

Solved Question Paper 2018

CBSE Class 10

Subject - Science

Time allowed: 3 hours

Maximum Marks : 80

General Instructions:

- i. The question paper comprises two Sections, A and B. You are to attempt both the sections.
- ii. All questions are compulsory.
- iii. All questions of Section A and Section B are to be attempted separately.
- iv. There is an internal choice in three questions of three marks each, two questions of five marks each in Section A and in one question of two marks in Section B.
- v. Question numbers 1 and 2 in Section A are one-mark questions. They are to be answered in one word or in one sentence.
- vi. Question numbers 3 to 5 in Section A are two-marks questions. These are to be answered in about 30 words each.
- vii. Question numbers 6 to 15 in Section A are three-marks questions. These are to be answered in about 50 words each.
- viii. Question numbers 16 to 21 in Section A are five-marks questions. These are to be answered in about 70 words each.
- ix. Question numbers 22 to 27 in Section B are based on practical skills. Each question is a two-marks question. These are to be answered in brief.

Section – A

1. A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F₁ progeny ?

Ans. Violet flowers

2. Write the energy conversion that takes place in a hydropower plant.

Ans. Potential /Kinetic/ Mechanical Energy into Electrical energy

3. A compound 'X' on heating with excess conc. sulphuric acid at 443 K gives an unsaturated compound 'Y'. 'X' also reacts with sodium metal to evolve a colourless gas 'Z'. Identify 'X', 'Y' and 'Z'. Write the equation of the chemical reaction of formation of 'Y' and also write the role of sulphuric acid in the reaction.

Ans.

- X-Ethanol/ ($\text{C}_2\text{H}_5\text{OH}$)/Ethyl Alcohol
- Y- Ethene / (C_2H_4)
- Z- Hydrogen/ (H_2)
- $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_2 = \text{CH}_2 + \text{H}_2\text{O}$
- Role of sulphuric acid - dehydrating agent

4. (a) Name one gustatory receptor and one olfactory receptor present in human beings.

(b) Write a and b in the given flow chart of neuron through which information travels as an electrical impulse.

Dendrite a $\rightarrow$ b $\rightarrow$ End point of Neuron

Ans. (a) Due to ambiguity in the question award 1 mark whether attempted or not.

(b) a. Axon

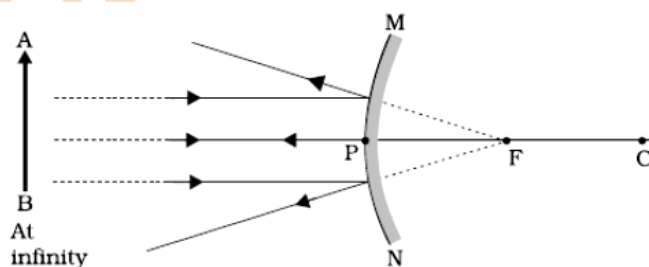
b. Cell body/ cyton

5. If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it? Draw a labelled ray diagram to support your answer.

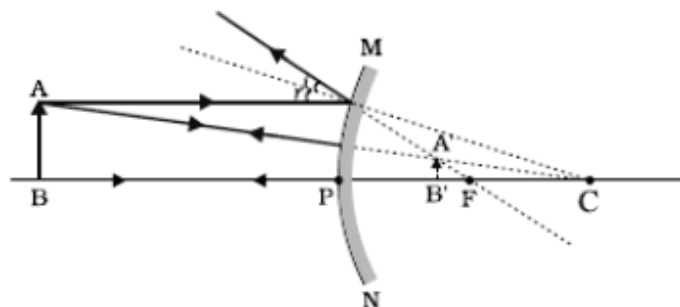
Ans. Convex Mirror as it produces an erect and diminished image of an object placed anywhere in front of it.

Below are given the labelled ray diagrams for an object lying at any position in front of convex mirror:

(i) When object is placed at infinity:



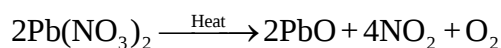
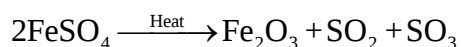
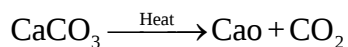
(ii) When object is placed anywhere between the pole and infinity:



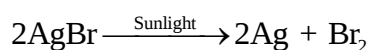
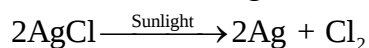
6. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.

