

CBSE Class 10 Science
Sample Paper - 11

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.

Section A

1. Why are food items packed in aluminium foils?
2. Define atomic radius. Give its units.
3. **Answer the questions that follows 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. Following questions are based on the two tables given below. Study these tables related to blood sugar levels and answer the questions that follow.

Table A (Blood glucose chart)

	Mean Blood Glucose Level (mg/dL)
Doctor's advice needed	380
	350
	315
	280
	250
	215
Good	180

	150
Excellent	115
	80
	50

Table B (Blood Report of Patient X and Y)

Time of check	Blood Glucose ranges (mg/dL)	
	Patient X	Patient Y
Before breakfast (Fasting)	<100	70-130
Before lunch, supper and snack	<110	70-130
Two hours after meals	<140	<180
Bedtime	<120	90-15

Answer the following questions:

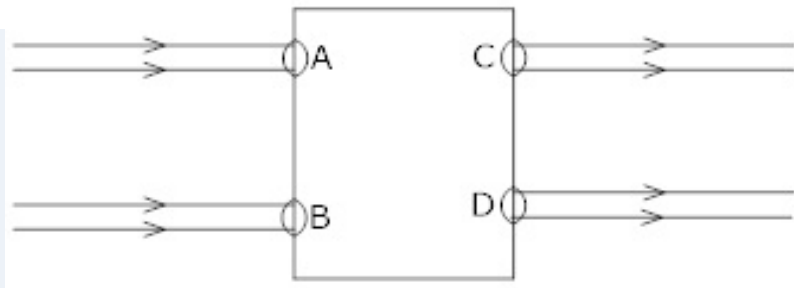
- a. Refer to Table B showing the blood report of the levels of glucose of patients X and Y. Infer the disease which can be diagnosed from the given data.
- b. Identify the hormone whose level in the blood is responsible for the above disease.
- c. Which one of the following diets would you recommend to the affected patient?
 - i. High sugar and a low-fat diet.
 - ii. Low sugar and high protein diet.
 - iii. High Fat and low fibre diet.
 - iv. Low sugar and high fibre diet.
- d. Refer to Table A and suggest the value of the mean blood glucose level beyond which doctor's advice is necessary:
 - i. 80 mg/dL
 - ii. 115 mg/dL
 - iii. 50 mg/dL
 - iv. 80 mg/dL
5. If a pencil beam is allowed to fall along the principal axis of a concave mirror, the ray

will

- a. emerge out along the principal axis
- b. deviate by 60°
- c. retrace its path along principal axis
- d. deviate by 30°

OR

Beams of light are incident through the holes C and D respectively as shown in the figure. Which of the following could be inside the box?



- a. A rectangular glass slab
- b. Convex lens
- c. Concave lens
- d. Prism

6. Some of the ancient 'water harvesting structures' used in different rural regions of our country are:

State	Water harvesting structures
Rajasthan	_____, _____, _____
Maharashtra	Bandharas, Tals
Uttar Pradesh	Bhundhis
Madhya Pradesh	Bhundhis

Which of the following is correct water harvesting structure of Rajasthan?

- a. Khadin, tanks, Nadis
- b. Kattas
- c. Ahars, Pynes
- d. Surangams

7. A wire of resistance $2\ \Omega$ is bent to form a circle. What is the resistance between two diametrically opposite points?

- a. $0.5\ \Omega$
- b. $4\ \Omega$
- c. $1\ \Omega$
- d. $1.5\ \Omega$

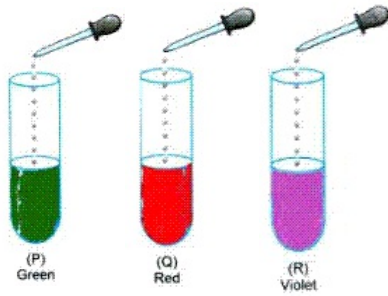
8. Which of the following pairs of safety symbols are marked on the bottles of commercial acetic acid available in the laboratory?



- a. III
- b. I
- c. IV
- d. II

OR

On adding a few drops of universal indicator to three unknown colourless solution (P), (Q) and (R) taken separately in three test tubes shown in the following diagrams, a student observed the changes in colour as green in (P), red in (Q) and violet in (R).



