

CBSE Class 10 Science
Sample Paper - 02

Maximum Marks: 80

Time Allowed: 3 hours

General Instructions:

- i. The question paper comprises three sections – A, B and C. Attempt all the sections.
 - ii. All questions are compulsory.
 - iii. Internal choice is given in each section.
 - iv. All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
 - v. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
 - vi. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
 - vii. This question paper consists of a total of 30 questions.
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Section A

1. What is corrosion?
2. What is the similarity in the electronic configuration of Mg, Ca and Sr?
3. **Answer the questions that follow on the basis of your understanding of the following paragraph and the related studied concepts:**

It is easy to see that solar cooker devices are useful only at certain times during the day. This limitation of using solar energy is overcome by using solar cells that convert solar energy into electricity. A typical cell develops a voltage of 0.5–1 V and can produce about 0.7 W of electricity when exposed to the Sun. A large number of solar cells are, combined in an arrangement called solar cell panel that can deliver enough

electricity for practical use. The principal advantages associated with solar cells are that they have no moving parts, require little maintenance and work quite satisfactorily without the use of any focussing device. Another advantage is that they can be set up in remote and inaccessible hamlets or very sparsely inhabited areas in which laying of a power transmission line may be expensive and not commercially viable.



- i. What type of source of energy is mentioned in the above picture?
 - ii. For what purpose solar panels are used?
 - iii. Write the three advantages of solar cells.
 - iv. Why solar cooker surface is painted with black colour?
4. You must have noticed many dramatic changes in your appearance as well as that of your friends as you approached 10–12 years of age. These changes associated with puberty are because of the secretion of testosterone in males and oestrogen in females. Do you know anyone in your family or friends who has been advised by the doctor to take less sugar in their diet because they are suffering from diabetes? As a treatment, they might be taking injections of insulin. This is a hormone which is produced by the pancreas and helps in regulating blood sugar levels. If it is not secreted in proper amounts, the sugar level in the blood rises causing many harmful effects.

Answer the following questions:

- a. Write the name of the hormone which is secreted by the pancreas.
- b. Name the hormone which is secreted by male and female during the adolescent.
- c. What happens if Insulin is not secreted in the proper amount?
- d. From which cells of pancreatic islets insulin and glucagon hormone are secreted?

5. When two lenses of powers +4 D and -3 D are placed in contact, the power of the resultant lens is:

- a. 7 D
- b. -1 D
- c. None of the above
- d. +1 D

OR

The angle to which an incident ray at an angle θ deviates on getting reflected from a surface is

- a. $180-\theta$
- b. $180-2\theta$
- c. 2θ
- d. θ

6. 'Hug the trees movement' was the result of grass root level effort to

- a. motivate the industrialists to make industries based on forest product
- b. All of these
- c. improve the quality of soil and the sources of water
- d. end the alienation of people from their forests

7. The function of rheostat in an electrical circuit is to:

- a. Change the resistance in the circuit.
- b. None of these
- c. Decrease the resistance in the circuit.

-
- d. Increase the resistance in the circuit.
8. "Alcohols and glucose contain hydrogen but are not treated as acids"
- a. False
 - b. No plausible explanation
 - c. These two are exceptions
 - d. True

OR

Ayush and Ishoo were given one test tube each. One of the test tube contained water and the other contained a solution of sodium hydroxide. They were asked to identify the test tube containing NaOH solution. Which one of the following can be used for correctly identifying the required test tube?

- a. Dilute hydrochloric acid
 - b. Red litmus
 - c. Blue litmus
 - d. sodium carbonate solution
9. The number of trophic levels in a food chain are:
- a. Two to three
 - b. Three to four
 - c. Four to five
 - d. Unlimited
10. Which of the following limits the number of trophic levels in a food chain?
- a. Food supply

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- b. Decrease in energy at each trophic level
 - c. Polluted air
 - d. Water

11. Which one of the following is not in liquid state at 10°C ?

- a. H_2O
- b. Glacial acetic acid
- c. $\text{C}_2\text{H}_5\text{OH}$
- d. Acetone

12. NH_4OH is a weak base in aqueous medium since it forms

- a. more number of OH^- ions
- b. less number of NH_4^+ ions
- c. more number of NH_4^+ ions
- d. less number of OH^- ions

13. **Assertion:** Propene reacts with HBr to give isopropyl bromide.