Ans.

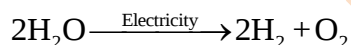
Reactions involving the energy supply in the form of heat:



Reactions involving the energy supply in the form of light:



Reactions involving the energy supply in the form of electricity:



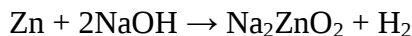
7. 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid.

OR

The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses.

Ans.

- When 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube, the following reaction takes place:



- When a burning splinter is brought near the gas, it burns with a pop Sound.
- When the same metal (zinc) reacts with dilute solution of a strong acid, Hydrogen (H_2) gas is evolved.

OR

- Sodium Hydrogen Carbonate/ Sodium Bicarbonate (NaHCO_3) salt is used.
- Chemical equation for the formation of sodium bicarbonate is:



Some of the uses of NaHCO_3 are:

- For making baking powder
- As ingredient of antacid.
- In the manufacture of soda-acid fire extinguishers

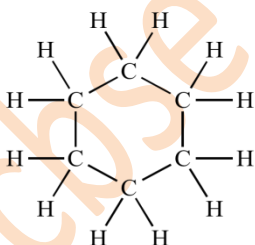
8. (a) Why are most carbon compounds poor conductors of electricity?

(b) Write the name and structure of a saturated compound in which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound.

Ans.

(a) Carbon compounds form Covalent bonds. They do not dissociate into ions and do not have charged particles (ions) to carry electric current.

(b) Cyclohexane



Total number of single bonds present in cyclohexane = 18

(OR you may write any other cycloalkane with corresponding number of bonds)

9. Name the hormones secreted by the following endocrine glands and specify one function of each:

- (a) Thyroid
- (b) Pituitary
- (c) Pancreas

Ans.

- (a) Thyroxine hormone is secreted by thyroid gland. It regulates carbohydrate protein and fat metabolism for balance of body growth.
- (b) Pituitary gland secretes growth hormone. It regulates growth and development of body.
- (c) Pancreas secretes insulin. It regulates/decreases the blood sugar level. Pancreas also secretes glucagon that regulates /increases blood sugar level.

10. Write one main difference between asexual and sexual mode of reproduction. Which species is likely to have comparatively better chances of survival – the one reproducing asexually or the one reproducing sexually? Give reason to justify your answer.

Ans.

Any one of the following difference:

- (i) In sexual reproduction two opposite sexes are involved where as in asexual reproduction only one individual is involved.
- (ii) In sexual reproduction male and female gamete formation takes place where as in asexual no gamete formation occurs.
 - Sexually reproducing organisms have better chances of survival
 - Because more variations are generated.

11. State the laws of refraction of light. Explain the term 'absolute refractive index of a medium' and write an expression to relate it with the speed of light in vacuum.

OR

What is meant by power of a lens? Write its SI unit. A student uses a lens of focal length 40 cm and another of – 20 cm. Write the nature and power of each lens.

Ans. 1st law: the incident ray, refracted ray and normal to the interface at the point of incidence lie in the same plane.

2nd law: The sine of angle of incidence bears a constant ratio with sine of angle of refraction for a given pair of media.

$$\text{i.e., } \frac{\sin i}{\sin r} = \text{constant}$$

$$\text{Absolute Refractive Index of a medium} = \frac{\text{speed of light in air or vacuum}}{\text{speed of light in the medium}}$$

OR

Power of lens is the ability of the lens to converge the rays of light falling on it. It is given as the reciprocal of its focal length in meters. It is represented by the letter P. Thus, the power P of a lens of focal length f is given by $f = 1/P$.

The SI unit of power is dioptre.

$$\text{Power of 1st lens, } P_1 = \frac{100}{f_1} = \frac{100}{40\text{cm}} = +2.5 \text{ D}$$

Nature: Converging lens or Convex lens

$$\text{Power of 2nd lens, } P_2 = \frac{100}{f_2} = \frac{100}{-20\text{cm}} = -5 \text{ D}$$

Nature: Diverging lens or Concave lens.

