Goa Board
Class X Science
Term II
Sample Paper – 9 Solution

SECTION A

1. From the given table, we can say that light moves faster in ice, because ice has the lowest value of refractive index.

2. According to the $2n^2$ rule, the maximum number of electrons in the third period
$= 2 \times (3)^2 = 18$.
But, the last shell cannot accommodate more than 8 electrons; so, the number of electrons in the third period is 8. Hence, the number of elements is also 8.

3. Organisms produced by asexual reproduction contain exactly the same number of chromosomes as the parent cells. So, they look alike and are considered as clones.

4. Pesticides kill insects and pests; thereby, they protect the crops. However these pesticides remain on the crops which enter the food chain and get accumulated in the organisms at the topmost trophic level that causes diseases. When these are washed away by rain river water, it also causes pollution.

5. Our two eyes are a few centimeters apart from each other. Due to this, the two eyes see the same object from two slightly different angles and send two slightly different images of the same object to the brain. The brain combines these two slightly different images to build a three-dimensional picture of the object which enables us to judge the distance of the object more accurately.

6. Ethanoic acid - CH_3COOH
Propanoic acid - CH_3CH_2COOH
$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

7. The category stakeholders include:
(a) Firstly, all those people who either live in forests or nearby forests and are dependent on them to meet each and every requirement of theirs.
(b) Second is the Forest Department, run by the Government and hence, responsible for controlling land and other resources of forests.
(c) Third category includes all the industrialists who are dependent on trees to obtain raw material.
(d) Lastly, come all those people who actively take part in conservation of wildlife and natural resources.

8. The TV signals coming from the satellite are light rays; so, they obey the law of reflection of light. The dish is a concave reflector. The dish collects a large amount of parallel beams of TV signals coming from the far off satellite and converges them to its focus. The antenna is fixed in front of the concave dish at its focus. Since the antenna is fixed, it receives the strongest possible TV signals from the satellite which make our television work.

9. Given:
Focal length, f = +25 cm (Positive for convex lens)
V = +75 cm (image is on the right side of the lens)
Mirror formula is given as,

$$\frac{1}{75} - \frac{1}{u} = \frac{1}{25}$$

$$\frac{1}{u} = \frac{1}{75} - \frac{1}{25}$$

$$u = -\frac{75}{2} \text{ cm} = -37.5 \text{ cm}$$

$$m = \frac{v}{u} = \frac{75}{-37.5} = -2$$

Thus, the object is kept at a distance of 37.5 cm from the lens, on its left side.
The image formed is real, inverted and magnified.

10.

(a) In the outer space, there is no atmosphere containing air to scatter the sunlight. Since there is no scattered light to reach our eye in the outer space, the sky looks dark and black there.

(b) Clouds consist of water droplets whose size is large enough to scatter all wavelengths easily. Therefore, when we look at the clouds, light of all wavelengths enters our eyes and the clouds appear white.

11.

(a) The iris of the eye regulates the amount of light entering the eye by adjusting the size of the pupil. If the amount of light received by the eye is too much, then the iris makes the pupil contract and reduces the amount of light entering the eye. On the other hand, if the amount of light received by the eye is small, then the iris makes the pupil expand and more light enters the eye.

(b) In old age, the medical condition in which the lens of the eye of a person becomes progressively cloudy resulting in blurred vision is called cataract. This causes a decrease or loss of vision of the eye. The vision can be restored after going through a cataract surgery.

12.

(a) Position of an element in modern periodic table is located by its group number and period number. From the electronic configuration, we can get both, the period number and the group number. The number of valence electrons suggests the group number. The outer shell number signifies the period number.

(b) The statement is true because element 'Y' has more electrons than the element 'X'. As we move from left to right in a period, the nuclear charge in element 'Y' increases and pulls the electrons closer to the nucleus; thereby, reducing the size of the atom.

13.

(a) CH_3-CH_2-CH_2-CH_2-Cl
1-chlorobutane

(b) CH_3-CO-CH_2-CH_3
Butanone

(c) CH_3-CH_2-CH_2-COOH
Butanoic acid

14.

(a) Sodium
(b) Phosphorus
(c) Carbon
(d) Helium
(e) Magnesium
(f) Sulphur

15. In a food chain, trophic levels are defined as the number of steps that are followed by one another in the process of energy flow and are also dependent on each other for food. Different trophic levels are as follows -

(a) Producers - They form the first trophic level and are able to manufacture their own food (green plants).

(b) Primary consumers - They form the second trophic level and are generally plant eaters (herbivores).

(c) Secondary consumers - They form the third trophic level and are flesh eaters. (carnivores).

(d) Tertiary consumers - They form the fourth trophic level and feed on secondary consumers.

16. Traits arise due to variations which occur due to sexual reproduction of inaccuracies during DNA copying or environmental factors.