Reason: Addition of Br_2 to alkene takes place at the faster rate in the presence of ionizing substance.

- a. Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
- b. Assertion is INCORRECT but, reason is CORRECT.
- c. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
- d. Assertion is CORRECT but, reason is INCORRECT.

14. **Assertion:** Electric appliances with metallic body have three connections, whereas an electric bulb has a two-pin connection.

Reason: Three-pin connections reduce heating of connecting wires.

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- a. Assertion is CORRECT but, reason is INCORRECT.
 - b. Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
 - c. Assertion is INCORRECT but, reason is CORRECT.
 - d. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

Section B

15. What is meant by reactivity series of metals? What is the reason for different reactivities of metals? Arrange the following metals in the increasing order of their reactivities. Fe, Zn, Na, Cu, Mg
16. What will be happened on heating ferrous sulphate crystals?

OR

Explain two ways by which food industries prevent rancidity.

17. Write the name and molecular formula of an organic compound having its name suffixed with '-ol' and having two C-atoms in the molecule. With the help of a balanced chemical equation indicate what happens when it is heated with excess of conc. H_2SO_4 ?
18. How do plants obtain CO_2 ?

OR

Photosynthesis is called a light dependant process. Comment.

19. An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can be obtained? Find the size and the nature of the image.
20. Mention the function of seminal vesicles.
21. Define 'nerve impulse'. Which structure in a neuron helps to conduct a nerve impulse? a) Towards the cell body?
b) Away from the cell body?

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22. A current of 1 ampere flows in a series circuit containing an electric lamp and a conductor of $5\ \Omega$ when connected to a 10 V battery. Calculate the resistance of the electric lamp. Now if a resistance of $10\ \Omega$ is connected in parallel with this series combination, what change (if any) in current flowing through $5\ \Omega$ conductor and potential difference across the lamp will take place? Give reason.
23. Two cells of 3V each are connected in parallel. An external resistance of $0.5\ \Omega$ is connected in series to the junction of two parallel resistors of $4\ \Omega$ and $2\ \Omega$ and then to the common terminal of the battery through each resistor. Draw the circuit diagram. What is the current flowing through $4\ \Omega$ resistors?
24. Why does the cord of an electric heater not glow while the heating element does?

OR

An object 4.0 cm in size is placed 25.0 cm. in front of a concave mirror of focal length 15.0 cm. At what distance from the mirror should a screen be placed in order to obtain sharp image ? Find the nature and the size of the image.

Section C

25. Give experiment to show that blue vitriol crystals contain water of crystallisation.
26. What is meant by group in the modern periodic table? How do the following changes occur on moving from top to bottom in a group?
- i. Number of valence electrons
 - ii. Number of occupied shells
 - iii. Size of atoms
 - iv. Metallic character of element
 - v. Metallic nuclear charge experienced by valence electrons
27. Explain the location, structure and functions of kidney in human beings. Also draw an appropriate diagram supporting your answer.
28. Write the various conclusion and hereditary principles drawn by Mendel from a monohybrid cross.

OR

What is artificial selection? How man has employed to obtain new varieties of plants and animals?

29. a. State Fleming's left-hand rule.
b. Write the function of the following parts of an electric motor.
 i. Brushes
 ii. Split ring
30. When do we consider a person to be myopic or hypermetropia? List two causes of hypermetropia. Explain using ray diagrams how the defect associated with hypermetropia eye can be corrected.

OR

- i. What is meant by power of a lens? Define its SI unit.
- ii. You have two lenses A and B of focal lengths +10 cm and - 10 cm, respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram to justify your answer.

