

CBSE
Class X Science
Board Paper – 2011 (Set 1)
Term II

Total time: 3 hrs

Total marks: 80

General instructions:

1. The question paper comprises of two **Sections, A and B**. You are to attempt both the sections.
 2. All questions are compulsory.
There is no overall choice. However, internal choice has been provided in all the three questions of five marks category. Only one option in such question is to be attempted.
 3. All questions for **Section A** and all questions of **Section B** are to be attempted separately.
 4. Questions number **1 to 4** in **Section A** are **one mark** question. These are to be answered in one word or one sentence.
 5. Question numbers **5 to 13** in **Section A** are **two marks** questions. These are to be answered in about **30 words each**.
 6. Question numbers **14 to 22** in **Section A** are **three marks** questions. These are to be answered in about **50 words each**.
 7. Question numbers **23 to 25** in **Section A** are **five marks** questions. These are to be answered in about **70 words each**.
 8. Question numbers **26 to 41** in **Section B** are multiple choice questions based on practical skills. Each question is a **one mark** question. You are to select one most appropriate response out of the four provided to you.
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SECTION A

1. Why is it necessary to conserve our environment? [1]
2. Distinguish between biodegradable and non-biodegradable wastes. [1]
3. What will be the colour of scattered sunlight when the size of the scattering particles is relatively large? [1]
4. Draw the structure of Butanone molecule, $\text{CH}_3\text{COC}_2\text{H}_5$. [1]
5. Explain with the help of a diagram, how we are able to observe the sunrise about two minutes before the Sun gets above the horizon. [2]

6. List any four reasons for vegetative propagation being practised in the growth of some type of plants. [2]
7. State the role of [2]
 - i. Seminal vesicle
 - ii. Prostate gland in the human body.
8. List any four disadvantages of using fossil fuels for the production of energy. [2]
9. Give two examples for each of the following: [2]
 - i. Renewable sources of energy
 - ii. Non-renewable sources of energy
10. How does the metallic character of elements change along a period of the periodic table from the left to the right and why? [2]
11. In the modern periodic table, the element calcium (atomic number = 20) is surrounded by elements with atomic numbers 12, 19, 21 and 38. Which of these elements has physical and chemical properties resembling those of calcium and why? [2]
12. State any four characteristics of the image of the objects formed by a plane mirror. [2]
13. Draw a diagram to show dispersion of white light by a glass prism. What is the cause of this dispersion? [2]
14.
 - (a) What is meant by the power of accommodation of an eye?
 - (b) A person with a myopic eye cannot see objects beyond 1.2 m directly. What should be the type of the corrective lens used? What would be its power? [3]
15. What does HIV stand for? Is AIDS an infectious disease? List any four modes of spreading AIDS. [3]
16. Describe any three ways in which individuals with a particular trait may increase in population. [3]
17. State the evidence we have for the origin of life from inanimate matter. [3]
18. Give an example of body characteristics used to determine how close two species are in terms of evolution and explain it. [3]

19. Write chemical equations to show what happens when: [3]
- Ethanol is heated with concentrated sulphuric acid at 443 K.
 - Ethanol reacts with ethanoic acid in the presence of an acid acting as a catalyst.
 - An ester reacts with a base.
20. The atomic number of an element is 16. Predict [3]
- the number of valence electrons in its atom
 - its valency
 - its group number
 - whether it is a metal or a non-metal
 - the nature of oxide formed by it
 - the formula of its chloride
21. An object is placed between infinity and the pole of a convex mirror. Draw a ray diagram and also state the position, the relative size and the nature of the image formed.
22. What is the principle of reversibility of light? Show that the incident ray of light is parallel to the emergent ray of light when light falls obliquely on a side of a rectangular glass slab. [3]
23. With the help of suitable diagrams, explain the various steps of budding in Hydra. [5]

OR

What is binary fission in organisms? With the help of suitable diagrams, describe the mode of reproduction in Amoeba.

