

SCIENCE
CLASS X (THEORY)
SAMPLE QUESTION PAPER-I

Time : 3 Hours

Maximum Marks : 75

Multiple Choice Questions

- 1.** Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Which among the following is (are) true about slaking of lime?
- (i) It is an endothermic reaction
 - (ii) It is an exothermic reaction
 - (iii) The pH of the resulting solution will be more than seven
 - (iv) The pH of the resulting solution will be less than seven
- (a) (i) and (ii)
(b) (ii) and (iii)
(c) (i) and (iv)
(d) (iii) and (iv) (1)
- 2.** Sodium carbonate is a basic salt because it is a salt of
- (a) strong acid and strong base
 - (b) weak acid and weak base
 - (c) weak base and strong acid
 - (d) strong base and weak acid (1)
- 3.** Which one of the following four metals would be displaced from the solution of its salt by other three metals?
- (a) Mg
 - (b) Ag
 - (c) Zn
 - (d) Cu (1)
- 4.** Which one among the following is the correct representation of electron dot structure of nitrogen
- (a) $\cdot\ddot{N} : \ddot{N} \cdot$
 - (b) $\cdot\ddot{N} :: \ddot{N} \cdot$
 - (c) $\cdot\ddot{N} : \ddot{N} \cdot$
 - (d) $\cdot N :: N \cdot$ (1)

5. The correct sequence of anaerobic reactions in yeast is

- (a) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Ethanol + Carbondioxide
(b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Lactic acid
(c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic acid
(d) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Ethanol + Carbondioxide
(1)

6. Offspring formed as a result of sexual reproduction exhibit more variations because

- (a) sexual reproduction is a lengthy process
(b) genetic material comes from two parents of the same species
(c) genetic material comes from two parents of different species
(d) genetic material comes from many parents
(1)

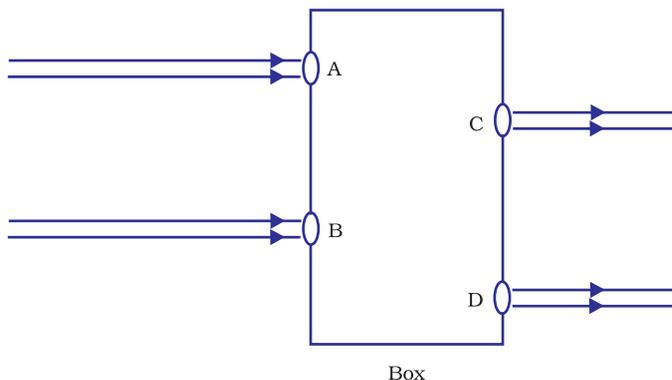
7. New species may be formed if

- (i) DNA undergoes significant changes in germ cells
(ii) chromosome number changes in the gamete
(iii) chromosome number remains the same
(iv) mating does not take place

- (a) (i) and (ii)
(b) (i) and (iii)
(c) (ii), (iii) and (iv)
(d) (i), (ii) and (iv)
(1)

8. Beams of light are incident through the holes A and B and emerge out of the box through the holes C and D respectively as shown in the Figure. Which of the following could be inside the box?