12. Show how would you join three resistors, each of resistance 9 so that the equivalent resistance of the combination is (i) 13.5Ω , (ii) 6Ω ?

OR

(a) Write Joule's law of heating.

(b) Two lamps, one rated 100 W; 220 V, and the other 60 W; 220 V, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V.

Ans.

(i) To obtain the combined resistance of 13.5Ω , three 9Ω resistors will be connected as shown below:



Here, two 9 ohm resistors in parallel connected to one 9 ohms in series

$$\frac{1}{R_p} = \frac{1}{9} + \frac{1}{9} = \frac{2}{9}$$

$$\therefore R_p = \frac{9}{2} \Omega$$

Thus, total resistance of combination, $R = 9\Omega + \frac{9}{2}\Omega = 13.5\Omega$

(ii) To obtain the combined resistance of 6Ω , three 9Ω resistors will be connected as shown below:



Here, two 9Ω resistors in series connected to one 9Ω resistor in parallel.

$$R_s = 9\Omega + 9\Omega = 18\Omega$$

$$\frac{1}{R} = \frac{1}{18} + \frac{1}{9} = \frac{3}{18}$$

$$\therefore R = 6\Omega$$

OR

(a) Joule's law of heating – Heat produced in a resistor is (i) directly proportional to the square of current for a given resistance, (ii) directly proportional to the resistance for a given current and (iii) directly proportional to the time for which the current flows through the resistor

$$\text{i.e., } H = I^2 R t$$

Where, H = Heat produced, I = current flowing through resistor, R = Resistance of the conductor and t = Time for which the current flows through the resistor.

b. Current in 1st bulb, $I_1 = \frac{P_1}{V} = \frac{100}{220} = \frac{5}{11}$ A or 0.45A

Current in 2nd bulb, $I_2 = \frac{P_2}{V} = \frac{60}{220} = \frac{3}{11}$ A or 0.27A

13. (a) List the factors on which the resistance of a conductor in the shape of a wire depends.

(b) Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.

(c) Why are alloys commonly used in electrical heating devices? Give reason.

Ans.

(a) Factors on which resistance of a conductor depends are:

i. Length of conductor

or $R \propto l$

ii. Area of cross-section of the conductor

Or $R \propto \frac{1}{A}$

(b) Metals are good conductor of electricity as they have low resistivity and possess free electrons to carry electric current.

Glass is a bad conductor of electricity as it has high resistivity and have no free electrons to pass on current.

(c) Alloys are commonly used in electrical heating devices because:

- They have high resistivity
- They have high melting point
- They do not oxidize (Or burn) readily at high temperatures. (anyone)

14. Students in a school listened to the news read in the morning assembly that the mountain of garbage in Delhi, suddenly exploded and various vehicles got buried under it. Several people were also injured and there was traffic jam all around. In the brain storming session the teacher also discussed this issue and asked the students to find out a solution to the problem of garbage.

Finally they arrived at two main points – one is self management of the garbage we produce and the second is to generate less garbage at individual level.

- (a) Suggest two measures to manage the garbage we produce.
- (b) As an individual, what can we do to generate the least garbage? Give two points.
- (c) List two values the teacher instilled in his students in this episode.

Ans.

(a) A few good measures to manage the garbage we produce include: Incineration, waste compaction, biogas generation, composting, segregation, vermicomposting and safe disposal. (write any two)

(b) Some activities that need to be incorporated to generate the least garbage include:

- Reuse of empty bottles, books etc.
- Reduce the use of non-biodegradable substances like polythene, thermocol etc.

(c) Awareness about environment, scientific attitude, concern for community health and personal health.

15. What is a dam? Why do we seek to build large dams? While building large dams, which three main problems should particularly be addressed to maintain peace among local people? Mention them.

Ans.

- i. Dam is a barrier that is built across a river or a stream for storage of water.
- ii. Large dam can ensure the storage of adequate water for irrigation and also for generating electricity.
- iii. Social problem, economic problem and environmental problem

16. (a) Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.