24. [5]
- State two properties of carbon which lead to a very large number of carbon compounds.
 - Why does micelle formation take place when soap is added to water? Why are micelles not formed when soap is added to ethanol?

OR

Explain isomerism. State any four characteristics of isomers. Draw the structures of possible isomers of butane, C_4H_{10} .

25.

- (a) What is meant by 'power of a lens'? [5]
- (b) State and define the S.I. unit of power of a lens.
- (c) A convex lens of focal length 25 cm and a concave lens of focal length 10 cm are placed in close contact with each other. Calculate the lens power of this combination.

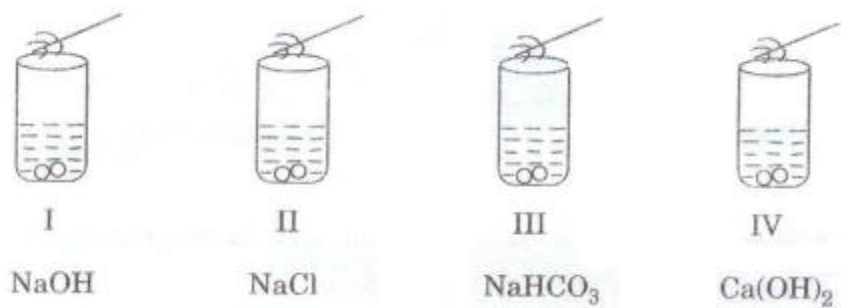
OR

- (a) Draw a ray diagram to show the formation of image of an object placed between infinity and the optical centre of a concave lens.
- (b) A concave lens of focal length 15 cm forms an image 10 cm from the lens. Calculate
 - i. The distance of the object from the lens.
 - ii. The magnification for the image formed
 - iii. The nature of the image formed.

SECTION B

26. The shape of yeast cells is [1]
- (a) Only spherical
 - (b) Only oval.
 - (c) Irregular
 - (d) Both oval and spherical.

27. A student added acetic acid to test tubes I, II, III and IV containing the labeled substances and then brought a burning splinter near the mouth of each test tube. [1]



The splinter would be extinguished when brought near the mouth of test tube.

- (a) I
 - (b) II
 - (c) III
 - (d) IV
28. Acetic acid reacts with solid sodium hydrogen carbonate, [1]
- (a) Slowly forming no gas
 - (b) Vigorously with effervescence
 - (c) Slowly without effervescence
 - (d) Vigorously without gas formation
29. Vapours of acetic acid smell: [1]
- (a) Pungent like vinegar
 - (b) Sweet like rose
 - (c) Suffocating like sulphur dioxide
 - (d) Odorless like water

30. A clean aluminium foil was placed in an aqueous solution of zinc sulphate. When the aluminium foil was taken out of the zinc sulphate solution after 15 minutes, its surface was found to be coated with a silvery grey deposit. From the above observation it can be concluded that: [1]

- (a) Aluminium is more reactive than zinc
- (b) Zinc is more reactive than aluminium.
- (c) Zinc and aluminium both are equally reactive.
- (d) Zinc and aluminium both are non-reactive

31. The colour of raisins as used in the experiment, 'To determine the percentage of water absorbed by raisins', was [1]

- (a) White
- (b) Yellow
- (c) Dark brown
- (d) Pink

32. Following are the steps involved in the experiment- 'To determine the percentage of water absorbed by raisins'. They are not in proper sequence. [1]

- I. Soak the raisins in fresh water.
- II. Weight dry raisins.
- III. Weigh soaked raisins.
- IV. Wipe out soaked raisins.

The correct sequence of steps is

- (a) I, II, III, IV
- (b) II, I, IV, III
- (c) II, I, III, IV
- (d) I, II, IV, III

33. During the course of an experiment, to determine the percentage of water absorbed by raisins, the raisins are weighed [1]

- (a) Every half an hour.
- (b) Every hour.
- (c) Once- only after completing the experiment.
- (d) Two times- Before soaking and after soaking for three hours.