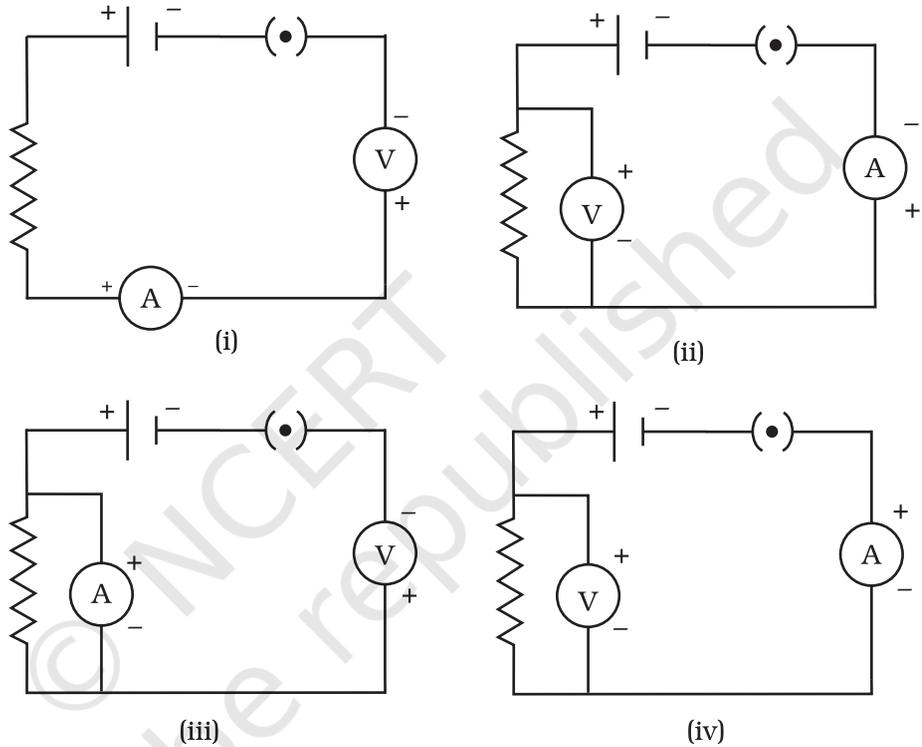
- (a) a rectangular glass slab
(b) a convex lens
(c) a concave lens
(d) a glass prism
(1)



9. The clear sky appears blue because

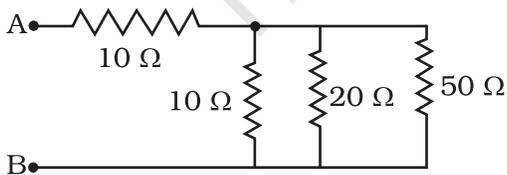
- (a) blue light gets absorbed in the atmosphere.
- (b) ultraviolet radiations are absorbed in the atmosphere.
- (c) violet and blue lights get scattered more than all other colours by the atmosphere.
- (d) light of all other colours is scattered more than the violet and blue colour lights by the atmosphere. (1)

10. Identify the given circuit in which the electrical components have been properly connected.



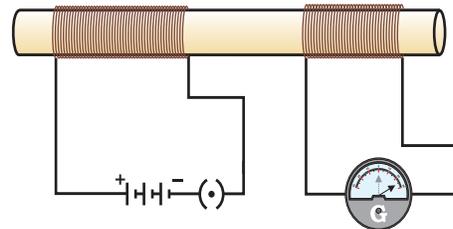
- (a) (i)
- (b) (ii)
- (c) (iii)
- (d) (iv) (1)

11. The resistance between A and B in the given Figure will be



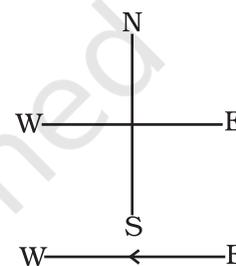
- (a) 20Ω
- (b) 30Ω
- (c) 90Ω
- (d) more than 10Ω but less than 20Ω (1)

12. In the arrangement shown in given Figure, there are two coils wound on a non-conducting cylindrical rod. Initially the key is not inserted. Then the key is inserted and later removed. Then



- the deflection in the galvanometer remains zero throughout
- there is a momentary deflection in the galvanometer but it dies out shortly and there is no effect when the key is removed
- there are momentary galvanometer deflections that die out shortly; the deflections are in the same direction
- there are momentary galvanometer deflections that die out shortly; the deflections are in opposite directions (1)

13. A constant current flows in a horizontal wire in the plane of the paper from east to west as shown in the given Figure. The direction of magnetic field at a point will be North to South



