

CLASS X (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-8

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) The question paper comprises of three sections-A, B and C. Attempt all the sections.
- (ii) All questions are compulsory.
- (iii) Internal choice is given in each sections.
- (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. What is the minimum distance between an object and its real image in case of concave mirror? [1]

Ans :

Zero, when object is at centre of curvature, its real image is also formed at the same point.

2. Name the two ways in which glucose is oxidised to provide energy in various organisms. [1]

Ans :

- i. Aerobic respiration
- ii. Anaerobic respiration

3. Answer question numbers 3.1-3.4 on the basis of your understanding of the following paragraph and the related studied concepts.

A number of different energy sources are used every day. Where does this energy come from? Burning of fossil fuel is a main energy source. Sources other than this fossil fuel are known as alternative energy sources and there are several of them being used every day.

Windmills work in the same manner as a waterwheel. For many years, windmills were usually used mainly for milling grain, pumping water, or both. Today, though, all of that has changed. Windmills are used as wind turbines that can generate electricity. As the wind propels the blades, energy is created and stored to be used to perform work. As long as there is movement, energy can be produced, and the wind is an excellent alternative energy source. In many parts of the Midwest where there is an abundance of wind, energy is produced for homes and businesses.

The internal heat of the earth is another energy source. The interior of the earth is very hot as is evidenced by hot water or steam coming out of the ground in certain places on the Earth. The earth's internal heat is called geothermal energy. Geothermal energy can be used to heat homes and produce electricity. There are homes in Boise, Idaho that have been heated solely by hot springs since the 1890's. Also at the Geysers in California, steam drives turbines that generate electricity. This steam comes

from underground water that is heated by geothermal energy.

Every day the sun provides energy. Solar energy is often thought to just be sunlight. Sunlight is full of energy. It is the sunlight that gives water the energy to evaporate and rise into the atmosphere. People are finding new ways to harness the power of sunlight. One major way is to trap or concentrate sunlight with the use of solar panels. This trapped sunlight can be used to heat homes and water. Also solar cells are devices that convert sunlight into electric energy.

- 3.1 What are sources of energy other than fossil fuel called? [1]

Ans : Alternate energy sources

- 3.2 What is the earth's internal heat called? [1]

Ans : Geothermal energy.

- 3.3 Which device converts sunlight into electric energy? [1]

Ans : Solar cell

- 3.4 Which is the tool used to trap or concentrate sunlight to be used for energy? [1]

Ans : Solar panel.

4. Question numbers 4.1-4.4 are based on two table given below. Study this table and answer the questions that follow:

Conductors	Substance	$\rho(\Omega - m)$
Metals:	Silver	1.47×10^{-8}
	Copper	1.72×10^{-8}
	Gold	2.44×10^{-8}
	Aluminium	2.75×10^{-8}
	Tungsten	5.25×10^{-8}
	Steel	20×10^{-8}
	Lead	22×10^{-8}
	Mercury	95×10^{-8}

Conductors	Substance	$\rho(\Omega - m)$
Alloys:	Manganin (Cu 84%, Mn 12%, Ni 4%)	44×10^{-8}
	Constantan (Cu 60%, Ni 40%)	49×10^{-8}
	Nichrome	100×10^{-8}
	Pure carbon (graphite)	3.5×10^{-5}
	Pure germanium	0.60
	Pure silicon	2300
Insulators:	Amber	5×10^{14}
	Glass	$10^{10} - 10^{14}$
	Lucite	$> 10^{13}$
	Quartz (fused)	$10^{15} - 10^{16}$
	Sulphur	10^{15}
	Teflon	$> 10^{13}$
	Wood	$10^8 - 10^{11}$

4.1 Mention two reasons why tungsten is used for making filament of electric lamps. [1]

Ans : (i) High resistivity, (ii) High melting point

4.2 State the difference between a wire used in the element of electric heater and in fuse wire. [1]

Ans : The wire used in the elements of an electric heater has high resistance whereas a fuse wire has low resistance.