CBSE Class 10 Science
Sample Paper 06 (2019-20)

Answer
Section A

1. **Corrosion:** Corrosion is a process in which materials deteriorate as a result of a chemical reaction with moisture and other chemicals present in its surroundings. Generally, metals get corroded more easily. For example, iron in the presence of moisture, reacts with oxygen (air) to form hydrated iron oxide also called Rust.
$$4\text{Fe} + 3\text{O}_2 + n\text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$$
2. All the elements have two electrons in their valence shell and thus have valency 2.
3.
 - i. It is a renewable source of energy.
 - ii. To produce electricity, solar panels are used.
 - iii. The three advantages of solar cells are as follows:
 - a. Have no moving parts.
 - b. Require little maintenance.
 - c. It can be set up in remote areas.
 - iv. Solar cooker surface is painted with black because it is better absorber of heat.
4.
 - a. Insulin hormone is secreted by the pancreas.
 - b. Testosterone in male and oestrogen in the female are the hormone that is secreted during the adolescent.
 - c. If Insulin is not secreted in the proper amount then it causes diabetes.
 - d. Glucagon and Insulin are secreted from alpha and beta cells of islets of pancreas respectively.
5. (d) +1 D, **Explanation:** The net power of the resultant lens is given by the algebraic powers of the individual powers.
Equivalent power of the lens combination, $P = P_1 + P_2 = (+4 \text{ D}) + (-3 \text{ D}) = +1 \text{ D}$

OR

- (b) $180 - 2\theta$, **Explanation:** Since $\angle r = \angle i$ the deviation should be $(180 - 2\theta)$
6. (d) end the alienation of people from their forests

Explanation: The Chipko Andolan - or the 'Hug the Trees Movement' was the result of a grassroot level effort of the local people to protect the forests. The movement originated from an incident in a remote village called Reni in Garhwal in the Himalayas during the early 1970s. The local people hugged the trees and prevented the contractors from felling the trees.

7. (a) Change the resistance in the circuit.

Explanation: A **Rheostat** is an electrical instrument used to control current in a circuit by varying the resistance. The resistance can be decreased or increased with the help of a rheostat.

8. (d) True, **Explanation:** This is true that alcohols and glucose contain hydrogen ions in them but they do not dissociate to produce hydrogen ions and hence are unable to show acidic behaviour.

OR

(b) Red litmus, **Explanation:** A base (NaOH) turns red litmus blue but a neutral compound (water) does not show any colour change.

9. (b) Three to four, **Explanation:** There is a loss of energy as the energy is transferred from a lower trophic level to a higher trophic level; this limits the number of trophic levels in a food-chain. The food chains generally consist of only three or four steps since very little usable energy remains after four trophic levels.
10. (b) Decrease in energy at each trophic level
Explanation: There is a decrease in energy as the energy is transferred from a lower trophic level to a higher trophic level. The energy available to each successive trophic level is 10% of the previous trophic level. This limits the number of trophic levels in a food-chain. The food chains generally consist of only three or four steps since very little usable energy is left after four trophic levels.
11. (b) Glacial acetic acid, **Explanation:** Freezing point of pure ethanoic acid is 16.6 °C (61.9 °F). Freezing point of pure water is 0 °C. Freezing point of pure ethyl alcohol (C₂H₅OH) is -114.1 °C. Freezing point of pure acetone is -95 °C. When ethanoic acid (acetic acid) is cooled below 10 °C, it freezes to form a colourless, ice-like solid. The solid looks like glacier and hence pure ethanoic acid is called glacial ethanoic acid (or glacial acetic acid).
12. (d) less number of OH⁻ ions **Explanation:**

A weak base that is not completely ionized in aqueous solution. NH_4OH is a weak base in aqueous medium since it forms less number of OH^- ions.

13. (a) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion. Explanation: Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
14. (a) Assertion is CORRECT but, reason is INCORRECT. Explanation: Assertion is CORRECT but, reason is INCORRECT.

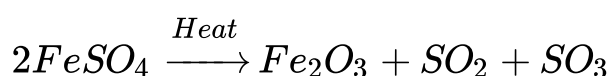
Section B

15. On the basis of reactivity of different metals with oxygen, water and acids as well as displacement reactions, the metals have been arranged in the decreasing order of their reactivities. The arrangement of metals in order of decreasing reactivities is called reactivity series or activity series of metals.

Reasons for different reactivities: In the activity series of metals, the basis of reactivity is the tendency of metal to lose electrons. If a metal can lose electrons easily to form positive ions, it will react readily with other substances. Therefore, it will be reactive metal. On the other hand, if a metal loses electrons less rapidly to form a positive ion, it will react slowly with the other substances.