The individuals with a particular trait may increase in a population due to the following factors:

i. Natural Section: Those variations which give survival advantage to organisms in nature and such traits increase in population.

ii. Genetic drift: It occurs due to change in gene frequency due to accumulation of a particular type of gene.

iii. Geographical isolation: It leads to change in gene frequency leading to expression of one type of trait in a geographically isolated population.

17. The females carry two X-chromosomes. Females produce one type of gametes (eggs) with same type of chromosomes (22 + X). Males have one X and one Y chromosome. Among the male gametes, half of the sperms carry X-chromosome (22 + X) and half carry Y-chromosome (22 + Y). Thus, female is homogametic and male is heterogametic.

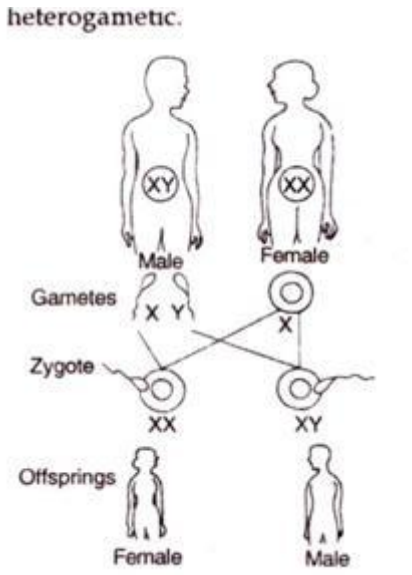


Fig. Human sex-determination mechanism.

When a sperm carrying X chromosome fertilizes an egg, the zygote develops into a female (XX condition). When a sperm carrying Y chromosome fertilizes an egg, the zygote develops into a male (XY condition). Thus, sex is determined at the time of fertilization.

18.

(a) Haploid: A single set of unpaired chromosomes is said to be haploid.

(b) Diploid: The paired condition of chromosomes is known as diploid.

(c) Genes are segments of DNA on a chromosome occupying specific positions. Every chromosome contains DNA and chromosomes are the carriers of genes. Genes have a specific sequence of nucleotides which determines their function.

19. The production of plants by cells or tissues or organs in a synthetic medium is called tissue culture. This technique is also known as micropropagation technique. The synthetic medium used in this technique contains all the nutrients and hormones which are required for growth.

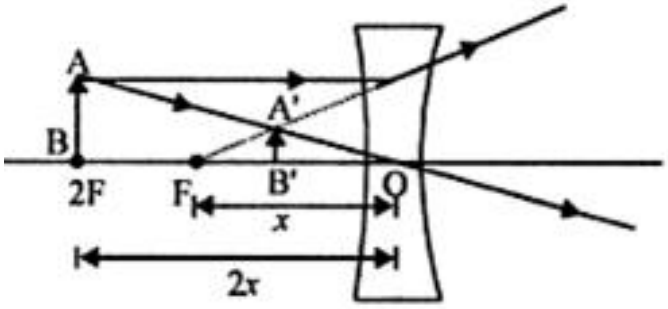
A cell or tissue is transferred into suitable synthetic medium under sterile conditions. The tissue often develops into a fast growing cellular mass called callus. The callus is transferred to another medium for growth and differentiation that forms plantlets. The plantlets can be transplanted into soil or pots where they can be grown to maturity.

Tissue culture technique is being popularly used for production of ornamental plants like Orchids, Dahlia and Carnation.

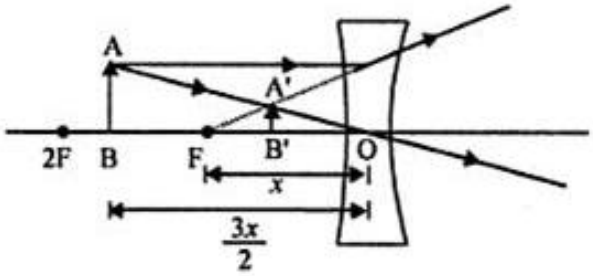
20.

(a) The required ray diagrams for the two cases are as shown below:

i. An object is kept at 2x



ii. An object is kept at (3x/2)



(b) Similarities:

i. The image formed is virtual, erect and diminished.

ii. The image is formed between the optical centre and the focus of the lens.

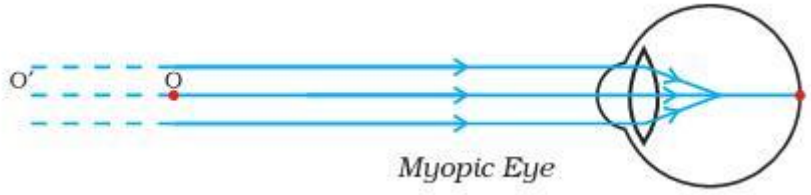
Dissimilarities:

i. The image is formed nearer to the lens in the second case.

ii. The image formed in the second case, is smaller in size than the image formed in the first case.

