hence depend on other organisms for their food.
2. They use CO ₂ and release O ₂ in the environment.	2. They use O ₂ and release CO ₂ in the environment.

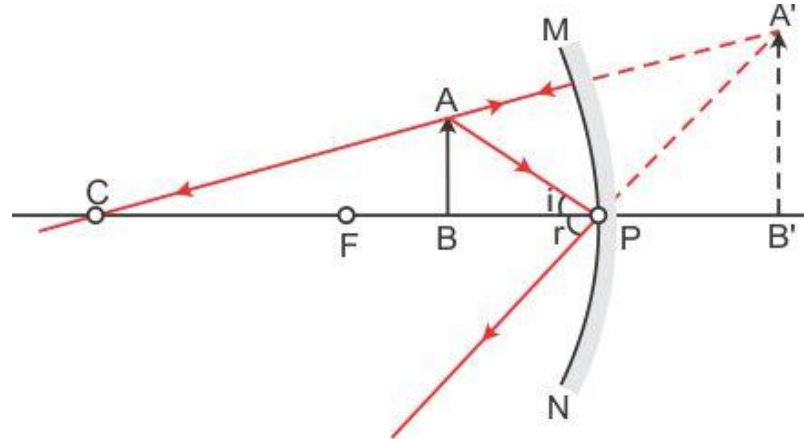
3. Example: Green plants

3. Example: Animals and human beings

(b) Producers (green plants) constitute the first trophic level in any given food chain.

16. Focal length of the concave mirror f is -15 cm.

A concave mirror produces an erect image when the object is between the pole and the focus.



Hence, the range of the object distance should be $0-15$ cm from the mirror.

The image so formed would be virtual, erect and magnified.

OR

Given:

Object distance, $u = -20$ cm

Image distance, $v = -40$ cm

Height of object (h_0) = 2 cm

According to the mirror formula,

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{-40} + \frac{1}{-20} = \frac{1}{f}$$

$$\frac{1}{f} = \frac{-1-2}{40}$$

$$f = -\frac{40}{3} = -13.33 \text{ cm}$$

$$\text{magnification, } m = -\frac{v}{u} = \frac{h_i}{h_0}$$

$$m = -\frac{-40}{-20} = \frac{h_i}{2}$$

$$h_i = -4 \text{ cm}$$

17.

- (a) ^{19}K has one electron in the outermost shell and its electronic configuration is 2, 8, 8, 1.
- (b) ^4Be and ^{20}Ca belong to the same group, i.e. Group 2.
Electronic configuration:
 ^4Be - 2, 2
 ^{20}Ca - 2, 8, 8, 2
 ^4Be and ^{20}Ca have the same number of valence electrons in the outermost shell, i.e. 2, so they belong to the same group.
- (c) ^9F and ^4Be belong to the same period, i.e. period 2.
Electronic configuration:
 ^9F - 2, 7
 ^4Be - 2, 2
 ^4Be has bigger atomic size than ^9F because the atomic radius decreases as we move from left to right due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus, and hence, the size of the atom reduces.

18.

- (a) Work done per unit time is called power.
- (b) The SI unit of power is Watt (W).
- (c) The commercial unit of electrical energy is kilowatt-hour (kWh).

19.

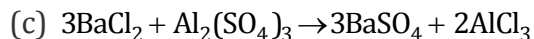
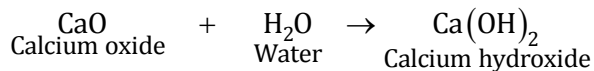
- (a) No. We will not have white-flowered pea plants in the F_1 generation. This is because all the F_1 progeny plants show genetic makeup Pp. Since P is a trait dominant over p, all the plants in the F_1 generation have purple flowers.
- (b) A dominant trait is a genetic trait which is expressed in 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 gene are present.

20.

- (a) *Archaeopteryx* looks like a bird but possesses many other features which are found in reptiles. It has feathered wings like those of birds, but its teeth and tail are like those of reptiles. Therefore, *Archaeopteryx* is considered a connecting link between reptiles and birds, suggesting that birds have evolved from reptiles.
- (b) Evolution may be defined as the formation of wide varieties of organisms which have been evolved from pre-existing organisms through gradual changes (variations) since the beginning of life.

21.

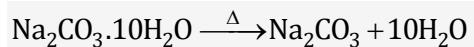
- (a) Substance 'X' is calcium oxide. Its chemical formula is CaO .
- (b) Calcium oxide reacts vigorously with water to form calcium hydroxide (slaked lime).