Increasing order of their reactivities: $\text{Cu} < \text{Fe} < \text{Zn} < \text{Mg} < \text{Na}$

16. On heating ferrous sulphate crystal, irritating, choking smell of sulphur dioxide (SO_2) and sulphur trioxide (SO_3) will be observed.

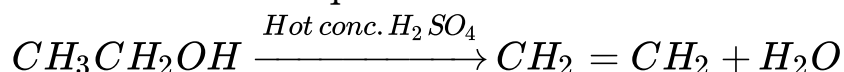


OR

- i. Rancidity can be prevented by adding antioxidants to food containing fat or oil, e.g. butylated hydroxy anisole is added to butter as antioxidant.
- ii. It can be prevented by packing fat and oil-containing foods in nitrogen gas.
17. Organic compound having 2 carbon atoms is ethane (C_2H_6).
It is suffixed with '-ol', it shows that -OH group is attached to it. So, it becomes $\text{C}_2\text{H}_5\text{OH}$.
It is known as ethanol.

When ethanol is heated with excess of conc. sulphuric acid, the sulphuric acid acts as a dehydrating agent i.e it removes excess water. This is known as elimination reaction.

balanced chemical equation :



18. Plants get carbon dioxide from the air through their leaves. Gaseous exchange occurs through stomata in plants. The carbon dioxide diffuses through small holes in the underside of the leaf called stomata.

OR

Green plants prepare their own food. They make food in the presence of sunlight. As the process of photosynthesis occurs only in the presence of light, it is called a light dependent process. Sunlight provides energy.

19. $u = -27$ cm, $f = -18$ cm. $h_o = 7.0$ cm

$$1/v = 1/f - 1/u$$

$$1/v = -1/18 + 1/27 = -1/54$$

$$v = -54 \text{ cm}$$

Screen must be placed at a distance of 54 cm from the mirror in front of it.

$$h_i/h_o = v/u$$

$$h_i/7 = +54/-27$$

$$h_i = -2 \times 7 = -14 \text{ cm.}$$

Thus, the image is of 14 cm length and is inverted image.

20. **Seminal Vesicle:** Its secretion forms a major part of the semen (60%). Its secretion is alkaline in nature which neutralises the effect of acid in the female genital tract. It has fructose sugar which provides nutrition and energy to the sperm.
21. Nerve Impulse is the electrical signal generated in neuron in response to stimulus.
- a) Dendrite
 - b) Axon
22. Total resistance of circuit (R) can be calculated as follows:

$$R = \frac{V}{I} = \frac{10V}{1A} = 10\Omega$$

Since lamp and conductor are in series so resistance of lamp

$$= 10\Omega - 5\Omega = 5\Omega$$

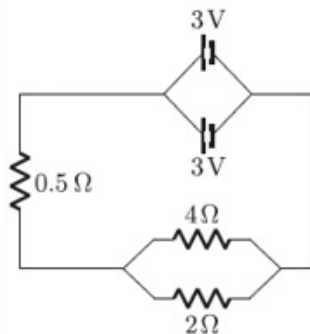
The new resistance in parallel to earlier combination has same value, i.e. 10Ω as the resistance of series combination. This means that the amount of current would be equally divided into two branches. Hence, 0.5A current will flow through 5Ω conductor.

Now, resistance remains the same but current has become half. Using Ohm law, V across the lamp can be calculated as follows:

$$V = IR = 0.5\text{A} \times 5\Omega = 2.5\text{V}$$

Thus total $R = 10\text{ ohm}$, $I = 0.5\text{ ampere}$, and potential difference across the conductors is 2.5 volt .

23. The circuit diagram is as follows:



To calculate the current

Resistor 4Ω and 2Ω are connected in parallel. So, their equivalent resistance is given by

$$R_p = \frac{4 \times 2}{4 + 2} = \frac{8}{6} = \frac{4}{3}\Omega = 1.33\Omega$$

Total resistance of circuit,

$$R = R_p + 0.5\Omega = (1.33 + 0.5)\Omega = 1.83\Omega$$

Current in the circuit,

$$I = \frac{3\text{V}}{1.83\Omega} = 1.64\text{A}$$

Potential difference across 0.5Ω resistor is

$$V' = 1.64 \times 0.5 = 0.82\text{V}$$

The potential difference across 4Ω resistor is

$$V'' = V - V' = 3 - 0.82 = 2.18 \text{ V}$$

Thus, current flowing through 4Ω resistor is

$$I_1 = \frac{2.18\text{V}}{4\Omega} = 0.55\text{A}$$

24. Cord of heater and electric heater are joined in series and carry same current when joined to voltage source. As resistance of cord is extremely small as compared to that of heater element. hence, heat produced $H = I^2 R t$ is extremely small in cord but much larger in heater element. So, the heating element begins to glow but cord does not glow.