4.3 Which among the following is a better conductor? [1]

- (i) Copper (ii) Glass
(iii) Sulphur (iv) Aluminium

Ans : (i) Copper

4.4 Which among the following is a better insulator? [1]

- (i) Teflon (ii) Wood
(iii) Quartz (iv) Glass

Ans : (iii) Quartz

5. Two conducting wires of same material with equal lengths and equal diameters are first connected in series and then parallel in an electric circuit. The ratio of heat produced in series and parallel combination would be : [1]

- (a) 1 : 2 (b) 2 : 1
(c) 1 : 4 (d) 4 : 1

Ans : (c) 1 : 4

or

A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R' , then the ratio R/R' is [1]

- (a) $1/25$ (b) $1/5$
(c) 5 (d) 25

Ans : (d) 25

6. A student is asked to add a teaspoonful of solid sodium bicarbonate to a test tube containing approximately 3 ml of acetic acid. He observed that the solid sodium

bicarbonate : [1]

- (a) floats on the surface of acetic acid
(b) remains suspended in the acetic acid
(c) settles down in the test tube
(d) reacts with acetic acid and a clear solution is obtained

Ans : (d) reacts with acetic acid and a clear solution is obtained

7. Having observed and studied the prepared slides of Amoeba and yeast for asexual reproduction, students made following conclusions. The correct conclusion is: [1]

- (a) both reproduce by binary fission
(b) both reproduce by budding
(c) Amoeba reproduces by budding and yeast by binary fission
(d) Amoeba reproduces by binary fission and yeast by budding

Ans : (d) Amoeba reproduces by binary fission and yeast by budding

8. A colourless and odourless gas is liberated when hydrochloric acid is added to a solution of washing soda. The name of the gas is [1]

- (a) carbon dioxide (b) nitrogen dioxide
(c) sulphur dioxide (d) sulphur trioxide

Ans : (a) carbon dioxide

or

Reddish brown deposit observed on iron nails, when these are kept in aqueous solution of CuSO_4 , is that of [1]

- (a) Cu_2O (b) CuO
(c) Cu (d) CuS

Ans : (c) Cu

9. The mature embryo of dicotyledonous seed has two cotyledons, the radical and the plumule. Which one of these tissue is not produced from the embryonic mass? [1]

- (a) plumule (b) hypocotyl
(c) root tip (d) cotyledons

Ans : (d) cotyledons

10. The image of a distant object is obtained on a screen by using a concave mirror. The focal length of the mirror can be determined by measuring the distance between : [1]

- (a) the object and the mirror
(b) the object and the screen
(c) the mirror and the screen
(d) the mirror and the screen as well as that between the object and the screen

Ans : (c) the mirror and the screen

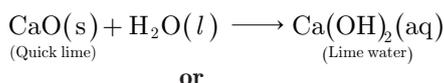
11. When we observe the slide of epidermal leaf peel we find that the inner walls of guard cells in contact with the stomata pore are : [1]

- (a) very thick (b) moderately thick
(c) moderately thin (d) thin

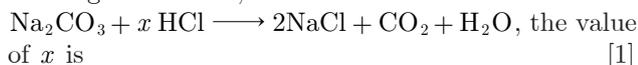
Ans : (b) moderately thick

12. Quick lime reacts with water to give [1]
 (a) $\text{Ca}(\text{OH})_2$ (b) CaCl_2
 (c) CaOCl_2 (d) CaO

Ans : (a) $\text{Ca}(\text{OH})_2$



In the give reaction,



- (a) 4 (b) 2
 (c) 3 (d) 1

Ans : (b) 2



(Q.no 13 to 14) In each of the following questions, a statement of Assertion is given by the corresponding statement of Reason. Of the statements, mark the correct answer as.

- (a) If assertion is true and reason is correct explanation of assertion.
 (b) If assertion is true but reason is false.
 (c) If assertion is false but reason is true.
 (d) If both are false.

13. **Assertion :** Acids do not show acidic behaviour in the absence of water.

Reason : All acids in pure state are covalent compounds which do not contain H^+ (aq.) ions. [1]

Ans : (a) If assertion is true and reason is correct explanation of assertion.

14. **Assertion :** Gold is not alloyed.

