CBSE
Class X Science
Sample Paper – 5 Solution
Term II

SECTION A

1. Ethanoic acid, CH_3COOH

2. Refractive index is given as,

$$\eta = \frac{\text{velocity of light in the air (C)}}{\text{Velocity of light in the medium (v)}}$$

Since speed of light in air is always greater than the speed of light in any other medium, so, refractive index of any medium with respect to air is greater than 1.

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. When we enter a dark hall, we cannot see the surrounding clearly, after a short time interval, our vision improves and we can see the surrounding because, in bright sunlight, the pupil of our eye is small. So, when we enter a dark hall, very little light enters our eye and we cannot see properly. After short time, the pupil of our eye expands and becomes larger. Hence, more light enters in our eye and we can see the surroundings properly.

5.

(a) Yes, the atoms of all the three elements lithium, sodium and potassium have one electron each in their outermost shells.

(b) Both helium (He) and neon (Ne) have filled outermost shells. Helium has a duplet in its K shell, while neon has an octet in its L shell.

6.

Biodegradable waste	Non-biodegradable waste
The substances that are easily decomposed by microorganisms.	The substances that are not decomposed by microorganisms.
These substances easily mix with the soil after a short interval of time. E.g. paper	These substances are not able to mix with soil even after a long interval of time. E.g. plastic

7.

(a)

i. The quality of environment was maintained due to conservation of forests.

ii. The local people could use the forest resources in suitable ways.

(b) Conservation of wild life helps in maintaining the ecological balance of the biosphere and provides a gene bank for improvement of domesticated plants and animals.

(c) IUCN stands for "International Union for Conservation of Nature and Natural Resources".

8.

(a) Elements which belong to the 3rd period of the Modern Periodic Table: Na, Mg, Al.

(b) Elements which belong to Group 1 of Modern Periodic Table are: Li, Na, and K

(c) Al

9.

(a) Given:

R = +3 m

f = + 1.5 m

Object distance, u = -5 m

Image distance, v =?

Image size h' =?

Using mirror formula,

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

$$\frac{1}{v}=\frac{1}{f}-\frac{1}{u}=\frac{1}{1.5}-\frac{1}{(-5)}$$

$$\frac{1}{v}=\frac{(10+3)}{15}=\frac{13}{15}$$

$$v=\frac{15}{13}=1.15\text{ m}$$

The image is 1.15 m behind the mirror.

Magnification, $m=\frac{-v}{u}=\frac{(-1.15)}{(-5)}=+0.23$

The image is virtual, upright and smaller in size than the object by factor of 0.23

(b) The wavelength of light decreases when it travels from a rarer to a denser medium.

10.

(a) When the object lies between the optical centre and the focus of the lens, convex lens forms an erect and virtual image.

(b) When a parallel beam of light falls on a smooth and highly polished surface, then the reflected beam is also parallel and directed in a fixed direction. Such reflection of light is called regular reflection.

(c) Concave mirrors are used as shaving mirrors to see a large image of the face. This is because when the face is held within the focus of a concave mirror, then an enlarged image of the face is seen in the concave mirror. This helps in making a smooth shave.

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.

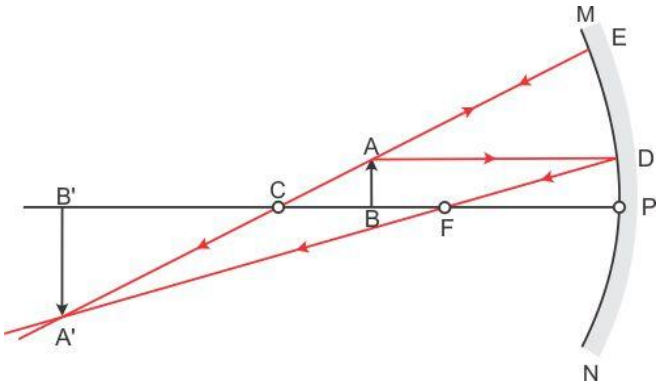
(b) The one of the cause of near sightedness could be decrease of the focal length of the eye lens.

12.

(a) The focal length of a lens depends on the following factors:

i. Radii of curvature of the surfaces of the lens.
ii. Nature of material of the lens.
iii. Nature of medium in which lens is placed.

(b)



13. Steps to discourage the use of alcohol:

i. By not getting attracted towards this habit and by stopping my friends as well and asking them to keep control on themselves.
ii. By making posters, banners and writing articles on this issue.
iii. By sensitizing the people about the harmful effects of liquor consumption.