The decreasing order of pH of the solutions taken is :

- a. $R > Q > P$
- b. $Q > P > R$
- c. $R > P > Q$
- d. $P > Q > R$

9. Which of the following is not a terrestrial ecosystem?

- a. Grassland
- b. Desert
- c. Aquarium
- d. Forest

10. The ecosystem of earth is known as:

- a. Association
- b. Biome
- c. Biosphere
- d. Community

11. While cooking, if the bottom of the vessels is getting blackened on the outside, it means that:

- a. The food is not cooked completely

-
- b. The fuel is not burning completely.
- c. The fuel is burning completely.
- d. The fuel is wet.
12. Dilute hydrochloric acid was added to solid sodium bicarbonate. It was observed that
- a. a gas evolved with a pop sound
- b. brisk effervescence was produced
- c. solution colour is yellow
- d. a gas evolved and a black residue appeared at the bottom of the test tube

13. **Assertion:** CH_3Cl is obtained from CH_4 by the action of Cl_2 in the presence of sunlight.

Reason: It is obtained by addition reaction.

- a. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
- 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. Assertion is CORRECT but, reason is INCORRECT.
14. **Assertion:** When the length of a wire is doubled, then its resistance also gets doubled.
- Reason :** The resistance of a wire is directly proportional to its length.

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

Section B

15. What is an ion? How does an atom change into an ion?

16. What happens when CaO is dissolved in water?

OR

On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

- i. Write a balanced chemical equation of the reaction involved.
- ii. What other name can be given to this precipitation reaction?
- iii. On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

17. Write the chemical equation for the following conversions, stating the essential conditions.

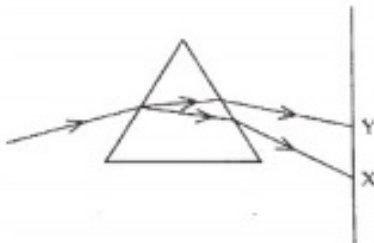
- i. Ethanol to ethene.
- ii. Propanol to propanoic acid

18. What are the components of the gastric juice? What are their functions?

OR

Give two function of pancreas.

19. In the figure given below, a narrow beam of white light is shown to pass through a triangular glass prism. After passing through the prism, it produces a spectrum XY on the screen.



- i. Name the phenomenon.
- ii. State the colours seen at X and Y.
- iii. Why do different colours of white light bend at different angles through a prism?

20. Draw well labelled diagram of V.S of mature ovule of Angiosperms.

21. Name the hormones responsible for

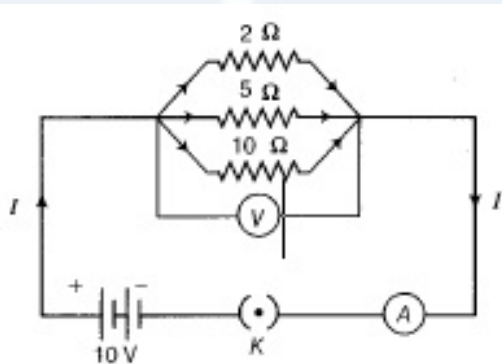
- i. development of moustaches and beard in males.
- ii. controlling the changes of uterus in menstrual cycle.
- iii. increasing blood glucose level.
- iv. maintaining water and electrolyte balance.

22. i. Heating elements of electrical heating devices is made up of an alloy rather than a pure metal. Give two reasons.

ii. Four resistors of 4Ω each are joined end to end to form a square. Calculate the equivalent resistance of the combination between two adjacent corner?

23. Draw a circuit diagram of an electric circuit containing of two resistors ammeter, a resistor of 2Ω in series with a combination of two resistors (4 each) in parallel and a voltmeter across the parallel combination. Will the potential difference across the 2Ω resistors be the same as that across the parallel combination of 4Ω resistors? Give reason.

24. A circuit diagram is given as shown below:



Calculate

- i. the total effective resistance of the circuit.
- ii. the total current in the circuit.
- iii. the current through each resistor.