34. The given figures illustrate binary fission in Amoeba in improper order.

[1]



The correct order is

- (a) III, IV, II, I
- (b) IV, III, II, I
- (c) II, III, IV, I
- (d) I, III, IV, II

35. The steps involved in observing a slide under a microscope are given below. They are not in proper sequence. [1]

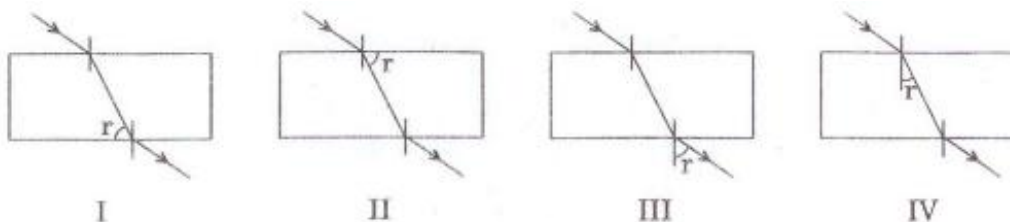
- I. Focus the object under high power of the microscope.
- II. Place the slide on the stage of the microscope.
- III. Arrange the mirror to reflect maximum light to the slide.
- IV. Focus the object under low power of the microscope.

The proper sequence of steps is

- (a) II, III, IV, I
- (b) I, II, III, IV
- (c) IV, III, II, I
- (d) III, I, II, IV

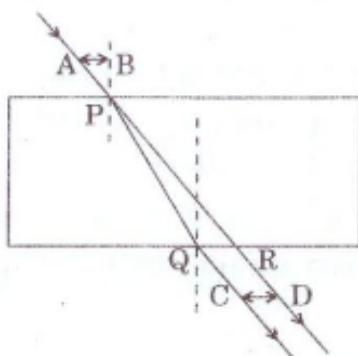
36. In which diagram the angle of refraction r has been correctly depicted?

[1]



- (a) I
- (b) II
- (c) III
- (d) IV

37. For a ray of light passing through a glass slab, the lateral displacement was correctly measured as: [1]



- (a) AB
(b) PQ
(c) CD
(d) PR
38. Iron nails were dipped in an aqueous solution of copper sulphate. After about 30 minutes, it was observed that the colour of the solution changed from [1]
(a) Colorless to light green.
(b) Blue to light green
(c) Blue to colourless.
(d) Green to blue.
39. To find the focal length of a concave mirror, Sita should choose which one of the following [1]
(a) A mirror holder and screen holder
(b) A screen holder and a scale
(c) A mirror holder, a screen holder and a scale
(d) A screen, a mirror, holders for them and a scale
40. By using a convex lens, a student obtained a sharp image of his classroom window grill on a screen. In which direction should he move the lens to focus a distant tree instead of the grill? [1]
(a) Towards the screen
(b) Away from the screen
(c) Very far away from the screen
(d) Behind the screen

41. To determine the focal length of a convex lens by obtaining a sharp image of a distant object, the following steps were suggested which are not in proper sequence. [1]

- I. Hold the lens between the object and the screen.
- II. Adjust the position of the lens to form a sharp image.
- III. Select a suitable distant object.
- IV. Measure the distance between the lens and the screen.

The correct sequence of steps to determine the focal length of the lens is

- (a) III, I, II, IV
- (b) III, I, IV, II
- (c) III, IV, II, I
- (d) I, II, III, IV

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Section A

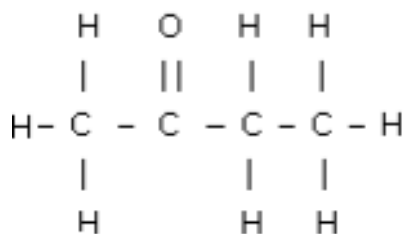
1. Conservation of environment is required for preventing damage to the environment and depletion of natural resources.

2.