- directly above the wire
- directly below the wire
- at a point located in the plane of the paper, on the north side of the wire
- at a point located in the plane of the paper, on the south side of the wire (1)

14. The major problem in harnessing nuclear energy is how to

- split nuclei
- sustain the reaction
- dispose off spent fuel safely
- convert nuclear energy into electrical energy (1)

15. Which of the statements is incorrect?

- All green plants and blue green algae are producers
- Green plants get their food from organic compounds
- Producers prepare their own food from inorganic compounds
- Plants convert solar energy into chemical energy (1)

Short Answer Questions

16. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case

- Nitrogen gas is treated with hydrogen gas in the presence of a catalyst at 773K to form ammonia gas.
- Limestone is heated strongly to form quicklime and carbon dioxide gas is evolved (1+1=2)

17. Salt A commonly used in bakery products on heating converts into another salt B which is used in the manufacture of glass and a gas C is evolved. The gas C when passed through lime water, turns it milky. Identify A, B and C. Write the reaction for heating of salt A. $(\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 2)$
18. Properties of the elements are given below. Where would you locate the following elements in the Periodic Table?
- (a) A soft metal stored under kerosene
- (b) An element with variable (more than one) valency stored under water. $(1+1=2)$
19. Why is 'nutrition' a necessity for an organism? (2)
20. Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse? (2)
21. In human beings, the statistical probability of getting either a male or female child is 50 : 50. Give a suitable explanation. (2)
22. Sudha finds out that the sharp image of the window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible to her outside the window instead of the window pane without disturbing the lens. In which direction will she move the screen to obtain a sharp image of the building? What is the approximate focal length of this lens? $(1+1=2)$
23. A student sitting at the back of the classroom cannot read clearly the letters written on the blackboard. What advice will a doctor give to her? Draw ray diagram for the correction of this defect. $(1 + 1 = 2)$
24. How will you use two identical prisms so that a ray of white light incident on one prism emerges out of the second prism as white light? Draw the diagram. (2)
25. Three 60 W incandescent bulbs are connected in a parallel.
- (a) Calculate the total power consumed.
- (b) Now suppose that one of the bulbs is fused. What will be the total power consumed now? $(1 + 1 = 2)$
26. A magnetic compass shows a deflection when placed near a current carrying wire. How will the deflection of the compass get affected if the current in the wire is increased? Support your answer with a reason. (2)

27. What is the difference between the direct and alternating currents? How many times does AC used in India change direction in one second? (1+1=2)
28. What steps would you suggest to minimise environmental pollution caused by burning of fossil fuels? (2)
29. List the common food chain of a pond ecosystem (2)
30. List two advantages associated with water harvesting at the community level. (2)

Long Answer Questions

31. Explain the following
- The reactivity of a piece of aluminium metal decreases if it is dipped in HNO_3
 - Carbon cannot reduce the oxides of Na or Mg
 - NaCl does not conduct electricity in solid state whereas it does conduct electricity in aqueous solution as well as in molten state
 - Necessity of galvanisation of iron articles
 - Metals like Na, K, Ca and Mg are never found in their free state in nature. (1+1+1+1+1= 5)

or

Given below are the steps for extraction of copper from its ore.

- Write the equations of the reactions involved in roasting of copper (I) sulphide followed by its reduction.
 - Draw a neat labelled diagram for electrolytic refining (3 + 2 = 5)
32. You are given the balls and sticks models of six carbon atoms and fourteen hydrogen atoms and sufficient number of sticks. In how many ways one can join the models of six carbon atoms and fourteen hydrogen atoms to form different molecules of C_6H_{14} . (5)

or

Draw structural formulae of all the possible isomers of the compound with molecular formula $\text{C}_3\text{H}_6\text{O}$ and also give their electron dot structures. (2 + 3 = 5)