Reason : Pure gold has a high melting point and is very soft. Thus, the ornaments made from it do not keep their shape. [1]

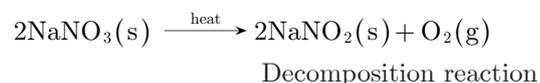
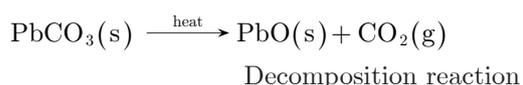
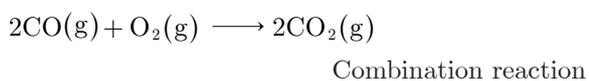
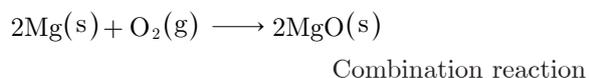
Ans : (c) If assertion is false but reason is true.

Section B

15. Why are decomposition reactions called opposite of combination reactions? Write equations for these reactions. [3]

Ans :

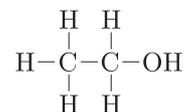
During decomposition reaction a single chemical compound breaks down into two or more different elements or compounds, whereas during chemical combination reaction two or more elements or compounds react to form a single chemical compound. Thus, we can say that chemical decomposition reaction is opposite of chemical combination reaction. Following examples will illustrate the point.



16. What is ethanol ? Draw the structure of ethanol molecule. How does ethanol behave with the following:
 i. Sodium
 ii. Excess of conc. sulphuric acid at 443 K ?
 Write chemical equation for each reaction. [3]

Ans :

Ethanol is the second member of the homologous series of alcohols.



- i. Ethanol reacts with sodium to liberate hydrogen gas.



- ii. Concentrated hydrochloric acid dehydrates ethanol to ethane.



or

Three elements A, B and C have atomic number 7, 8 and 9 respectively.

- i. What would be their positions in the Modern Periodic Table (Mention group and period both)?
 ii. Arrange A, B and C in the decreasing order of their size.
 iii. Which one of the three elements is most reactive and why ? [3]

Ans :

- i. A, B and C occupy 2nd period of periodic table and 15, 16 and 17 groups respectively.
 ii. $A > B > C$ because atomic size decreases as we move from left to right across a period.
 iii. C has electronic configuration 2, 7. It needs only one electron to complete its outermost shell. So it is more reactive.

17. What is 'Baking Powder' ? How does it make cakes soft and spongy ? [3]

Ans :

Baking powder is a dry mixture of sodium hydrogen carbonate (baking soda) and tartaric acid.

When baking powder is added to the dough, the chemicals on coming in contact with water react to form sodium tartrate, carbon dioxide gas and water. The carbon dioxide gets trapped in the dough. When dough is baked, the carbon dioxide in it expands. This in turn raises the cake and makes it soft and spongy.

18. State the role of following parts of human respiratory system (i) Nasal cavity (ii) Diaphragm (iii) Alveoli [3]

Ans :

- i. **Nasal Cavity :**
 (a) Filtration of inhaled air.
 (b) Removal of germs and dust.
 (c) Moistening the inhaled air.
 (d) Air conditioning of inhaled air, etc.

- ii. **Diaphragm** : Increasing and decreasing the size of thoracic cavity in vertical direction for inhalation and exhalation of air during breathing.
- iii. **Alveoli** : The wall of alveoli are extremely thin and covered by blood capillaries. These walls have rich supply of blood for gaseous exchange i.e., passage of oxygen from alveolar air to blood and passage of carbon dioxide from blood of alveolar air.

or

List the functions of testosterone and estrogen. [3]

Ans :

Testosterone : These hormones are secreted by the testes. They regulate male accessory sex organs and secondary sexual characters like moustache, beard and voice.

Estrogen : Estrogen is secreted by the ovary. It regulates the female accessory sex organs and secondary sexual characters like mammary gland, hair pattern and voice.

19. Acquired characters are not inherited. Justify, the statement with an example. The wings of bat and the wings of insects are considered analogous organs Why? [3]

Ans :

The acquired changes during a lifetime are not inherited by the progeny. It can be understood with the help of some examples such as –

If a group of mice having tail will breed, their progeny will also have the same type of tail but if the tail of all the mice is removed by surgery in each generation, no tailless mouse will be produced even after a few generations. It is because the removal of tail is a physical change which could not make a change in the gene responsible for the presence of tail in mice.