21.

(a) Diagram to show defect.



Myopic Eye

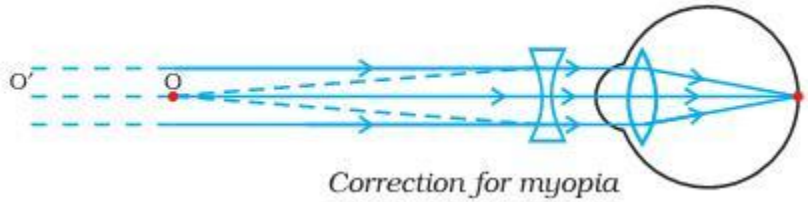
(b) Two causes of the defect:

i. Increase in the length of the eye ball

ii. Decrease in the focal length of the eye lens

(c) Concave lens would correct this defect.

(d) Diagram to show correction.



Correction for myopia

22.

(a)

i. Gallium

ii. Germanium

(b) 4th period

(c) Gallium: 13th group; Germanium: 14th group.

(d) Gallium: Metal; Germanium: Metalloid

(e) In the periodic table, all the elements have been divided into a few groups of elements. It is much more convenient to study the properties of a few elements of each group than to study the properties of all the elements separately.

23.

(a)

i. Multiple fission.

ii. Binary fission.

(b) This kind of division takes place during unfavorable conditions. The nucleus divides several times into many daughter nuclei. This process takes place inside a cyst which is a protective wall formed in single celled conditions. The daughter nuclei arrange along the periphery of the parent cell, and a bit of cytoplasm around each daughter nucleus develops another membrane. Finally, the multinucleated body divides into as many parts as the number of daughter nuclei and forms daughter individuals. This type of fission, where not one but several individuals arise, is called multiple fission. Example - Plasmodium.

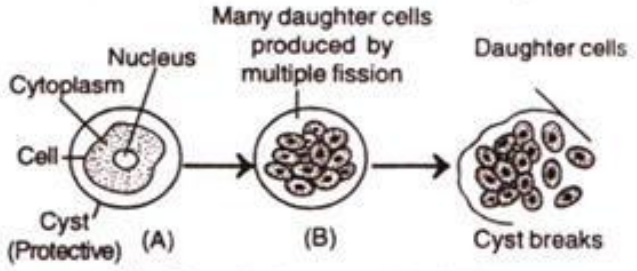


Fig. Reproduction by multiple fission.

24. In the life of human beings, reproductive system becomes functional at a definite age called puberty. Generally, males attain puberty at the age 13-14 years, while females attain it at the age of 11-12 years. Secondary sexual characters develop and the following visible changes can be noticed.

Secondary Sexual Characters in males:

(a) Appearance of facial hair (beard and moustache).

(b) Pubic hair grows over reproductive organs.

(c) Pitch of voice changes.

(d) Increased development of musculature.

Secondary Sexual Characters in females:

(a) Development of mammary glands.

(b) Pubic hair grows over reproductive organs.

(c) Menstrual cycle starts.

(d) Increase in subcutaneous fat particularly in thighs, buttocks and face.

SECTION B

25. (c) C

For better results, the angle of incidence should be in the range of 30^o - 60^o and larger separation between the pins will give better collinearity of pins and accuracy of results.

26. (b) At F_1

When the source is placed at the first principal focus, after refraction from the lens, a parallel beam of light can be obtained.

27. (b) 'b' and 'c'

Na_2CO_3 and $NaHCO_3$ react with acetic acid and liberate CO_2 which is a non-supporter of combustion.

28. (c) CH_3COOH

Carboxylic acids react with alcohols in the presence of acid (catalyst) to produce sweet smelling compounds called esters.

29. (b) Hydrogen

Hydrogen gas is released when ethyl alcohol reacts with sodium.

30. (d) It smells like vinegar and turns blue litmus red.

It smells like vinegar and turns blue litmus red.

31. (b) Binary fission in Amoeba

During binary fission, nucleus divides first followed by the division of cytoplasm. Moreover, binary fission occurs in Amoeba and budding occurs in yeast.

32. (c) Unicellular eukaryotes

Yeast and Amoeba are unicellular organisms with prominent nucleus.

33. (d) False foot

Amoeba use false foot for locomotion.

34. (c) $P_A < P_B > P_C$

Absorption of water increases up to its maximum limit with time.

35. $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2$

Acetic acid on reaction with sodium hydrogen carbonate produces sodium acetate, water and carbon dioxide.

Therefore, molecule A is CH_3COOH and molecule B is an H_2O molecule.

36. (c) Focal length of lens

A parallel set of rays converge at the principal focus of a convex lens. So, the distance of the screen from the lens gives the measure of rough focal length of a convex lens.