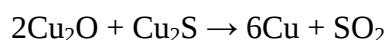
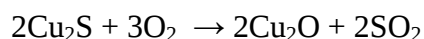
(b) How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.

Ans.

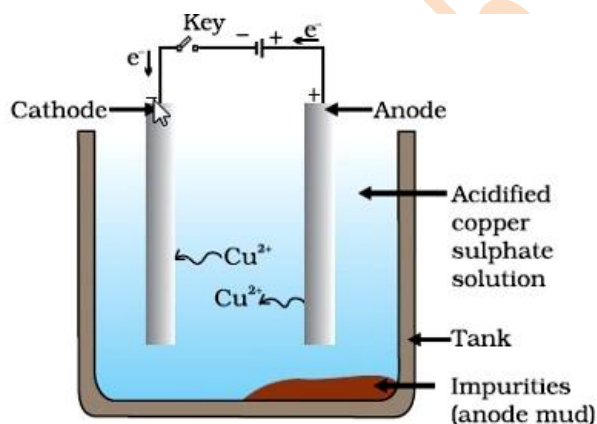
(a) Metals lying in the middle of the activity series can be extracted from their carbonate ores by following the steps given below in sequential order:

- Calcination
- Reduction
- Purification

b. Sulphide ore of copper is heated in air



(c) Labelled diagram of electrolytic refining of copper is given below:



17. (a) The modern periodic table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.

(b) Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.

(c) State Modern periodic law.

Ans.

(a) **Dobereiner Periodic Table**

Advantage: To predict the atomic mass of middle element in each triad

Limitation: Dobereiner could identify only three triads

Newland Periodic table

Advantage: Every eighth element had properties similar to that of first element.

Limitation: It was only applicable up to Calcium. It included only 56 elements and no future elements were given place in the table.

Mendeleev's Periodic Table

Advantage: Elements with similar properties could be grouped.

He also predicted the existence of new elements that had not been discovered at that time.

Limitation: No fixed position was assigned to hydrogen.

Position of isotopes was not satisfactory.

Atomic masses increased in an irregular manner.

(b) Henry Moseley was the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.

(c) Properties of elements are a periodic function of their atomic number.

18. (a) Mention any two components of blood.

(b) Trace the movement of oxygenated blood in the body.

(c) Write the function of valves present in between atria and ventricles.

(d) Write one structural difference between the composition of artery and veins.

OR

(a) Define excretion.

(b) Name the basic filtration unit present in the kidney.

(c) Draw excretory system in human beings and label the following organs of excretory system which perform following functions :

i. form urine.

ii. is a long tube which collects urine from kidney.

iii. stores urine until it is passed out

Ans.

(a) Components of blood are: Plasma, red blood cells, white blood cells, platelets (write any two)

(b) Lungs → left side of the heart → aorta → body organs

(c) Valves present in between atria and ventricles prevent back flow of blood.

(d) Artery has thick elastic wall and vein is thin walled.

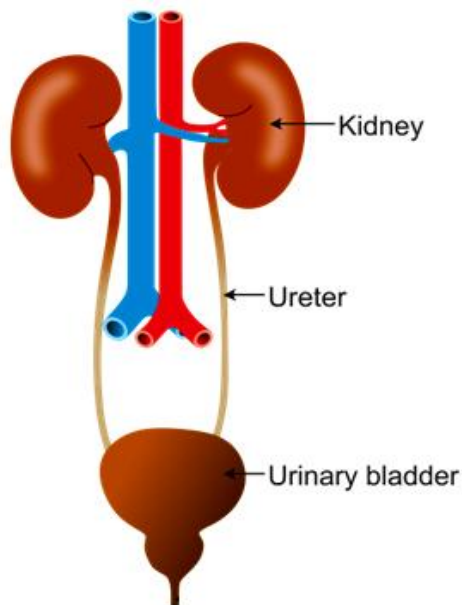
Valves are present in the veins and not in arteries

OR

(a) Process involved in removal of nitrogenous or harmful metabolic waste from the body is termed as excretion.

(b) Nephron is the basic filtration unit present in the kidney.