33. Distinguish between pollination and fertilisation. Mention the site and product of fertilisation in a flower. Draw a neat, labelled diagram of a pistil showing pollen tube growth and its entry into the ovule. (1½+1½+2=5)

or

Reproduction is essentially a phenomenon that is not for survival of an individual but for continuation of a species. Justify (5)

34. (a) Draw ray diagrams showing the image formation by a convex lens when an object is placed
- at twice the focal length of the lens
 - at infinity
- (b) The image of a candle flame formed by a lens is obtained on a screen placed on the other side of the lens. If the image is three times the size of the flame and the distance between lens and image is 80 cm, at what distance has the candle been placed from the lens? What is the nature of the image and the lens? (1 + 1 + 3 = 5)

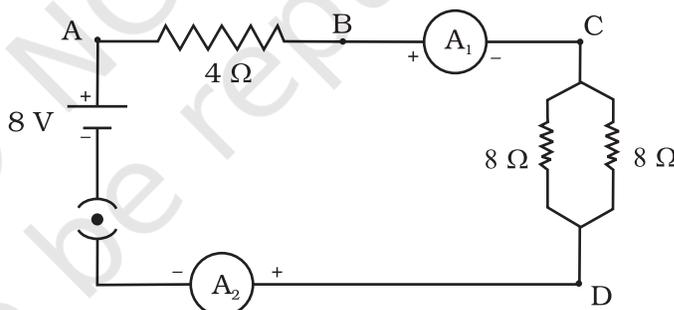
or

Write laws of refraction of light. Explain the same with the help of ray diagram, when a ray of light passes through a rectangular glass slab (2 + 3 = 5)

35. How will you infer with the help of an experiment that the same current flows through every part of the circuit containing three resistances in series connected to a battery? (5)

or

Find out the following in the electric circuit given in the Figure.



- Effective resistance of two $8\ \Omega$ resistors in combination.
 - Current flowing through $4\ \Omega$ resistor.
 - Potential difference across $4\ \Omega$ resistor.
 - Power dissipated by $4\ \Omega$ resistor.
 - Difference in ammeter readings, if any. (1+1+1+1+1 = 5)
36. In the context of conservation of natural resources, explain the terms reduce, recycle and reuse. From among the materials that we use in daily life, identify two materials for each category. (5)

or

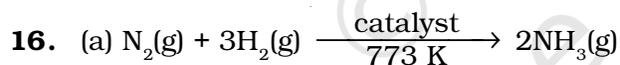
Suggest a few useful ways of utilising waste water. (5)

ANSWERS

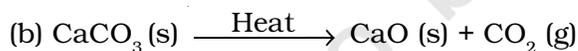
Multiple Choice Questions

1. (b)
2. (d)
3. (b)
4. (d)
5. (d)
6. (b)
7. (a)
8. (a)
9. (c)
10. (b)
11. (d)
12. (d)
13. (b)
14. (c)
15. (b)

Short Answer Questions

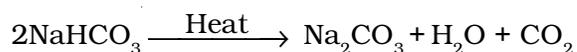


Combination reaction



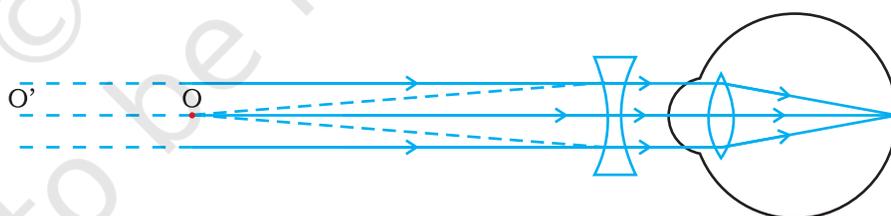
Decomposition reaction

17. The salt A which is commonly used in bakery product is baking powder (NaHCO_3). On heating it forms B sodium carbonate (Na_2CO_3) and CO_2 gas C is evolved. When $\text{CO}_2(\text{g})$ is passed through lime water, it forms calcium carbonate (CaCO_3), which is sparingly soluble in water making it milky.