The wings of birds and the wings of insects are considered as analogous organs because they have different structures but perform the same function.

20. How has the method of artificial selection by humans helped in the evolution of different vegetables ? Explain in brief giving an example. [3]

Ans :

Humans have developed different varieties of vegetables from a single wild cabbage by artificial selection, some of these are as follows –

- i. Some farmers wanted to have very short distances between the leaves and developed the present day cabbage.
- ii. Some farmers selected immature green flowers and developed the broccoli.
- iii. Some have selected the sterile flowers and developed the cauliflowers.
- iv. Some farmers selected the swollen part of the wild cabbage and developed the kohlrabi.
- v. Some of them have selected the larger leaves and developed Kale.

So all these vegetables are descended from a common ancestor.

21. Design an activity to show that CO₂ is produced during breathing. [3]

Ans :

Materials Required:

Two test tubes, a cork with two holes, two glass tubes bent at right angle, syringe, lime water Ca(OH)₂.

Procedure :

- a. Take some freshly prepared lime water, Ca(OH)₂ in two test tubes,
- b. Fit cork with two holes in test tubes A and B.
- c. Fix two glass tubes in this cork of test tube A as shown in the figure.
- d. Exhale air into the tube and record your observations.
- e. Pass air by the syringe through the lime water contained in test tube B and record your observations.

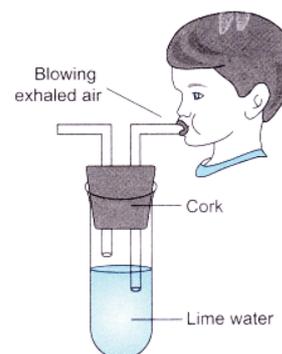


Fig: (A) Air being exhaled into lime water

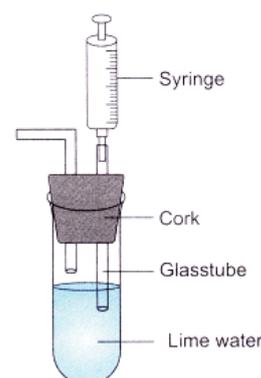


Fig: (B) Air being passed into lime water with a syringe

Observation:

Lime water turns milky sooner in test tube A than in test tube B.

Conclusion

- a. The exhaled air contains lot of CO₂ which turns lime water milky.
- b. This proves that CO₂ gas is exhaled out by humans during respiration.

22. A convex lens forms a real image 4 times magnified at a distance of 60 cm from the lens. Calculate the focal length and the power of the lens. [3]

Ans :

Given, $v = 60 \text{ cm}$

$m = -4$ (For real image)

$$\frac{v}{u} = -4 \Rightarrow u = \frac{v}{-4}$$

$$= -\frac{60}{4} = -15 \text{ cm}$$

Now, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{60} - \frac{1}{-15} = \frac{1+4}{60}$

$$= \frac{5}{60} = \frac{1}{12}$$

$$\text{Focal length, } f = 12 \text{ cm} = \frac{12}{100} \text{ m}$$

$$\begin{aligned} \text{The power of lens} &= \frac{1}{f \text{ (in m)}} = \frac{1}{\frac{12}{100} \text{ m}} = \frac{100}{12} \text{ D} \\ &= 8.33 \text{ D} \end{aligned}$$

23. What is meant by scattering of light? Use this phenomenon to explain why the clear sky appears blue or the sun appears reddish at sunrise. [3]

Ans :

- Scattering of light is phenomenon by which beam of light is spreaded in many direction when it interacts with particle of matter. When sunlight strikes molecules in atmosphere, the light is redirected in many direction.
- Scattering of blue colour is most due to shorter wavelength, where as scattering of red colour is least. All colours scattered in the sky and red colour light reaches to earth, due to this sun appears reddish.