(c) Diagram of Human Excretory System with labelling of the parts; i. kidney ii. ureter iii. urinary bladder, is shown below:



19 (a) Write the function of following parts in human female reproductive system:

i. Ovary

ii. Oviduct

iii. Uterus

(b) Describe in brief the structure and function of placenta.

Ans.

- (a) i. Ovary: It produces egg (ovum). It also produces the hormones; oestrogen and progesterone.
- ii. Oviduct: It is the site of fertilization. It carries egg (ovum) or fertilized ovum (zygote) to the uterus.
- iii. Uterus: It is the site of development of embryo. It protects and nourishes the embryo.
- (b) Placenta- It is a disc embedded in uterine wall which contains villi on the embryo side of the tissue and blood space on mother side.

Function of placenta: It provides nourishment to embryo from mother's blood and also facilitates removal of waste from embryo to mother's blood.

20.

- (a) A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.
- (b) Why do stars twinkle? Explain.

OR

(a) Write the function of each of the following parts of human eye:

- i. Cornea
- ii. Iris
- iii. Crystalline lens
- iv. Ciliary muscles

(b) Why does the sun appear reddish early in the morning? Will this phenomenon be observed by an astronaut on the Moon? Give reason to justify your answer.

Ans.

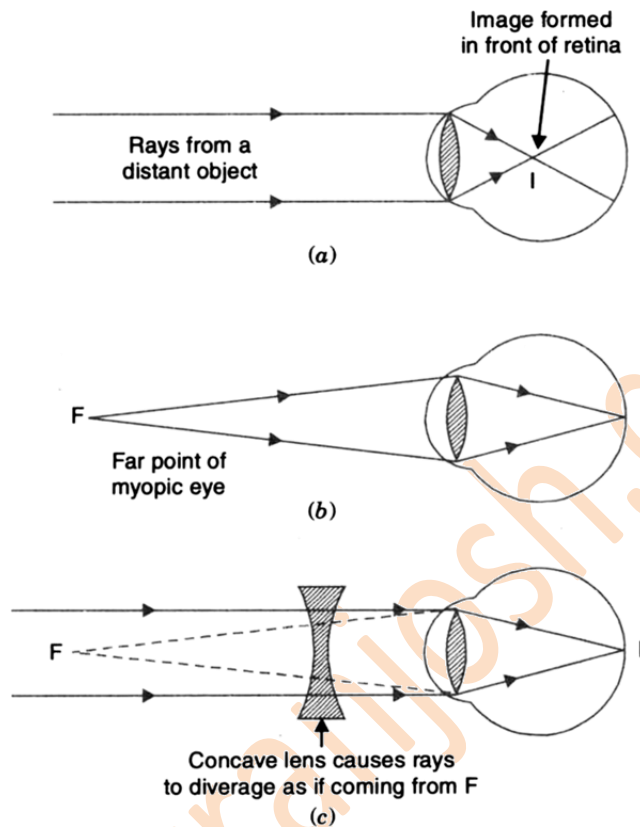
(a) Defect of vision – Myopia or short sightedness or near sightedness.

Causes of myopia:

- i. Eye lens becomes more converging
- ii. Elongation of eye ball

Methods of correction of myopia: By the use of concave lens of suitable power or focal length this defect is corrected.

Below is given the diagrammatic representation of correction of myopia using concave lens:



(b) The twinkling of stars is due to atmospheric refraction of star-light. The atmosphere is made of several layers and the refractive indices which keep on changing continuously. Due to this, light rays from the star keeps on changing their path continuously. As a consequence the number of rays entering, the pupil of eye goes on changing with time and the stars appear twinkling.

OR

(a) Function of:

- i. Cornea: It helps to focus light rays. It permits the light to enter the eye.
- ii. Iris: It controls amount of light entering the eye. It also controls the size of pupil.
- iii. Crystalline lens: It converges light rays onto retina.
- iv. Ciliary Muscles: It helps to adjust focal length of eye lens by contraction and relaxation so that sharp image can be obtained on the retina. It helps in accommodation

(b) In early morning, sun light has to cover larger distance in the atmosphere. So, the shorter wavelengths scatter out. Only the longer wavelengths like red reach our eye. This phenomenon is called as Rayleigh scattering. This phenomenon can be observed by an astronaut on the moon as moon has no atmosphere to cause refraction of light.