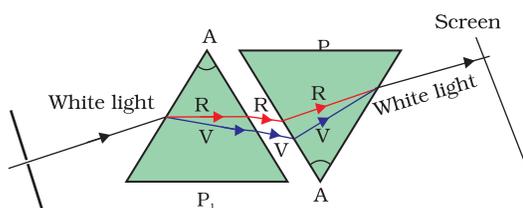
18. (a) Sodium (Na) Group 1 and Period 3
(b) Phosphorus (P) Group 15 and Period 3

- 19.** Food is required for the following purposes.
- It provides energy for the various metabolic processes in the body.
 - It is essential for the growth of new cells and the repair or replacement of worn out cells.
 - It is needed to develop resistance against various diseases.
- 20.** When an electrical signal reaches the axonal end of a neuron, it releases a chemical substance. This chemical diffuses towards the dendrite end of next neuron where it generates an electrical impulse or signal. Hence, the electrical signal is converted into a chemical signal at the axonal end. Since these chemicals are absent at the dendrite end of the neuron, the electrical signal cannot be converted into chemical signal.
- 21.** The sex of an infant is determined by the type of sex chromosome contributed by the male gamete. Since the ratio of male gametes containing X chromosome and those containing Y chromosome is 50 : 50, the statistical possibility of male or a female infant is also 50 : 50.
- 22.** Sudha should move the screen towards the lens so as to obtain a clearer image of the building. The approximate focal length of this lens will be 15 cm.
- 23.** The student is suffering from myopia (Short sightedness). Doctor advises her to use a concave lens of appropriate power to correct this defect.



Correction for myopia

- 24. Hint—** By using two identical prisms, one placed inverted with respect to the other.



- 25. Hint—** (a) $60\text{ W} \times 3 = 180\text{ W}$. Since wattage in parallel combination becomes three times the wattage of a single bulb.
 (b) 120 W
- 26.** The deflection increases. The strength of magnetic field is directly proportional to the magnitude of current passing through the straight conductor.
- 27.** Direct current always flows in one direction but the alternating current reverses its direction periodically. The frequency of AC in India is 50 Hz and in each cycle it alters direction twice. Therefore AC changes direction $2 \times 50 = 100$ times in one second.
- 28.** (a) Use of alternative source of energy like solar and wind energy
 (b) Use of catalytic converters in vehicles
 (c) Use of refined fuels like CNG
 (d) Proper servicing of vehicles
- 29.** Phytoplanktons and aquatic plants \rightarrow small aquatic animals (insects, larvae etc.) \rightarrow fish \rightarrow bird.
- 30. Hint—** (a) The ground water level increases due to recharging of wells.
 (b) Ground water keeps the layers of soil above it moist and prevents loss of water by evaporation.
 (c) The water can be stored during rainy season and can be used when required.

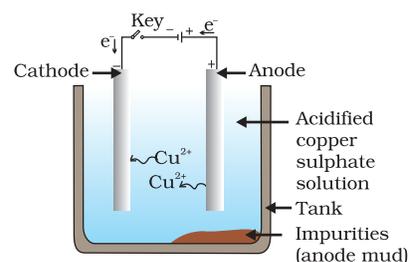
Long Answer Questions

- 31. Hint—** (a) Due to the formation of a layer of oxide that is, Al_2O_3
 (b) Na or Mg are more reactive metals as compared to carbon
 (c) In solid state the movement of NaCl ions is not possible due to its rigid structure. In molten state, the ions can move freely as the forces of attraction between oppositely charged ions are overcome due to heat. Also, in aqueous solution, the ions are free to move.
 (d) To protect iron from rusting
 (e) They are highly reactive