OR

$u = -25$ (u is always negative) $v = ?$ $h_1 = 4 \text{ cm}$, $h_2 = ?$ $f = -15 \text{ cm}$ using $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{(-15)} - \frac{1}{(-25)}$$

$$\text{or } \frac{1}{v} = -\frac{1}{15} + \frac{1}{25} = \frac{-5 + 3}{75} = \frac{-2}{75}$$

$$\text{Or } v = \frac{-75}{2} = -37.5 \text{ cm}$$

The image is real and screen should be placed 37.5 cm from the mirror on the object side of the mirror.

$$\text{Now } m = \frac{h_2}{h_1} = -\frac{v}{u}$$

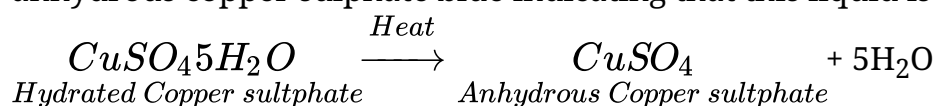
$$\text{or } m = \frac{h_2}{4} = \frac{(-37.5) \text{ cm}}{(-25) \text{ cm}} = -\frac{3}{2} \text{ or } h_2 = -\frac{3}{2} \times 4 = -6 \text{ cm}$$

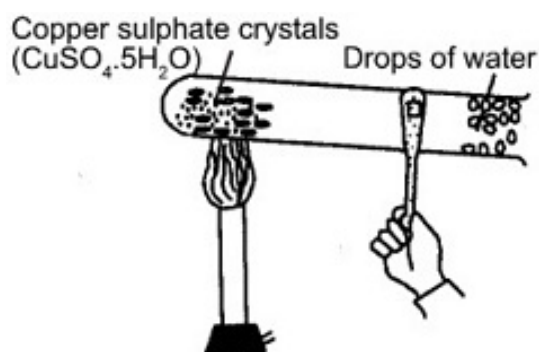
The image is inverted and enlarged.

Section C

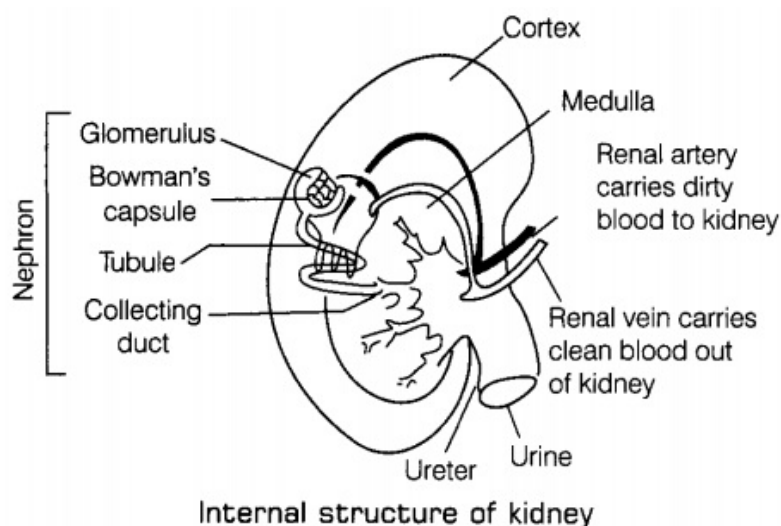
25. Experiment to show that blue vitriol crystals contain water of crystallization: Take some powdered copper sulphate crystals in a clean and dry test tube and heat the crystals with slightly tilting it downwards. Drops of colourless liquid will condense on the cooler parts and collect it in a dish.