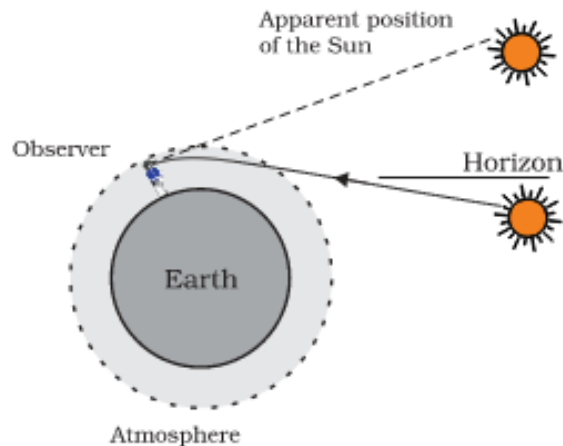
Biodegradable wastes	Non-biodegradable wastes
Substances which are easily decomposed by microorganisms are called biodegradable wastes.	Substances which are not decomposed by microorganisms are called non-biodegradable wastes.

3. If the size of the scattering particles is relatively large, then the scattered light will appear white.

4. Structure of butanone, $\text{CH}_3\text{COC}_2\text{H}_5$



5. Sunrise takes place when the sun is just above the horizon. But due to refraction of sunlight caused by the atmosphere, we can see the rising sun about 2 minutes before it is actually above the horizon. This happens because when the sun is slightly below the horizon, the sun's light coming from less dense air to more dense air is refracted downwards as it passes through the atmosphere. Because of this atmospheric refraction, the sun appears to be raised above the horizon when actually it is slightly below the horizon.



6. Reasons for vegetative propagation:
- It is done for plants which have lost the capacity to produce seeds.
 - To produce plants which are genetically similar to the parent plant.
 - It helps in producing those plants which either produce very few seeds or produce such seeds which are not viable.
 - It can be used to produce plants which reach maturity and produce fruits and seeds faster.
- 7.
- Seminal vesicles - secrete alkaline secretions which lower the pH of semen and provide nourishment.
 - Prostate Gland - secretions of these glands keep the sperm active and mobile.
8. Disadvantages of using fossil fuels for the production of energy:
- Burning of fossil fuels (e.g. coal and petroleum products) causes air pollution.
 - The oxides of carbon, nitrogen and sulphur which are released on burning fossil fuels are acidic oxides. These cause acid rain which adversely affects our water and soil resources.
 - Green house gases like carbon dioxide released during the combustion of fossil fuels enhances the process of global warming.
 - Fossil fuels were formed over millions of years ago and have limited reserves. If we were to continue consuming these sources at such alarming rates, we would soon run out of energy.

9.

- i. Solar energy and wind energy are the renewable sources of energy.
- ii. Fossil fuels and uranium are the non-renewable sources of energy.

10. Metallic character decreases from left to right along a period of the periodic table because on moving from left to right, size of the atoms decreases and nuclear charge increases. Hence, the tendency to release electrons decreases. Thus, the electropositive character decreases.

11. Ca: Electronic configuration is: 2,8,8,2

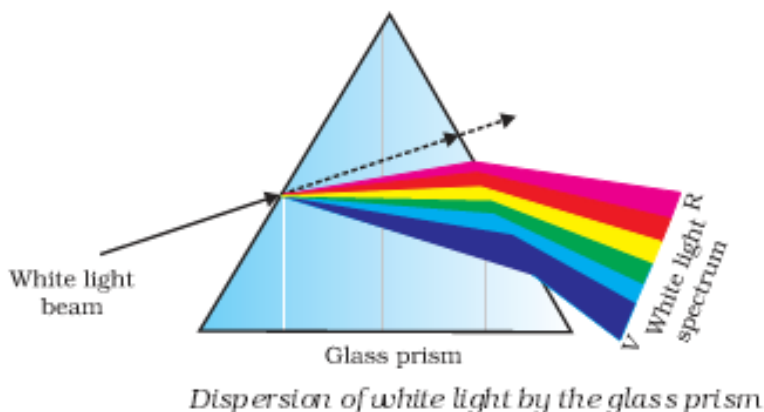
The physical and chemical properties of elements with atomic number 12 and 38 will resemble those of calcium.