OR

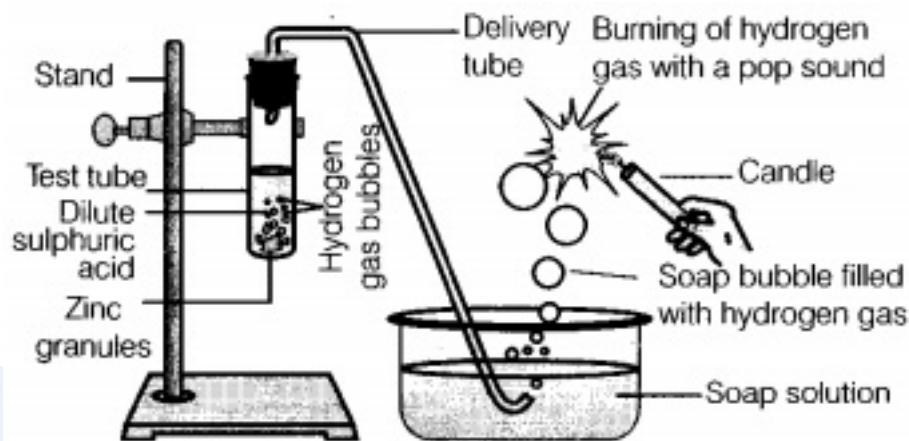
An object is placed at $2F_1$ in front of a convex lens. What is the

- i. Position

- ii. Size
- iii. nature of image?

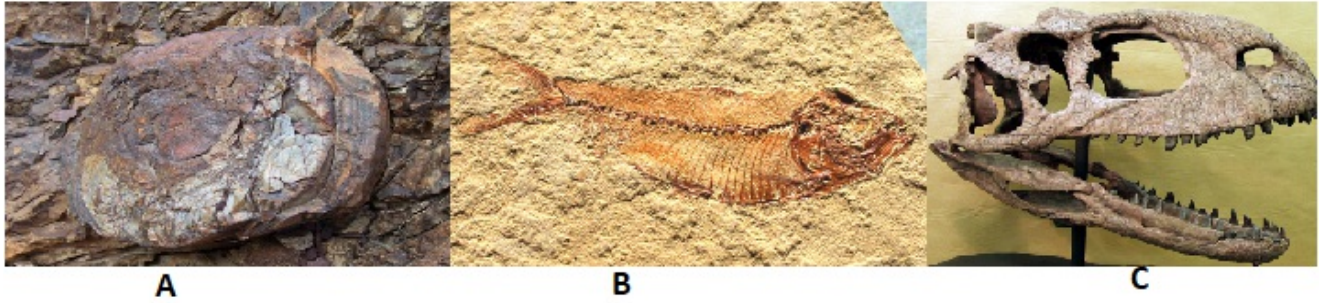
Section C

25. In the following schematic diagram for the preparation of hydrogen gas as shown in the figure, what would happen if the following changes are made?



- i. In place of zinc granules, same amount of zinc dust is taken in the test tube.
 - ii. Instead of dilute sulphuric acid, dilute hydrochloric acid is taken.
 - iii. In place of zinc, copper turnings are taken.
 - iv. Sodium hydroxide is taken in place of dilute sulphuric acid and the test tube is heated.
26. The elements of a period of the periodic table are given below in order, from left to right with one of its element missing.
- Li Be B C O F Ne
- i. To which period do these elements belong?
 - ii. One element of this period is missing. Which is the missing element and where should it be placed?
 - iii. Which one of these elements in the period shows the property of catenation?
 - iv. Which one of the above elements belongs to the halogen series?
 - v. Identify the noble gas.
27. Define nutrition. What are the different modes of nutrition?

28.



- i. Identify the fossils A, B and C.
- ii. In which region was fossil C found?
- iii. In which region are recent fossils found?

OR

In man four types of blood groups A, B, AB and O are controlled by three alleles of a gene. What is the mechanism of inheritance of the blood groups?

29. Give the principle, construction and working of an electric motor. Where is it used? Write the function of a split ring in electric motor.
30. A 14-year old student is not able to see clearly the questions written on the blackboard placed at a distance of 5 m from him.
 - a. Name the defect of vision he is suffering from.
 - b. With the help of labelled ray, diagrams show how this defect can be corrected.
 - c. Name the type of lens used to correct this defect.

OR

- i. Define optical centre of spherical lens.
- ii. A divergent lens has a focal length of 20 cm. At what distance should an object of height 4 cm from the optical centre of the lens be placed, so that its image is formed 10 cm away from the lens. Find the size of the image also.
- iii. Draw a ray diagram to show the formation of image in above situation.

CBSE Class 10 Science
Sample Paper 09 (2019-20)

Answer
Section A

1. A protective coating of aluminium oxide (Al_2O_3) is formed on the surface of the foil which prevents it from getting corroded in the presence of air and water. Hence, food items are saved from getting spoilt when packed in aluminium foils.
2. Atomic radius is the distance from the centre of the nucleus to the valence electron in an energy level. Atomic radius is expressed in angstrom units.