Anhydrous white copper sulphate is left behind in the test tube. This liquid turns anhydrous copper sulphate blue indicating that this liquid is water





26. The vertical column of the periodic table consisting elements of similar properties is called group. There are 18 groups in modern periodic table which are divided into two blocks A and B.
- Number of valence electrons i.e. the outermost electrons remains same in a group.
 - Number of occupied shells increases down the group.
 - Size of atoms increases (as number of shell increases).
 - Metallic character increases on going down the group.
 - Effective nuclear charge (Z_{eff}) decreases on going down the group.
27. The kidneys are bean-shaped organs that are located against the back muscles in the upper abdominal area. They sit opposite each other on both the left and right side of the body; the right kidney is little lower than the left to accommodate the liver.
- Structure: Each kidney is bean-shaped organs reddish-brown in colour (about 11 **cm** x 7 **cm** x 3 **cm**). The renal artery brings the impure blood containing waste substances into the kidneys, while renal vein carries away the pure blood from the kidneys. They contain nephrons as their structural and functional unit in large number which remove harmful substances such as urea and other salts along with an excess of water from the blood and form urine



The main functions of the kidney are:

- i. **Waste excretion:** There are many things that our body doesn't want inside of it. The kidneys filter out toxins, excess salts, and **urea**, a nitrogen-based waste created by cell metabolism. Urea is synthesized in the liver and transported through the blood to the kidneys for removal.
- ii. **Water level balancing:** As the kidneys are key in the chemical breakdown of urine, they react to changes in the body's water level throughout the day. As water intake decreases, the kidneys adjust accordingly and leave water in the body instead of helping excrete it.
- iii. **Blood pressure regulation:** The kidneys need constant pressure to filter the blood. When it drops too low, the kidneys increase the pressure. One way is by producing a blood vessel-constricting protein (**angiotensin**) that also signals the body to retain sodium and water. Both the constriction and retention help restore normal blood pressure.
- iv. **Red blood cell regulation:** When the kidneys don't get enough oxygen, they send out a distress call in the form of **erythropoietin**, a hormone that stimulates the bone marrow to produce more oxygen-carrying red blood cells.
- v. **Acid regulation:** As cells metabolize, they produce acids. Foods we eat can either increase the acid in our body or neutralize it. If the body is to function properly, it needs to keep a healthy balance of these chemicals. The kidneys do that, too

28. Conclusion and hereditary principles derived from monohybrid cross.

1) Principles of paired factors: Each character is represented in an individual by two determinants/factors/genes. They are same in homozygous which breed true. In hybrid or heterozygous individuals two factors represent alternative forms.

2) Principle of dominance: In a heterozygous individual only one allele is able to express its effect called dominant while the other remains hidden termed recessive.

3) Principle of purity of gametes: A gamete receives only one of the two genes or factors, thus gametes are always pure for a character.

4) The two genes or determinants do not mix up.

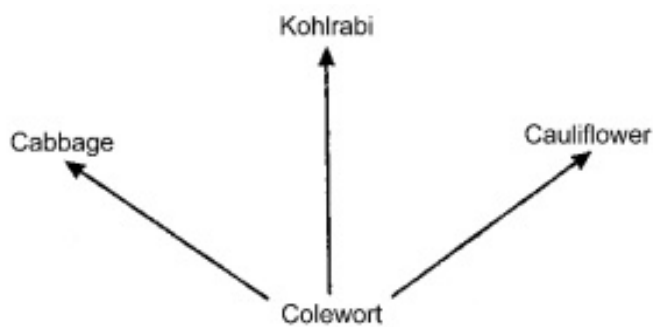
5) Homozygous individuals breed true whereas heterozygous give a phenotypic ratio of 3 : 1.

6) Principle of segregation: The two factors of a character keep their identity in an individual. They segregate (separate) during gamete formation and are passed on to

the offspring randomly after fertilization.