This is because they all belong to the second group and all of them have two electrons in the valence shell.

12. Four characteristics of images formed by a plane mirror are:

- i. The image formed by a plane mirror is always virtual.
- ii. The image formed by a plane mirror is always erect.
- iii. Size of the image is same as the size of the object and the image is laterally inverted.
- iv. The image formed by a plane mirror is at the same distance behind the mirror as object is in front of it.

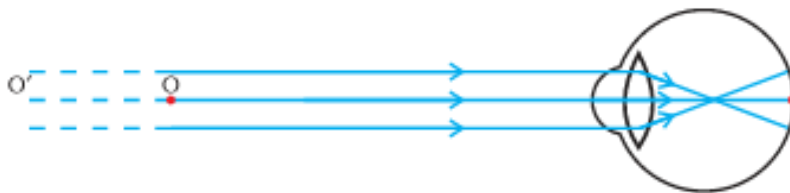
13.



Different colours of white light bend through different angles with respect to the incident ray, as they pass through a prism. Thus the rays of each colour emerge along different paths and become distinct. It is the band of distinct colours that we see in a spectrum.

14.

- (a) The process by which the ciliary muscles change the focal length of an eye lens to focus distant or near objects clearly on the retina is called the accommodation of the eye. The ability of the eye to do this is called the power of accommodation of the eye.
- (b) The person is able to see nearby objects clearly, but he is unable to see objects beyond 1.2 m. This happens because the image of an object beyond 1.2 m is formed in front of the retina and not at the retina, as shown in the given figure.



To correct this defect of vision, the person must use a concave lens. The concave lens will bring the image back to the retina as shown in the given figure.



Focal length of the corrective lens used = - (Distance of far point of the myopic eye)
= -1.2 m

$$\text{Power of the lens} = \frac{1}{\text{focal length}} = \frac{1}{-1.2} = -0.83 \text{ D}$$

15. HIV stands for Human Immuno Deficiency Virus.

Yes, HIV is an infectious agent which spreads through sexual contact.

Modes by which can HIV spread:

- i. Through sexual contact.
- ii. From pregnant mothers to the growing fetus.
- iii. Through transfusion of infected blood.
- iv. By sharing of needles or syringes.

16. Different ways in which individuals with a particular trait may increase in population are variation, natural selection and genetic drift.

Variation: Variation is defined as the occurrence of differences among the individuals. No two individuals are exactly alike. Variations arising during the process of reproduction can be inherited and lead to increased survival of the individuals.

Natural selection: It results in adaptations in population to fit their environment better. Thus, natural selection directs evolution in the population of a particular species.

Genetic drift: The change in the frequency of certain genes in a population over generations is called genetic drift.

17. J.B.S. Haldane suggested that life must have developed from the simple inorganic molecules which were present on Earth soon after it was formed. He speculated that the conditions on Earth at that time could have given rise to more complex organic molecules which were necessary for life. The first primitive organisms would arise from further chemical synthesis. Later on, Stanley L. Miller and Harold C. Urey conducted experiments to understand the origin of organic molecules. They created an atmosphere similar to that thought to exist on early Earth (this had molecules like ammonia, methane and hydrogen sulphide, but no oxygen) over water. This was maintained at a temperature just below 100°C and sparks were passed through the mixture of gases to simulate lightning. At the end of a week, 15% of the carbon (from methane) had been converted to simple compounds of carbon including amino acids which make up protein molecules. This is considered as evidence for origin of life on the Earth from inanimate matter.

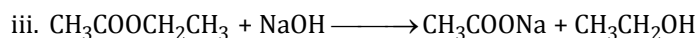
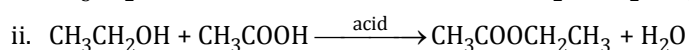
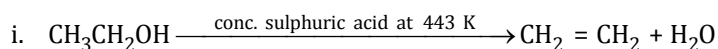
18. Homologous organs, analogous organs and vestigial organs help to identify evolutionary relationships.