24. i. How does the resistance of the following change with the rise in temperature?
 (a) Pure metals;
 (b) German silver;
 (c) Carbon.
- ii. Name three substances whose resistance changes very little with the rise in temperature. [3]

Ans :

- (a) The resistance of pure metals increases with the rise in temperature.
 (b) The resistance of German silver practically remains the same with the rise in temperature.
 (c) The resistance of carbon decreases with the rise in temperature.
- (a) Constant-an; (b) Eureka; (c) German silver

or

- Explain why a conductor offers resistance to the flow of current.
- Differentiate between conductor, resistor and resistance. [3]

Ans :

- When a current is passed through a conductor, the atoms or molecule of the conductor produce an hindrance in the path of flow of electron. This hindrance in the path of flow of charge is called resistance of the conductor.
- Conductor :** A substance which allow to pass the charges through them easily is called a conductor.
Resistor : A conductor having some value of resistance is called a resistor.
Resistance : It is the property of any conductor by virtue of which it opposes the flow of charge through it.

Section C

25. State the reactions, if any of the following metals react with lead nitrate solution. In case the reaction takes place, support it by a chemical equation.

- Silver,
- Zinc,
- Copper, and
- Iron. [5]

Ans :

- Silver does not react with lead nitrate solution.
- Zinc reacts with lead nitrate solution and displaces lead metal.

$$\text{Pb(NO}_3)_2(\text{aq}) + \text{Zn(s)} \longrightarrow \text{Zn(NO}_3)_2(\text{aq}) + \text{Pb(s)}$$
- Copper does not react with lead nitrate solution.
- Iron reacts with lead nitrate solution and displaces lead metal.

$$\text{Pb(NO}_3)_2(\text{aq}) + \text{Fe(s)} \longrightarrow \text{Fe(NO}_3)_2(\text{aq}) + \text{Pb(s)}$$

or

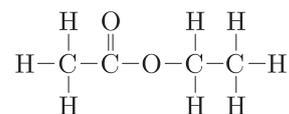
State the reason why ?

- carbon is not used to reduce the oxides of sodium or aluminium.
- an iron strip is dipped in a blue copper sulphate solution turns the blue solution pale green.
- metals replace hydrogen from acids whereas non-metals do not.
- calcium does not occur free in nature.
- zinc is used in the galvanisation of iron and not the copper. [5]

Ans :

- Sodium or aluminium have a great affinity for oxygen and therefore cannot be reduced by carbon. Hence, carbon is not used to reduce the oxides of sodium or aluminium.
- When an iron strip is dipped in a blue copper sulphate solution, iron metal reacts with copper sulphate solution and displaces copper from copper sulphate solution. Hence, the colour of the solution gradually changes to pale green.
- The ionisation energy of metals is higher than hydrogen, so they can replace hydrogen from metals whereas ionisation energy of non-metals is lower than that of hydrogen, hence, they cannot displace hydrogen from acids.
- Calcium is very reactive and combine with oxygen or water vapour present in air to form compounds. Hence, these metals are not found in the free state in nature.
- Zinc is used in the galvanising of iron because zinc being a more active metal than iron will get oxidised first as it is coated over the surface of iron. Thus, iron escapes rusting. Copper is less reactive than iron hence, it will not react with iron and does not form any oxide layer it.

26. i. The structural formula of an ester is :

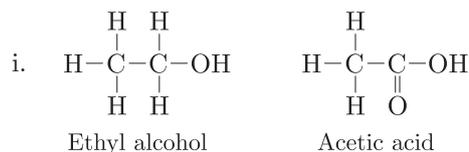


Write the structural formulae of the corresponding alcohol and the acid.

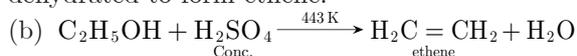
- (a) Mention the experimental conditions involved in obtaining ethne from ethanol.
 (b) Write the chemical equation for the above reaction.

iii. Explain the cleansing action of soap. [5]

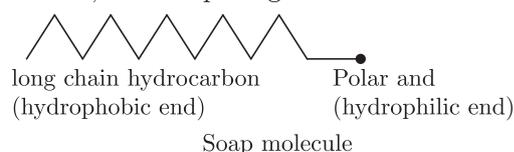
Ans :



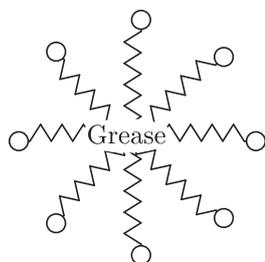
ii. (a) When ethanol is heated with excess of concentrated sulphuric acid at 443 K, it gets dehydrated to form ethene.



iii. A molecule of soap is made up of two parts:
(a) An ionic part which is hydrophilic, i.e., water soluble.
(b) A hydrocarbon chain which is hydrophobic i.e., water-repelling and oil soluble.