OR

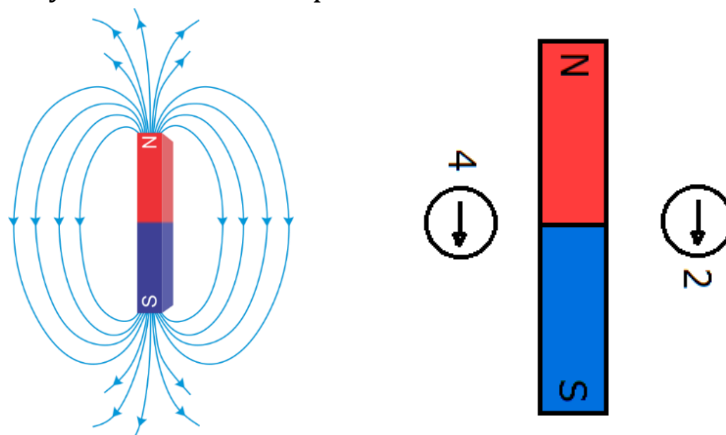
(a) X: NaHCO_3 , Y: Na_2CO_3 , Z: $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

(b) By heating



(c) It is used for washing purposes and for removing the permanent hardness of water.

22. Directions shown by the needle of compasses 2 and 4 would be as shown below.

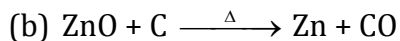
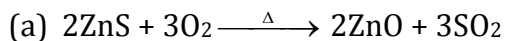


This is because the magnetic field lines arise from the North Pole and end at the South Pole.

Hence, the needle of compasses 2 and 4 will be aligned along the magnetic field lines directed downwards.

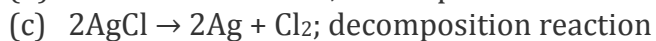
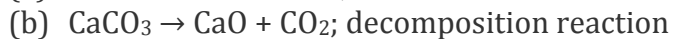
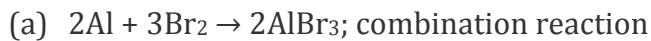
23.

Ore of zinc is zinc blende with formula ZnS .



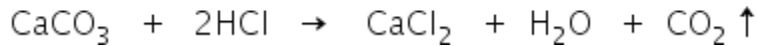
(c) The large-scale use of zinc is in galvanising.

24.



Section C

25. Dilute HCl on reaction with metallic carbonates liberates carbon dioxide, which is a colourless, odourless gas which turns lime water milky.



Compound 'X' is calcium carbonate.

The gas formed is carbon dioxide.

When carbon dioxide is passed through lime water, it turns lime water milky due to the formation of CaCO_3 .

If excess of CO_2 is passed through lime water, then water-soluble calcium bicarbonate will form and the solution will remain clear.

26.

(a) Steps which take place in chloroplasts during photosynthesis:

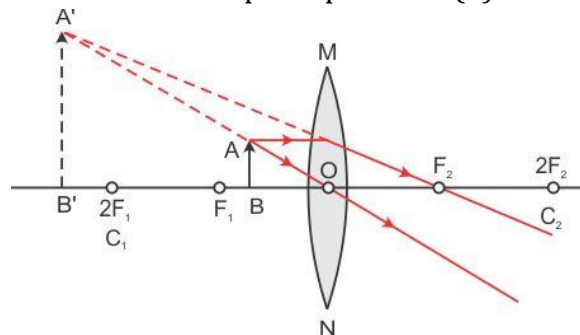
- Absorption of sunlight energy by chlorophyll.
- Conversion of light energy to chemical energy and splitting of water into hydrogen and oxygen by light energy.
- Reduction of carbon dioxide by hydrogen to form carbohydrates (glucose) by utilising chemical energy.

(b) Opening and closing of stomata is controlled by the guard cells. When water flows into the guard cells, they swell, become curved and cause the stomata to open. When the guard cells lose water, they shrink, become straight and close the stomata.

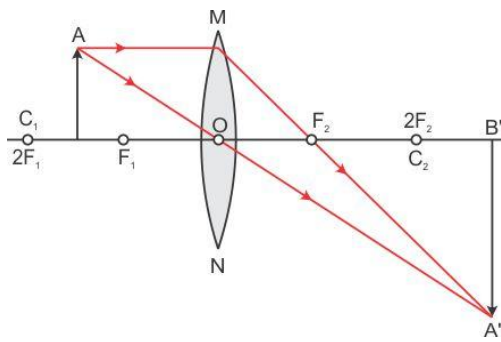
(c) Carbon dioxide is made available to plants when the stomata are open.