Homologous organs are those organs which have similar basic structure but have been modified to perform different functions. Example - forelimbs of reptiles, frog, lizard, bird and humans are homologous organs. Such homologous characteristics help to identify an evolutionary relationship between apparently different species.

Analogous organs are those organs which are different in basic structure but perform the same function. Example - wings of bird and wings of bat.

Vestigial organs are certain reduced and non-functional organs present in some organisms. Example - vermiform appendix in human body.

19.



20. Atomic number = 16

Electronic configuration = 2, 8, 6

i. Number of valence electrons in its atom = 6

ii. Valency = 2

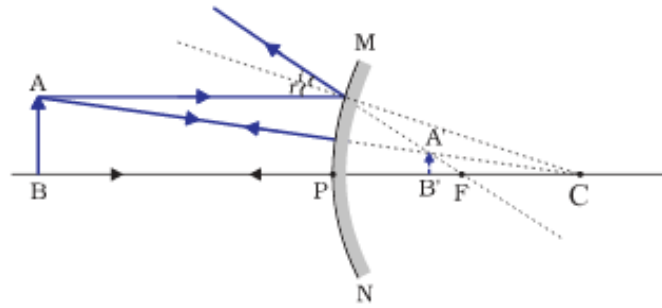
iii. Group number = 16

iv. It is a non-metal

v. Acidic oxide

vi. XCl_2

21.

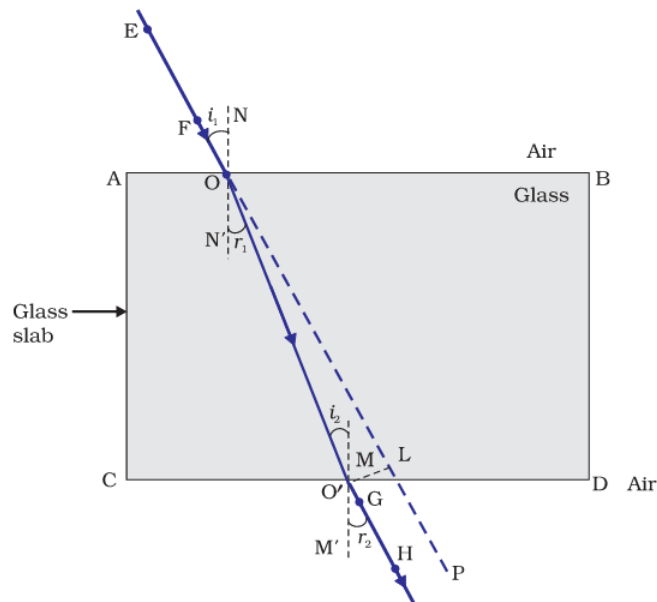


An object is placed between infinity and the pole of a convex mirror, the image formed is:

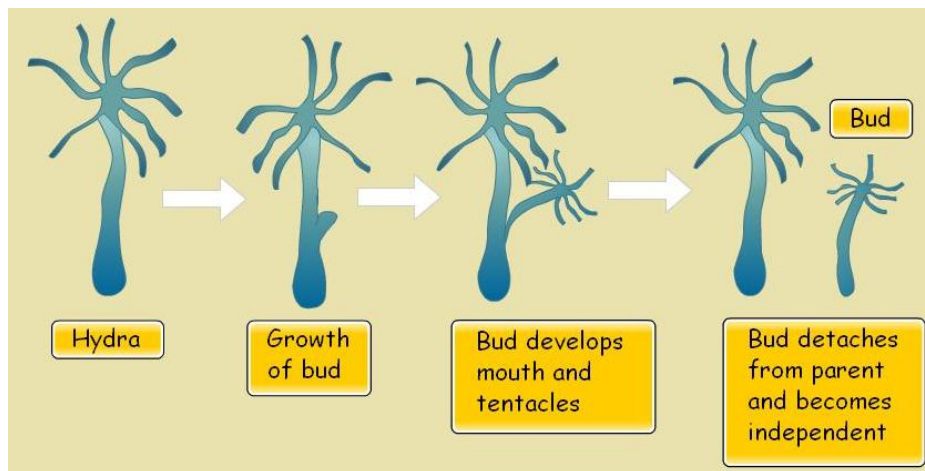
- i. Behind the mirror at focus (F),
- ii. Virtual and erect,
- iii. Highly diminished