21.

(a) State Fleming's left hand rule.

(b) Write the principle of working of an electric motor.

(c) Explain the function of the following parts of an electric motor.

i. Armature

ii. Brushes

iii. Split ring

Ans.

(a) Fleming's left-hand rule: Stretch the forefinger, middle finger and thumb of left hand in such a way that they are mutually perpendicular to each other. 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.

(b) Principle of working of electric motor: A coil carrying electric current placed in an external magnetic field experiences a force.

(c) i. Function of Armature: It enhances the power of the motor and induces motion.

ii. Function of brushes: They help in easy transfer of charge between the coil and the external circuit.

iii. Function of split rings: They reverse the direction of current after each half rotation of the coil so that the coil can keep rotating continuously.

Section – B

22. A student added few pieces of aluminium metal to two test tubes A and B containing aqueous solutions of iron sulphate and copper sulphate. In the second part of her experiment, she added iron metal to another test tubes C and D containing aqueous solutions of aluminium sulphate and copper sulphate. In which test tube or test tubes will she observe colour change? On the basis of this experiment, state which one is the most reactive metal and why?

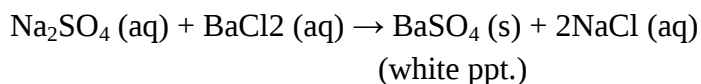
Ans.

In the test tube A, B, D she will observe colour change (No splitting of marks) Aluminum is the most reactive metal, because it displaces Iron, Zinc and Copper from their aqueous salt solutions.

23. What is observed when a solution of sodium sulphate is added to a solution of barium chloride taken in a test tube? Write equation for the chemical reaction involved and name the type of reaction in this case.

Ans. When a solution of sodium sulphate is added to a solution of barium chloride taken in a test tube formation of white precipitate is observed.

Chemical equation for reaction is:



This is a type of double displacement reaction.

24. List the steps of preparation of temporary mount of a leaf peel to observe stomata.

Ans.

The steps are:

- i. Removal of peel from leaf.
- ii. Stain with safranin.
- iii. Put the stained peel on a clean slide.
- iv. Mount it with glycerine and cover slip.

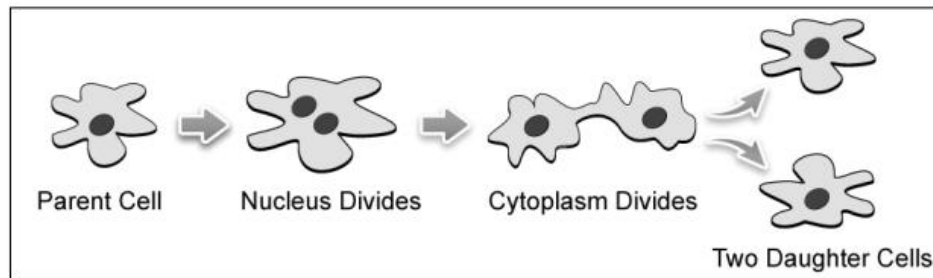
25. Name the process by which an amoeba reproduces. Draw the various stages of its reproduction in a proper sequence.

OR

A student is viewing under a microscope a permanent slide showing various stages of asexual reproduction by budding in yeast. Draw diagrams of what he observes. (in proper sequence)

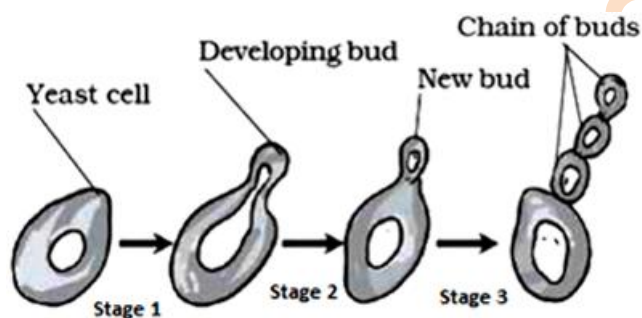
Ans. Amoeba reproduces by the method of binary fission.