When soap is at the surface of water, the hydrophobic tail protrudes out of water while the ionic end remains inside water. Inside water, the molecules form clusters with the hydrophobic tails in the interior of the cluster and the ionic ends on the surface of the cluster. This formation is called a micelle. Soap, in the form of micelle collects the oily dirt in the centre of the micelle. The micelles stay in solution as a colloid and do not precipitate due to ion-ion repulsion. Thus, the dirt suspended in water is washed away during rinsing.



27. i. Differentiate between germination and fertilisation.
ii. State in brief the functions of the following parts of the human male reproductive system:
(a) Scrotum (b) Testes (c) Vas deferens [5]

Ans :

i.

	Fertilisation	Germination
1.	It is the fusion of male and female gametes.	In it the food reserves present in a seed are broken down and the embryo start to grow.
2.	It occurs in plants and animals of various types.	It occurs only in seed plants.
3.	It actually brings about fusion of gametes.	During it, seeds convert into seedling.

	Fertilisation	Germination
4.	Fertilisation occurs only after pollination when the pollen grain has germinated and sent the male gametes to the ovule.	It begins when a seed starts to absorb water.

ii.

- (a) **Scrotum** : It contains and supports the testes. It is situated outside the body cavity and allow sperm to develop at the optimum temperature, which is slightly lower than body temperature.
(b) **Testes** : The formation of male germ cells or sperms take place in it. Leydig cells of testes secrete hormone testosterone which brings about changes in appearance seen in boys at the time of puberty.
(c) **Vas deferens** : It ascends into the abdomen, passes over the urinary bladder and receives duct from the seminal vesicles behind the urinary bladder to form the ejaculatory duct.

28. The sexual act always has the potential to result in pregnancy'. What approach would you use to prevent pregnancies? [5]

or

What would result if fertilisation takes place in humans? Also, incorporate the post-fertilisation changes. [5]

Ans :

The prevention of pregnancy is called contraception or birth control. The methods of contraception are summarised in the following table.

Methods of Birth Control

Method	Example	Detail
Barrier	Condom	Rubber sheath worn over the penis to stop sperms from entering the vagina Prevents transmission of Sexually Transmitted Diseases (STDs) and has no side effect.
	Diaphragm	Rubber cup that is placed in the vagina over the cervix.
	Intrauterine	Copper-T placed in the uterus by a doctor.
	Contraceptive Device (IUCD)	Used to prevent pregnancy. Can cause side effects due to the irritation of uterus.

Method	Example	Detail
Hormonal	Oral Contraceptive pills	Contain hormones, which prevent the release of ovum, so that fertilisation cannot occur. These disturb the hormonal balance of the body.
Chemical	Spermicide	Applied in vagina Kills sperms Can only be used with condoms or diaphragm.
Surgical	Vasectomy	Small portion of the sperm duct is cut or tied properly. Prevents sperms from coming out. An irreversible process.
	Tubectomy	Small portion of oviduct is cut or tied properly. Prevents the egg meeting the sperms. An irreversible process.

or

What would result if fertilisation takes place in humans? Also, incorporate the post-fertilisation changes. [5]

Ans :

The fusion of the nucleus of the sperm (male gamete) is known as fertilisation. This process occurs only when both the sperm and an egg is present in the oviduct at the same time.

The sperms enters into the vagina by the process of copulation or mating. The sperms are highly active and motile. They swim into the uterus through cervix and then pass into the oviduct. When a sperm reaches the egg it penetrates the ovum. Syngamy or fusion of male and female nuclei occurs to form a zygote. The zygote undergoes many cycles of cell division to form an embryo.

The embryo sinks down and reaches into the soft and thick lining of the uterus. The embedding of the embryo in the thick lining of the uterus is known as implantation.