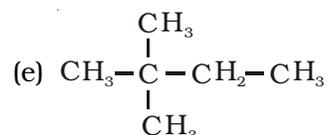
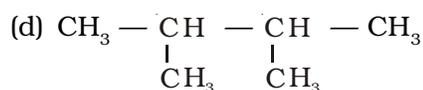
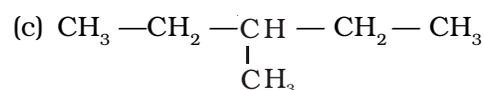
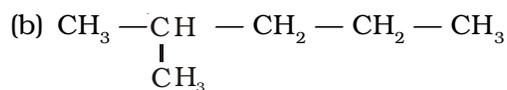
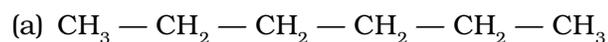
or



- (b) Diagram for electrolytic refining

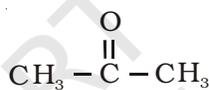
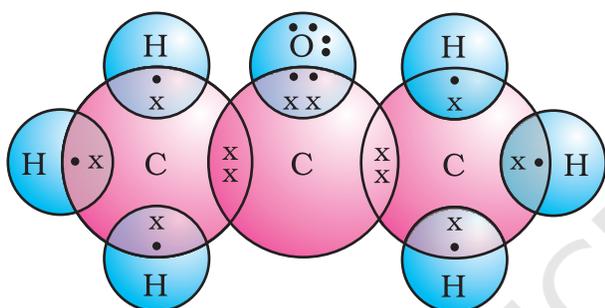


32. C_6H_{14}



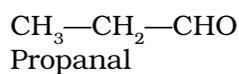
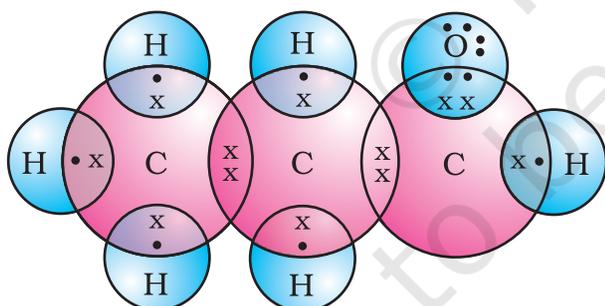
Hint—

or



Propanone

Electron dot structure of propanone



Propanal

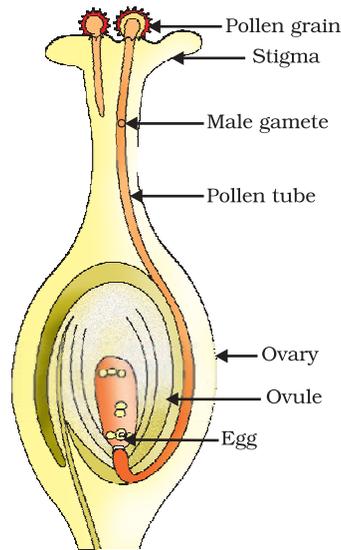
Electron dot structure of propanal

33. The process or mechanism of transfer of pollen grains from the anther to the stigma is termed pollination.

The fusion of male and female gametes giving rise to zygote is termed fertilisation.

The site of fertilisation is ovule.

The product of fertilisation is zygote.

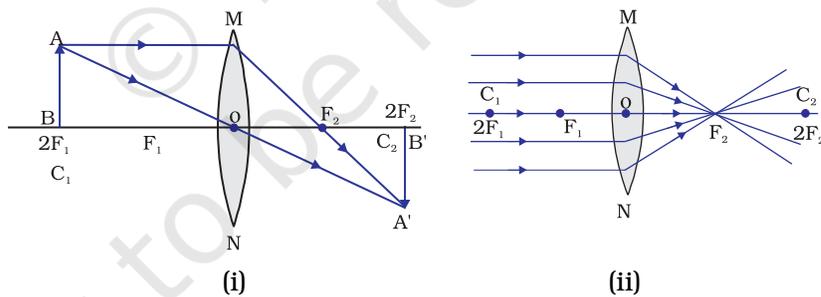


or

Hint—

- (a) For survival an individual needs energy which it obtains from life processes such as nutrition and respiration.
- (b) Reproduction does not provide energy.
- (c) Reproduction ensures transfer of genetic material from one generation to the next which helps in continuation of species.