Also, the atomic radius of a non-metallic element is defined as half the distance between the nuclei of two atoms bound by a single covalent bond.

Units = $\overset{\circ}{\text{A}}$ or pm (picometre)

e.g. atomic radius of hydrogen atom = 37 pm.

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. Diabetes
 - b. (b) Insulin
 - c. (iv) low sugar high fibre diet
 - d. (i) 180mg/dL
5. (c) retrace its path along principal axis

Explanation: Angle of incidence for a ray along principal axis is zero and so will be the reflection angle. So the ray will retrace its path.

OR

(a) A rectangular glass slab

Explanation: A rectangular glass slab could be inside the box since the emergent rays are parallel to the incident rays. A convex lens converges the parallel rays while a concave lens diverges the parallel rays. Parallel rays incident on the face of a prism will bend towards its base.

6. (a) Khadin, tanks, Nadis

Explanation: A khadin, also called a dhora, is an ingenious construction designed to harvest surface runoff water for agriculture.

Tankas (small tank) are underground tanks.

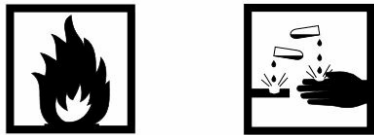
Nadis are village ponds.

These structures are used to harvest water in a sustainable way where rainfall is very low.

7. (a) 0.5Ω , **Explanation:** When a wire of resistance 2Ω is bent to form a circle, the resistance between the two diametrically opposite points can be calculated as a parallel combination of two resistors of 1Ω each. The effective resistance of the two resistors will be

8. (a) III

Explanation:



This symbol represent given solution is corrosive and inflammable.

OR

(c) $R > P > Q$

Explanation: R is basic \therefore pH is > 7

P is neutral, pH = 7

Q is red, acidic, i.e. pH is less than 7.

So, pH of $R > P > Q$

9. (c) Aquarium, **Explanation:** An aquarium is not a terrestrial ecosystem. Forest, desert and grassland are terrestrial ecosystems. An ecosystem may be a terrestrial ecosystem or an aquatic ecosystem.

10. (c) Biosphere

Explanation: The ecosystem of the earth is known as **biosphere**. The term "biosphere"

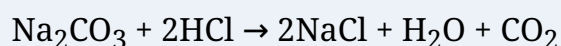
was coined by geologist Eduard Suess in 1875, which he defined as the place on Earth's surface where life dwells.

11. (b) The fuel is not burning completely.

Explanation: If the bottom of the vessels is getting blackened (due to deposit of soot) on the outside while cooking, it is an indication that the fuel is not burning completely. When the fuel does not burn completely, some carbon particles remain un-oxidised and form soot.

12. (b) brisk effervescence was produced

Explanation: Sodium carbonate on reaction with dilute HCl forms sodium chloride, water and carbon dioxide. This reaction is an example of neutralisation reaction, as sodium carbonate is a basic salt, while hydrochloric acid is an acid. Following is the chemical equation for the reaction



Brisk effervescence was produced due to carbon dioxide.

13. (d) Assertion is CORRECT but, reason is INCORRECT. Explanation: Assertion is CORRECT but, reason is INCORRECT.
14. (b) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion. Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

Section B

15. An ion may be defined as: An atom or group of atoms having positive or negative charge.

An atom may change into an ion either by the loss of one or more electrons or by the gain of one or more electrons. For example, when sodium atom loses one electron, it forms Na^+ ion which has one electron less than the atom.

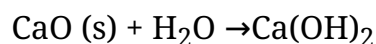
Na	$\xrightarrow{\text{losses one electron}(e)}$	Na^+
Sodium atom		Sodium ion

Similarly, when chlorine atom gains one electron, it changes into Cl^- ion which has one electron more than the Cl atom.