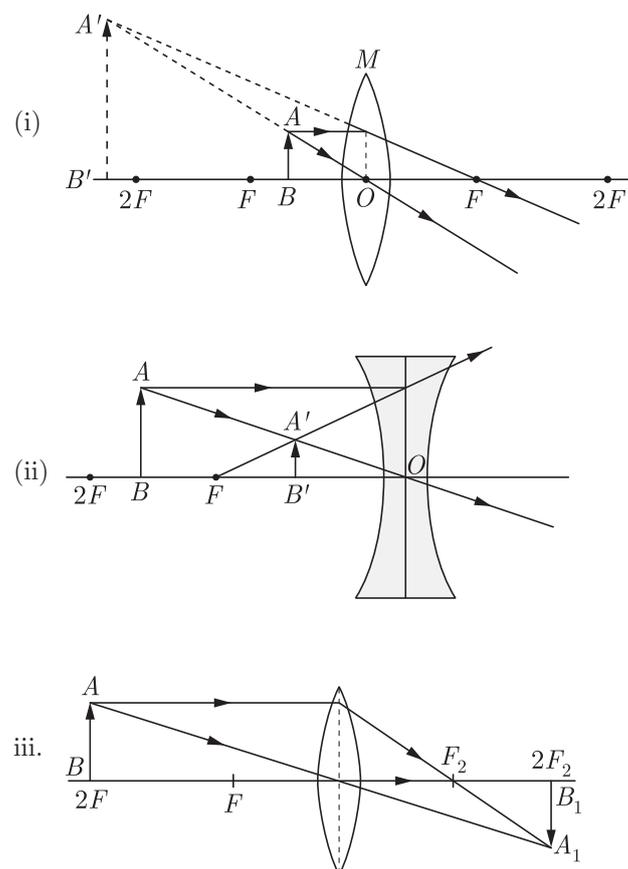
During pregnancy, the placenta grows into a disc between the uterine wall and the embryo. Placenta forms finger-like projections called villi towards embryo, which provides a large surface area for the exchange of nutrients and waste products between the mother and the developing embryo.

29. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed :

- between optical centre and principal focus of a convex lens
- between F and 2F of a concave lens
- At 2F of a convex lens

What can you say about sign and value of linear magnification ratio in, (a) and (b) above. [5]

Ans :



Sign and value of linear magnification ratio in (a) Positive and > 1 (b) Positive and < 1

30. What is meant by resistance of a conductor? Name and define its SI unit. List the factors on which the resistance of a conductor depends. How is the resistance of a wire affected if:

- its length is doubled,
- its radius is doubled? [5]

Ans :

Property of any conductor by virtue of which it opposes the flow of current in the conductor is called its resistance.

SI unit of resistance is Ohm. If by applying a potential difference of 1 volt the current in the conductor is 1 A. Then the resistance of the conductor is said to be 1 ohm.

Factor affecting resistances:

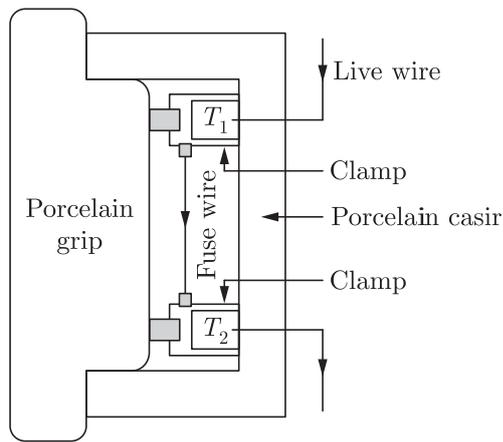
- If length is double then resistance also becomes doubled.
- If radius is doubled then area $A = \pi(2r)^2$ becomes 4 times, then the resistance becomes $1/4$.

or

- Draw a neat diagram of a fuse wire connected in a fuse socket and label it.
- State two properties of the material of the fuse wire.
- Why is a fuse wire, always placed in a live wire? [5]

Ans :

i.



- ii. (a) It has a low melting point.
 (b) It has high resistivity.
- iii. It is because, when the circuit gets overloaded or short circuit takes place, then the power should not flow to the appliance. This is possible only, if the fuse wire is placed in the live wire, such that when the fuse melts the appliance is completely cut off from the electric power.

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