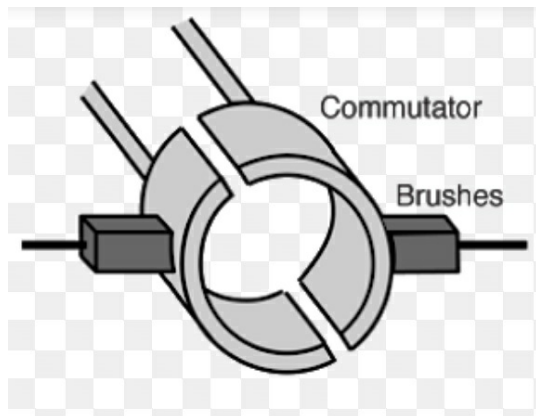
OR

A close parallelism exists between natural selection and artificial selection. Artificial selection is done by man exactly in the same way as nature does. The criteria for selections are based on human interest. Man in breeding experiments on useful animals, selects individuals with desired traits and separates them from those which do not possess such traits. After repeating this process for a few generations a new breed of animals is formed. In this way man has been able to produce several varieties of domesticated animals like cows, horses, sheep, dogs etc. from their wild ancestors. Other examples of organisms produced by man through artificial selection are kohlrabi, cabbage, cauliflower, all these are obtained from common ancestor, colewort.



Different breeds of pigeons have been obtained from wild Rock Pigeon through artificial selection. If man can produce new varieties of breeds in a short period of time, nature with its vast resources and long period can produce vast varieties of organisms.

29. a. **Fleming's left-hand rule:** Adjust your forefinger, middle finger and thumb of left hand in such a way that they are mutually perpendicular to one another. If the forefinger point in the direction of magnetic field, middle finger point in the direction of current then the thumb show the direction of force or motion on the current-carrying conductor.
- Function of brushes:** Maintain contact between the coil and the external circuit.
 - Function of split rings:** Reverse the direction of current after each half rotation of the coil so that the coil can keep rotating continuously.



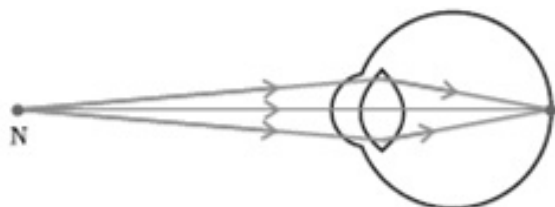
30. Myopia: The defect of an eye in which it cannot see the distant objects clearly is called myopia. A person with myopia can see nearby objects clearly.

Hypermetropia: Hypermetropia is also known as long-sightedness. In this defect, a person can see the distant objects clearly but cannot see the nearby objects clearly.

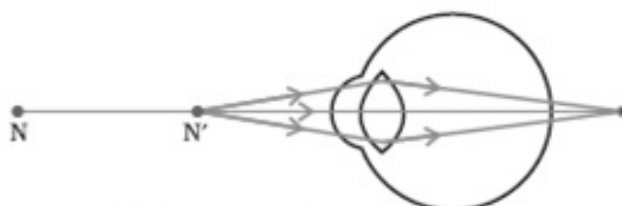
Causes of Hypermetropia:

- i. The focal length of the eye lens is too long.
- ii. The eyeball has become too small.

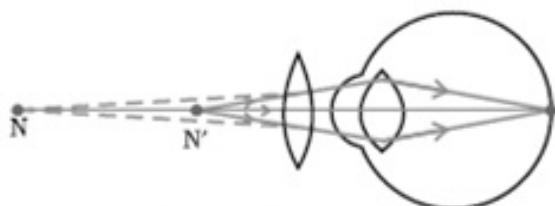
In hypermetropia, the image of a distant object is formed behind the retina and not on the retina. The defect is corrected by using the Convex lens of suitable power so that the lens will bring the image back on to the retina. The ray diagram of hypermetropia eye are as follows:



(a) Near point of a Hypermetropic eye



(b) Hypermetropic eye



(c) Correction for Hypermetropic eye

OR

The ability of a lens to converge or diverge light rays is called power of the lens. It is defined as the reciprocal of focal length. It's SI unit is dioptre (D). If focal length is expressed in metres, then power is expressed in dioptre. We can say, dioptre is the power of a lens whose focal length is one metre. For concave lens P and f are negative. For convex lens P and f are positive. Lens A of focal length + 10 cm is convex lens

and power, $P = \frac{100}{f(\text{in cm})} = \frac{100}{10} = +10D$

Lens B of focal length - 10 cm is concave lens

and power, $P = \frac{100}{f(\text{in cm})} = \frac{100}{-10} = -10D$

Lens A (i.e. convex lens) will form a virtual and magnified image of an object placed 8 cm from it, as shown.