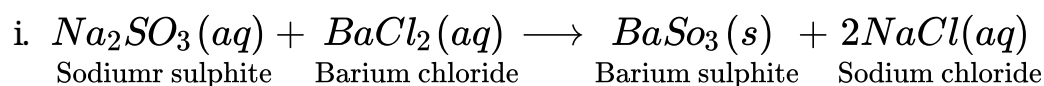
Cl	$\xrightarrow{\text{gains one electron}(e)}$	Cl ⁻
Chlorine atom		Chloride ion

16. Calcium oxide reacts with water to form calcium hydroxide, also called slaked lime. It is an exothermic reaction.

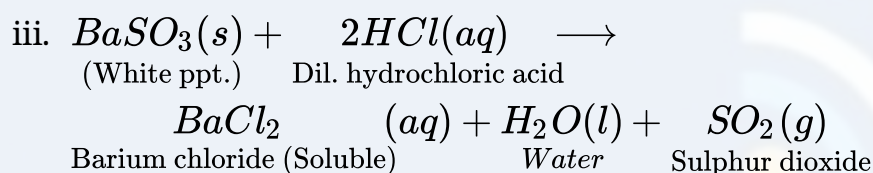
Here are the equations for this reaction: calcium oxide + water → calcium hydroxide



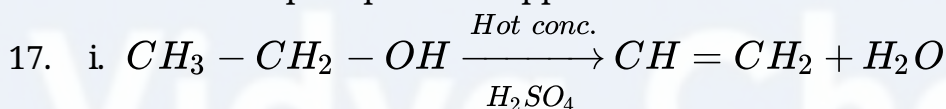
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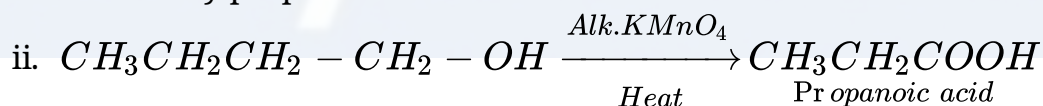
ii. Double displacement reaction



The white precipitate disappears because it is soluble in water.



The name of the reaction is dehydration reaction. This reaction is used for laboratory preparation of ethene.



The name of the reaction is oxidation reaction.

18. Gastric juice contains three components: hydrochloric acid, enzyme pepsin and mucus.

Their functions are:

(i) Hydrochloric acid in the stomach is used to make the medium acidic to facilitate the action of the enzyme pepsin and to kill germs if any.

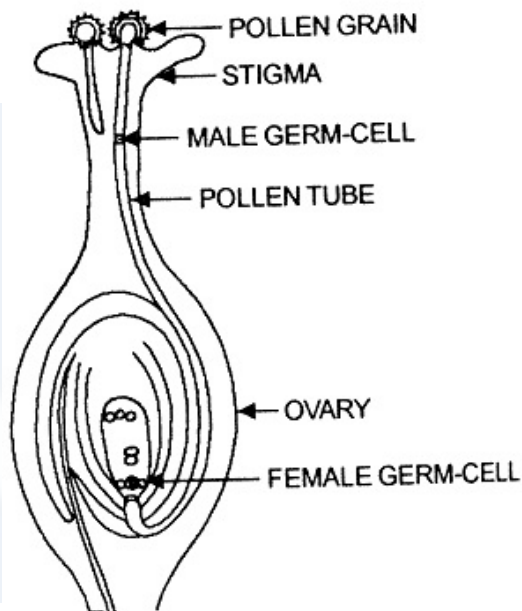
(ii) Enzyme pepsin digests proteins to convert them into peptones.

(iii) The mucus helps to protect the stomach wall from its own secretions of hydrochloric acid.

OR

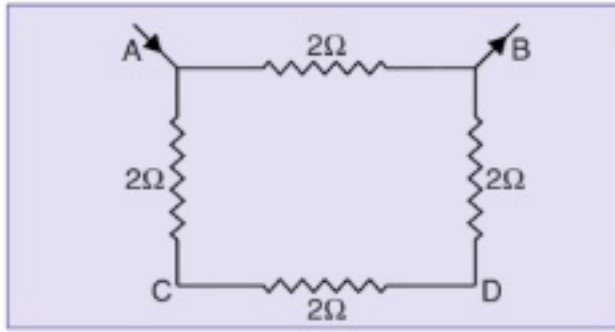
Function of pancreas are:

1. Secretion of pancreatic juice.
 2. Helps in Digestion
 3. Two of the main pancreatic hormones are insulin, which acts to lower blood sugar, and glucagon, which acts to raise blood sugar.
19. i. The phenomenon is called dispersion.
ii. X — Violet Y — Red
iii. Different colours of white light bend through different angles with respect to the incident beam of light due to difference in speed of light of different wavelengths.
20. Mature ovule



21. i. Testosterone Hormone is responsible for development of mustaches and beard in males.
ii. Progesterone Hormone is responsible for controlling the changes of uterus in menstrual cycle.
iii. Glucagon Hormone is responsible for increasing blood glucose level.
iv. Vasopressin Hormone is responsible for maintaining water and electrolyte balance.
22. i. Alloys are used for making electrical devices because they have a higher resistivity and do not oxidize readily at high temperature.
ii. As shown in the figure given alongside, let resistance is required across the corners A and B of the square ABCD. It means each of the 2Ω resistors across the sides AC, CD and DB of the square are connected in series and to this combination,

fourth resistors across the side AB is connected in parallel.