22. The principle of reversibility of light states that light will follow exactly the same path if its direction of travel is reversed.

When light falls obliquely on a rectangular glass slab, the incident ray is parallel to the emergent ray; as shown in the figure. Angle of incidence is equal to the angle of emergence.

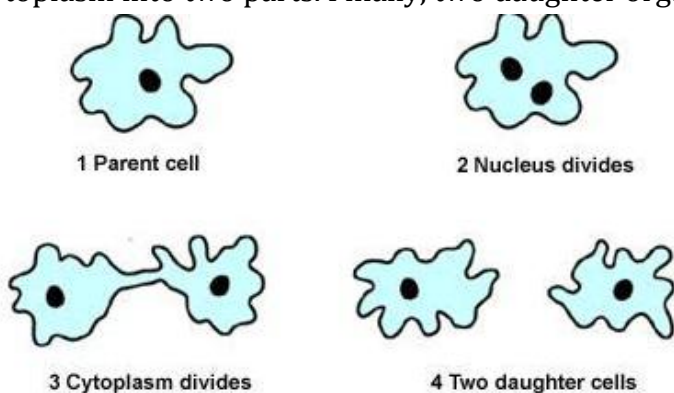


23. In Hydra, a bud develops as an outgrowth due to repeated cell divisions at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.



OR

Binary fission is an asexual method of reproduction. Amoeba reproduces by this method. During this process, nuclear division takes place first, followed by the appearance of a constriction in the cell membrane, which gradually increases inwards and divides the cytoplasm into two parts. Finally, two daughter organisms are formed.



24.

- (a) Two properties of carbon which lead to a very large number of carbon compounds are:

- Tetravalency**: Carbon has valency 4 i.e. it is tetravalent. Hence, it is capable of bonding with four other atoms of other monovalent elements.
- Catenation**: Carbon has the unique ability to form bonds with other atoms of carbon to form long chains.

- (b) A soap molecule has two parts –one hydrophobic part and the other hydrophilic part. When added to water, the hydrophobic part arranges itself towards the dirt and the hydrophilic end arranges itself towards the water.

Micelle formation does not take place when soap is added to ethanol because the hydrophobic part of soap molecules is soluble in ethanol.

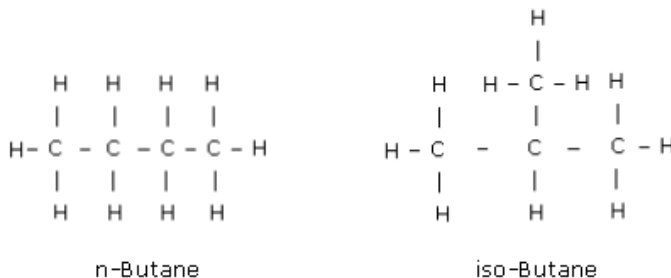
OR

Isomers are compounds with same molecular formula but different structures.

Four characteristics of isomers:

- Isomers have different physical properties.
- Isomers may have same or different chemical properties.
- All isomers have the same number of atoms.
- Isomers have different structural arrangements.

Isomers of butane, C_4H_{10}



25.

- (a) The degree of convergence or divergence of light rays achieved by a lens is expressed in terms of its power. The power of a lens is defined as the reciprocal of its focal length. The power P of a lens of focal length f is given by:

$$P = \frac{1}{f(\text{in metres})}$$

- (b) The S.I. unit of power of a lens is 'diopetre'.