27.

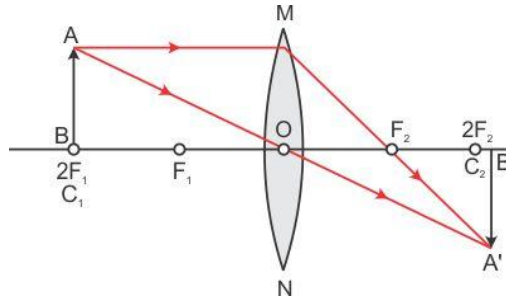
(a) Between the optical centre and the principal focus (F)



(b) Between F and 2F



(c) At $2F$



(d)

CASE	CONVEX	CONCAVE
(i)	Virtual, erect and magnified	Virtual, erect and diminished
(ii)	Real, inverted and magnified	Virtual, erect and diminished

28.

(a) **Joule's law of heating:** Amount of heat energy produced in an electric circuit is directly proportional to the

- (i) Square of the amount of electric current
- (ii) Time for which the current passes
- (iii) Amount of resistance which the circuit provides to the flow of current

Derivation:

A conductor offers resistance to the flow of current. Hence, work must be continuously done by the current to keep itself flowing.

Let 'I' be the current passing for time 't' through a resistor of resistance 'R'.

When an electric charge Q moves against a potential difference V, the work done is $W = QV$.

From the definition of current,

$$I = \frac{Q}{t}$$

$$\therefore Q = It$$

From Ohm's law,

$$V = IR$$

$$\therefore W = It \times IR = I^2Rt,$$

Assuming that all this work goes in producing heat energy, the heat produced in a conductor of resistance 'R' when current 'I' is flowing for time 't' is

$$H = I^2Rt$$

(b)

(i) When the resistors are connected in series:

$$R_s = R + R = 2R$$

$$\therefore H_s = \frac{V^2}{R_s} = \frac{V^2}{2R} \quad \text{..... (1)}$$

(ii) When the resistors are connected in parallel:

$$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R} = \frac{2}{R}$$

$$\therefore R_p = \frac{R}{2}$$

$$\therefore H_p = \frac{V^2}{R_p} = \frac{2V^2}{R} \quad \text{..... (2)}$$

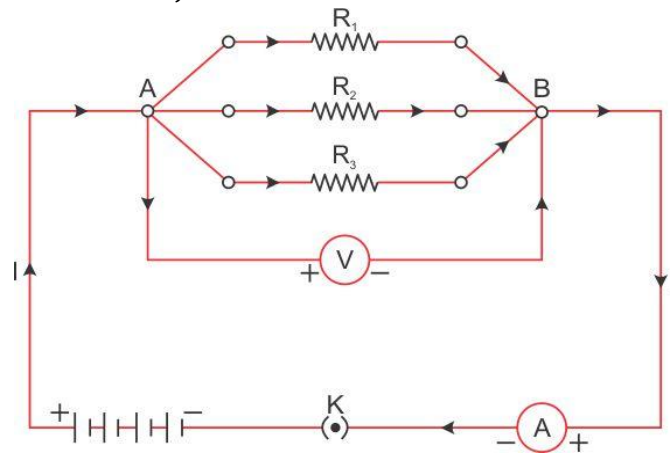
From (1) and (2),

$$\frac{H_s}{H_p} = \frac{V^2}{2R} \times \frac{R}{2V^2} = \frac{1}{4}$$

$$\therefore H_p = 4H_s$$

OR

(a) Two or more resistors joined to the same end are connected in parallel.



Potential difference in a parallel circuit remains the same across all resistors.

Current is the sum of the currents across all the individual resistors.

$$I = I_1 + I_2 + I_3 \quad \text{..... (1)}$$

Let R_p be the resultant resistance of the circuit.

On applying Ohm's law to the entire circuit,

$$I = \frac{V}{R_p} \quad \text{..... (2)}$$

Now applying Ohm's law to individual resistances,

$$\left. \begin{aligned} I_1 &= \frac{V}{R_1} \\ I_2 &= \frac{V}{R_2} \\ I_3 &= \frac{V}{R_3} \end{aligned} \right\} (3)$$

From equations (1), (2) and (3),

$$\begin{aligned} \frac{V}{R_p} &= \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \\ \therefore \frac{1}{R_p} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \end{aligned}$$

(b) For the given circuit,

(i) Resultant resistance is

$$\begin{aligned} R_{eq} &= 7 + 5 || 10 \\ \therefore R_{eq} &= 7 + \frac{10 \times 5}{10 + 5} = 7 + \frac{50}{15} \\ \therefore R_{eq} &= \frac{105 + 50}{15} = \frac{155}{15} = 10.33 \, \Omega \end{aligned}$$

Total current is

$$\begin{aligned} I &= \frac{V}{R_{eq}} \\ \therefore I &= \frac{6}{10.33} = 0.58 \, \text{A} \end{aligned}$$

(ii) Heat energy evolved in this circuit if it is switched on for 30 min.