Diagram to show the various stages of reproduction in amoeba:



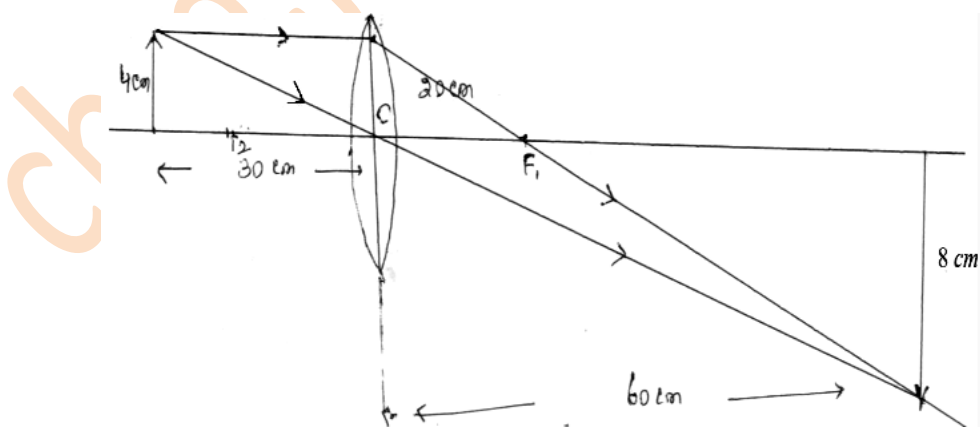
OR

Ans. Various stages of asexual reproduction by budding in yeast are represented below:



26. An object of height 4.0 cm is placed at a distance of 30 cm from the optical centre 'O' of a convex lens of focal length 20 cm. Draw a ray diagram to find the position and size of the image formed. Mark optical centre 'O' and principal focus 'F' on the diagram. Also find the approximate ratio of size of the image to the size of the object.

Ans. Ray diagram for the above mentioned conditions with the optical centre 'O' and principal focus 'F' marked on it, is as follows:



Ratio= $\frac{h_i}{h_o} = 2:1$ (approximately)

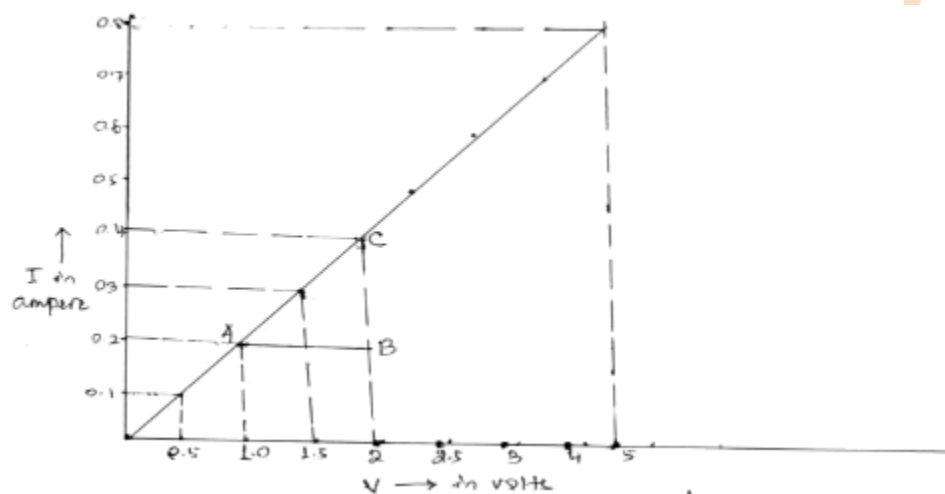
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27. The values of current (I) flowing through a given resistor of resistance (R), for the corresponding values of potential difference (V) across the resistor are as given below:

V (volts)	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
I (amperes)	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0

Plot a graph between current (I) and potential difference (V) and determine the resistance (R) of the resistor.

Ans.



$$\text{Resistance} = \frac{\Delta V}{\Delta I} = \frac{AB}{BC} = \frac{2-1}{0.4-0.2} = \frac{1}{0.2} = 5\Omega$$