The net resistance of first three resistors in series is,

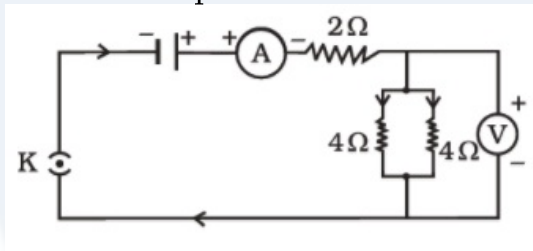
$$R = 2 + 2 + 2 = 6\Omega$$

Now the fourth resistor across AB is in parallel to this combination. Hence equivalent resistance across AB,

$$\frac{1}{R} = \frac{1}{6} + \frac{1}{2} = \frac{4}{6}$$

$$\text{or } R = \frac{6}{4} = 1.5\Omega$$

23.



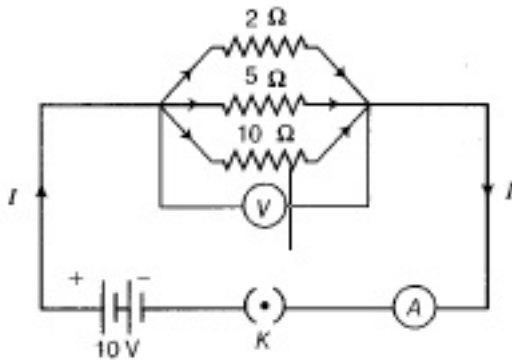
Total resistance for parallel combination of 4Ω resistor can be calculated as follow:

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

$$\text{or, } R = 2\Omega$$

Thus, resistance of parallel combination is equal to resistance of resistors in series. So, potential difference across 2Ω resistance will be same as potential difference across the other two resistors which are connected in parallel.

24.



i. Effective resistance is,

$$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$= \frac{1}{2} + \frac{1}{5} + \frac{1}{10} = \frac{5+2+1}{10} = \frac{8}{10}$$

$$\Rightarrow R_{eff} = \frac{10}{8} = 1.25\Omega$$

ii. Total current,

$$I = \frac{V}{R_{eff}}$$

$$= \frac{10}{1.25}$$

$$= 8A$$

iii. Current through each resistor,

$$I_1 = \frac{V}{R_1} = \frac{10}{2} = 5A,$$

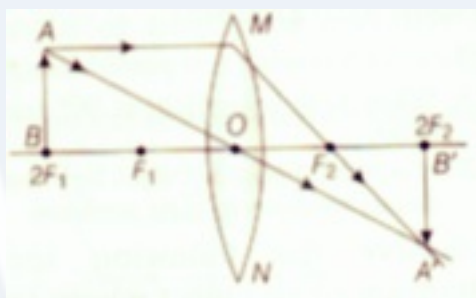
$$I_2 = \frac{V}{R_2} = \frac{10}{5} = 2A$$

and

$$I_3 = \frac{V}{R_3} = \frac{10}{10} = 1A.$$

OR

When object is placed at $2F_1$.



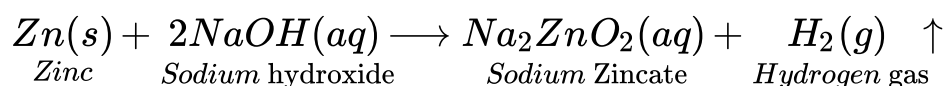
i. Image is formed at $2F_2$.

ii. Same size of image as that of the object.

iii. Real and inverted.

Section C

25. i. Since the zinc dust has a larger surface area than zinc granules. If the same amount of zinc dust is taken in the test tube then the reaction will be comparatively faster and hydrogen gas will evolve with greater speed.
- ii. With dilute hydrochloric acid, almost the same amount of gas is evolved.
- iii. With copper turnings, hydrogen gas will not evolve because copper is less reactive and it will not displace hydrogen from the acid. Hence, no reaction will take place.
- iv. Zinc also reacts with NaOH. So, if sodium hydroxide is taken, then hydrogen gas will be evolved.