1 diopetre is the power of a lens whose focal length is 1 metre.

- (c) Focal length of convex lens = +25 cm

$$\text{Power of convex lens, } P_1 = \frac{100}{25} = 4 \text{ D}$$

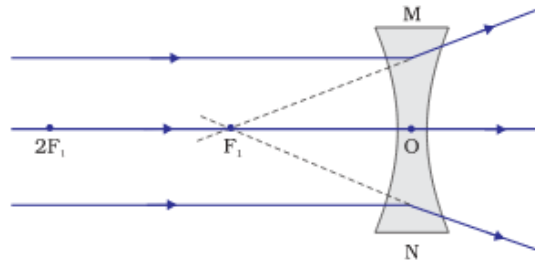
Focal length of concave lens = -10 cm

$$\text{Power of concave lens, } P_2 = \frac{100}{-10} = -10 \text{ D}$$

Hence, power of this combination, $P = P_1 + P_2 = (+4\text{D}) + (-10 \text{ D}) = -6\text{D}$

OR

- (a) Ray diagram showing the formation of image of an object placed between infinity and optical centre of a concave lens:



- (b) A concave lens always forms a virtual, erect image on the same side of the object.

Focal length of concave lens, $f = -15$ cm

Image distance, $v = -10$ cm

- i. Let 'u' be the object distance; then using lens formula:

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

$$\text{or, } \frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

Substituting the values,

$$\frac{1}{u} = \left(\frac{-1}{10} \right) - \left(\frac{-1}{15} \right) = \left(\frac{-1}{30} \right)$$

Or, $u = -30$ cm = -0.3 m

Thus, object distance is 30 cm

ii. Magnification, $m = \frac{v}{u} = \frac{-10\text{cm}}{-30\text{cm}} = \frac{1}{3} = +0.33$

- iii. The positive sign shows that the image is erect and virtual. The image is one-third the size of the object.

SECTION B

26.(b) Only oval.

Yeast cells are usually oval.

27.(c) III

Sodium bicarbonate reacts with acetic acid to release carbon dioxide gas which is a non-supporter of combustion.

28.(b) Vigorously with effervescence

Acetic acid reacts with solid sodium hydrogen carbonate vigorously and effervescence is produced due to evolution of CO_2 gas.

29.(a) Pungent like vinegar

Vapours of acetic acid smell pungent like vinegar.

30.(a) Aluminium is more reactive than zinc

Aluminium is more reactive than zinc and is hence able to displace zinc from its solution.

31.(c) Dark brown

The raisins are dark brown in colour.

32.(b) II, I, IV, III

The correct sequence is- II, I, IV, III

33.(d) Two times– Before soaking and after soaking for three hours.

Raisins are weighed two times– before soaking and after soaking for three hours.

34.(c) II, III, IV, I

The correct order of binary fission is- II, III, IV, I

35. (a) II, III, IV, I

The steps to observe a slide under the microscope are- II, III, IV, I

36.(d) IV

Angle of refraction is measured with respect to the normal at the first point of incidence.

37.(c) CD

Lateral displacement is the sideways shift of the emergent ray from the direction of the incident ray.

38.(b) Blue to light green

The blue coloured copper sulphate solution changes to light green iron sulphate solution after displacement of copper by iron from copper sulphate solution.

39.(d) A screen, a mirror, holders for them and a scale

A screen, a mirror, holders for them and scale are needed to find the focal length of a concave mirror.

40.(a) Towards the screen

The lens should be moved towards the screen because the distant tree can be considered an object at infinity whose image will be formed at the focus, while earlier the image of nearer grill was formed at a distance farther than the focal length.

41.(a) III, I, II, IV

The proper sequence to determine the focal length of a convex lens is:

III - Select a suitable distant object.

I - Hold the lens between the object and the screen.

II - Adjust the position of the lens to form a sharp image.

IV - Measure the distance between the lens and the screen.