34. (a)

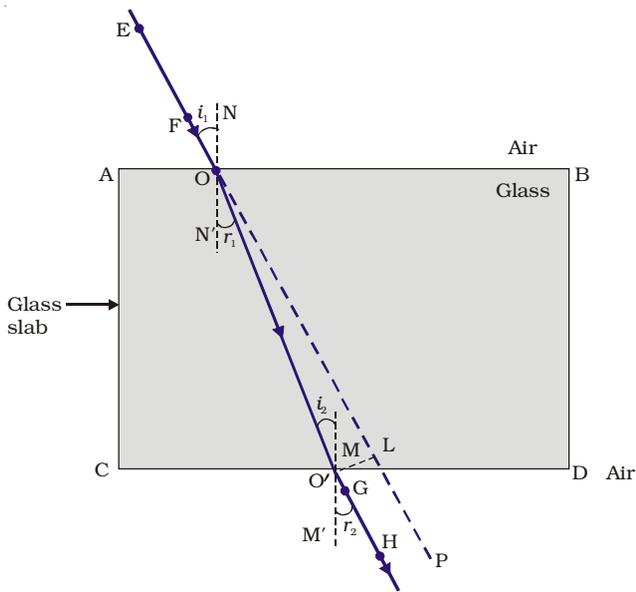


(b) **Hint—** $m = -\frac{v}{u} = -3$, using $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$ calculate u .

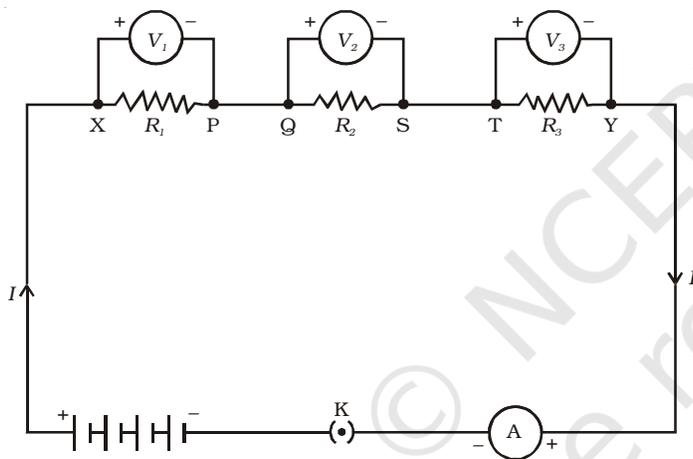
$u = -\frac{80}{3} \text{ cm}$. Image is real and inverted. The lens is convex.

or

Give the laws of refraction



35. Hint— Explain with the help of the diagram



or

Describe the experiment showing that same current flows through each component in a series circuit

- (a) 1 A.
- (b) 4 Ω .
- (c) 4 V.
- (d) 4 W.
- (e) No difference. (Same current flows through each element in a series circuit)

36. Reduce means to use a material/commodity in lesser quantity, e.g. electricity and water.

Recycle means a material that is used once is collected and sent back to a manufacturer so that they can make some other useful material from it.

e.g., plastic cups and buckets, glass tumbler, paper, metal objects.

Reuse means using a thing over and over again instead of throwing it away. It does not involve the process of recycling either in small or large scale: e.g., used envelopes, plastic carry bags, bottles of jam.

or

Hint— The waste water can be used for

- (a) recharging the ground water
- (b) irrigation purpose
- (c) municipal water can be treated and used for washing cars, watering the garden and other domestic uses.
- (c) pollutants in sewage water can become fertilisers for various crops.

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