-
26. i. All of these elements belongs to the 2nd period. Second period consists of 8 elements in total.
- ii. Nitrogen (N) is missing from these elements. It should be placed between carbon and oxygen in the V A group.
- iii. Carbon (C) shows the property of catenation.
- iv. Fluorine (F) belongs to the halogen series
- v. Neon (Ne) is the noble gas.

27. **Nutrition:** The sum total of processes by which living organisms obtain food materials and prepare them for use in the growth, repair and providing energy is termed nutrition.

Nutrition is of two types: 1) Autotrophic nutrition, 2) Heterotrophic nutrition.

1) Autotrophic nutrition: The mode of nutrition in which an organism prepares its own food is called autotrophic nutrition. Mostly green plants have the ability to manufacture their own organic food due to the presence of chlorophyll. They take up CO₂ and H₂O and manufacture carbohydrates in the presence of sunlight process called as photosynthesis. Such organisms are called autotrophs and their mode of nutrition is called autotrophic.

2) Heterotrophic nutrition: The mode of nutrition in which an organism takes food from another organism is called heterotrophic nutrition. In this type of nutrition, the animals derive organic food materials by consuming bodies or products of other living or dead plants or animals.

28. i. Fossil A is a tree trunk.
Fossil B is a fish (Knightia).
Fossil C is a dinosaur skull (Rajasaurus).
- ii. Fossil C, i.e. the dinosaur skull, was found only a few years ago in the Narmada Valley. Which lies in the northern zone of India.
- iii. The recent fossils means they are less old that is the remains of the organism who recently became extinct. The more recent the fossil the more it lies close to the surface of earth. Thus it will be found in the upper layers of the earth.
Depending on the depth of the fossils in the layers of Earth, the fossils are classified as recent or older.

OR

More than two forms exist for certain genes. It is an example of multiple alleles. A well-known example is ABO blood types in humans. The four human blood groups, A, B, AB, and O are phenotypes of the trait.

Three different alleles I^A , I^B and i of a gene determine the phenotypes of the four blood groups. The six types of genotypes are as follows:

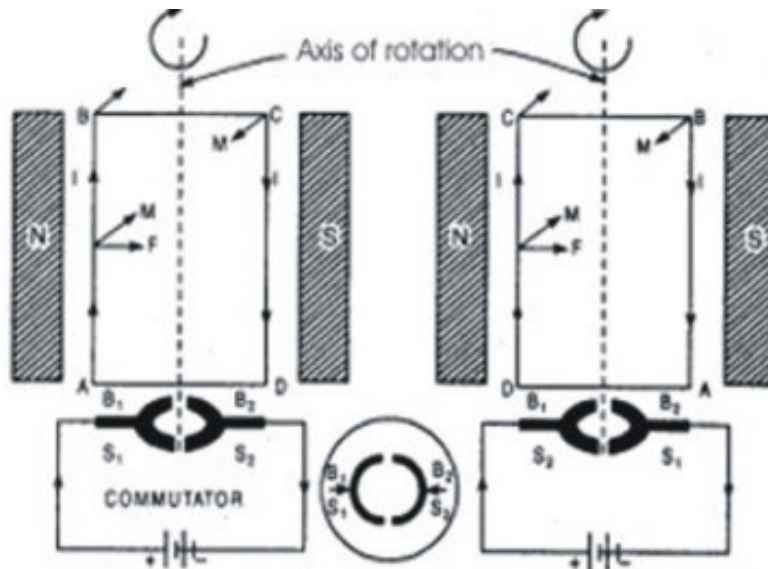
Phenotype (Blood group)	Genotype
O	ii
A	$I^A I^A$ or $I^A i$
B	$I^B I^B$ or $I^B i$
AB	$I^A I^B$

Both I^A and I^B are dominant over i . Since a person with genotype $I^A I^B$ has AB blood groups. It is an example of codominance.

Thus ABO blood groups exhibit three genetic aspects:

- 1) Dominant recessive mechanism
- 2) Multiple alleles
- 3) Co-dominance.