By Joule's law of heating,

$$\begin{aligned} H &= I^2 R t \\ H &= 0.58^2 \times 10.33 \times (30 \times 60) \\ H &= 0.3364 \times 10.33 \times 1800 \\ H &= 6255 \, \text{J/s} \end{aligned}$$

29.

(a)

Diamond	Graphite
(i) Each carbon atom is linked to four other carbon atoms.	(i) Each carbon atom is joined to three other carbon atoms.
(ii) A diamond crystal has a tetrahedral arrangement of carbon atoms.	(ii) A graphite crystal has a flat hexagonal ring structure.

(b) Powdered graphite can be used as a lubricant because of its softness, whereas diamond being extremely hard cannot be used as a lubricant.

(c)

(i) Catenation

(ii) Linking of carbon with other atoms

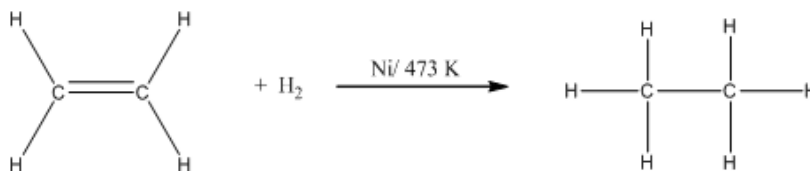
(d) The size of the silicon atom is larger than the carbon atom because the atomic size increases down the group. Therefore, the C–C bond is smaller and stronger than the Si–Si bond. As a result, any number of carbon atoms can be linked to each other resulting in a large number of carbon compounds. However, this is not possible in silicon and only a few atoms can be linked by covalent bonds.

OR

(a) Compounds 'B' and 'D' represent the same family.

(b) Compounds 'E' and 'F' do not represent any hydrocarbon.

(c) Compound 'C' can be converted to 'A' by passing hydrogen (H_2) in the presence of Ni at 473 K.

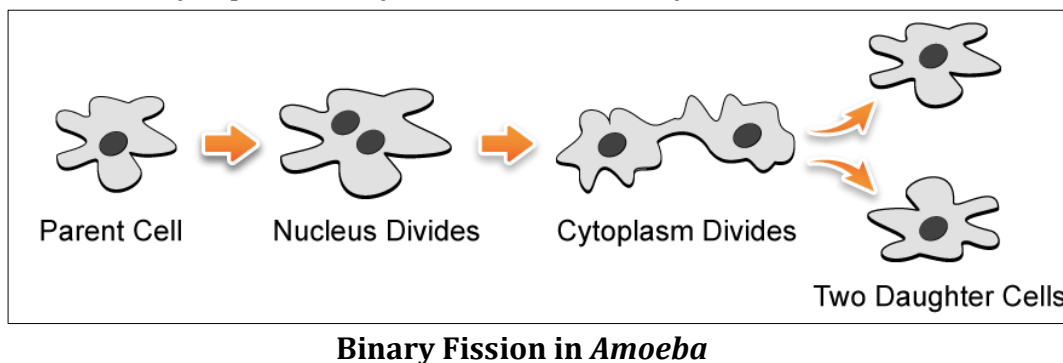


30.

(a) Advantages of vegetative propagation:

- It helps in producing identical clones.
- It helps in producing plants which do not produce viable seeds or produce very few seeds.

(b) *Amoeba* commonly reproduces by the method of binary fission.



(c) Fertilisation occurs in the fallopian tube or oviduct of the female reproductive tract.

OR

(a) If an egg is not fertilised by a sperm, then blood along with cellular debris comes out through the vagina; this process is called menstruation.

(b) Need to adopt contraceptive measures:

- To prevent unwanted pregnancies
- To prevent sexually transmitted diseases
- Spacing between children
- Sound health

(c) Sexually transmitted diseases:

- Bacterial – Gonorrhea
- Viral – AIDS

(d) The embryo gets its nourishment inside the mother's body with the help of the placenta.