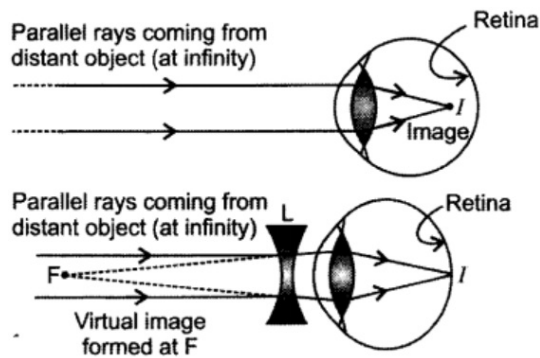
29. Principle: Electric motor is based upon Fleming's left-hand rule. When a current-carrying conductor capable of free movement is placed in a magnetic field, it experiences a mechanical force and begins to move in a direction given by Fleming's left-hand rule. Construction: A DC motor consists of a single coil ABCD called an armature between the pole pieces of a magnet as shown in fig. The armature consists of a coil of a large number of turns of insulated wire wrapped on a soft iron core. The two ends of the armature are connected to segments S_1 and S_2 of a commutator. The brushes B_1 and B_2 keep their contact with the commutator as it rotates.



Working: A direct current from a battery is passed through armature. The current flows in the coil along ABCD as shown in fig. The limb AB of the coil experience downwards and CD of the coil experience upward force in accordance with Fleming's left-hand rule. These two equal and opposite forces constitute a couple tending to rotate the coil in clockwise direction. After half the rotation, brush B_1 has contact with S_2 and brush B_2 with S_1 . The direction of the current gets reversed. The current now flows along DCBA instead of along ABCD. Limb DC experiences downward and BA experiences an upward force in accordance with Fleming's left-hand rule. The process repeats itself and motion of armature becomes continuous after some time.

Split rings help in reversing the current in the coil after every half rotation.

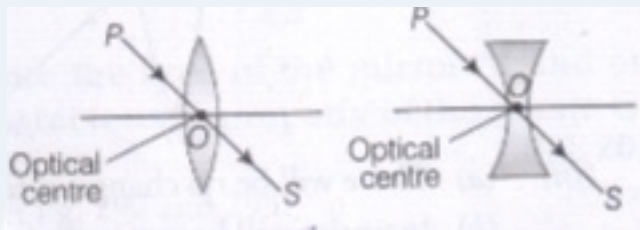
30. a. Since, 14-year old student is not able to see clearly the questions written on the blackboard placed at a distance of 5 m from him. Therefore, he is suffering from myopia (short-sightedness) defect. It is caused due to
1. excessive curvature in cornea.
 2. elongation of eyeball.
- b. A myopic eye has its far point nearer than infinity. It forms the image of a distant object in front of its retina as shown in the figure. It can be corrected by using the concave lens of suitable focal length.



- c. The concave lens should be used to correct this defect.

OR

- i. The centre point of a lens is known as its optical centre. The optical centre is a point within the lens, directed to which incident rays refract without any deviation in the path whether it is convex lens or concave lens as represented below:



- ii. Given, there is a divergent lens(concave lens.)

Given, $f = -20\text{cm}$, $h_0 = 4\text{ cm}$, $v = -10\text{ cm}$

\therefore By lens formula,

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

$$\Rightarrow \frac{-1}{10} - \frac{1}{u} = \frac{-1}{20}$$

$$\Rightarrow \frac{1}{u} = \frac{-1}{10} + \frac{1}{20} \Rightarrow \frac{1}{u} = \frac{-2 + 1}{20}$$

$$\Rightarrow u = -20\text{ cm}$$

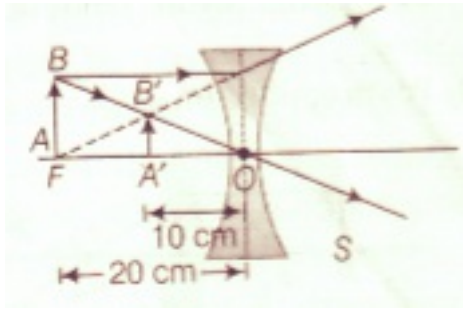
$$\therefore \text{Magnification, } m = \frac{v}{u} = \frac{h_i}{h_0}$$

$$\Rightarrow \frac{h_i}{4} = \frac{-10}{-20}$$

$$\Rightarrow h_i = 2\text{ cm}$$

Size of the image, $h_i = 2\text{ cm}$

- iii.



Thus, the object is placed at 20 cm from the concave lens.



Vidya Champ