14.

(a) Lithium (Li), sodium (Na), and potassium (K) have a single electron in their outermost shells.

(b) Magnesium (Mg) and calcium (Ca) have two electrons in their outermost shells.

(c) Neon (Ne), argon (Ar) and xenon (Xe) have filled outermost shells.

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 –

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

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

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

iv. Tertiary consumers- They form the fourth trophic level and feed on secondary consumers.

16.

(a) A section of DNA that provides information for one protein is called the gene for that protein.

(b) Speciation may take place when variation is combined with geographical isolation.

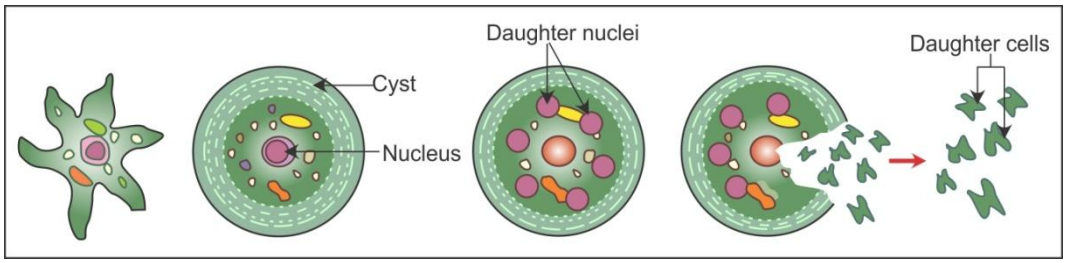
(c) The person will have black hair.

17.

(a) Two characters.
They are the shape of the seed and the colour of the seed.

(b) Dominant trait is a genetic trait which is considered dominant if it is expressed in a person who has only one copy of that gene.
Recessive trait is a genetic trait that is expressed only when two copies of the same gene are present.

18. Multiple fission is a kind of division, which 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.



19.

(a) In plants, one male gamete fuses with the egg to form a diploid zygote. This fusion is called syngamy. The other male gamete fuses with the other two polar nuclei to form triploid primary endosperm nucleus. This fusion is called triple fusion. This mechanism of two acts of fertilization occurring in an embryo is called double fertilization.

(b) Since the ovary of the woman releases one egg every month, therefore, the uterus also prepares itself every month to receive a fertilized egg. In this process, the inner lining of the uterus becomes thick and soft with lots of blood capillaries in it. If however, the egg released by the ovary is not fertilized, then the thick lining of the uterus breaks down and comes out through the vagina in the form of blood and mucous. This is called menstruation.

20.

(a)

i. Ethanol is converted to ethanoic acid by oxidation of ethanol in the presence of an oxidising agent like alkaline potassium permanganate or acidified potassium dichromate.

$$C_2H_5OH \xrightarrow[(Or\ Alkaline\ KMnO_4 + Heat}^{Acidified\ K_2Cr_2O_7 + Heat} CH_3COOH$$

ii. Ethanol is converted to ethene by dehydration of ethanol in the presence of dehydrating agent conc. H_2SO_4.

$$C_2H_5OH \xrightarrow{Conc.\ H_2SO_4} CH_2{=}CH_2 + H_2O$$

iii. Ethanol is converted to ethyl ethanoate by the process of esterification i.e. by treating ethanol with ethanoic acid in the presence of conc. H_2SO_4 and warming it.

iv. $$C_2H_5OH + CH_3COOH \xrightarrow{Conc.\ H_2SO_4} CH_3COOC_2H_5 + H_2O$$

(b) Unsaturated hydrocarbons burn with a yellow flame because of incomplete combustion.

(c) Hardness of water is due to the presence of Ca^{2+} and Mg^{2+} ions. These ions react with soaps to form curdy white precipitates of calcium and magnesium salts of fatty acids.

21.

(a) Humans have cultivated wild cabbage and generated different vegetables. Example:

i. Some farmers wanted to have very short distances between the leaves of wild cabbage and produced the common variety of 'cabbage'.

ii. When farmers opted for the arrested flower development of wild cabbage plant, it led to the production of broccoli.

iii. Some farmers went in for sterile flower of wild cabbage and developed another variety of cabbage called cauliflower.

iv. When farmers opted for the swollen part of wild cabbage, it led to the production of Kohlrabi.

v. Finally, the farmers wanted to grow large leaves of wild cabbage and ended up producing a leafy vegetable called Kale.

(b) The tools that can be used to trace evolutionary relationships among species are:

i. Excavating

ii. Time-dating

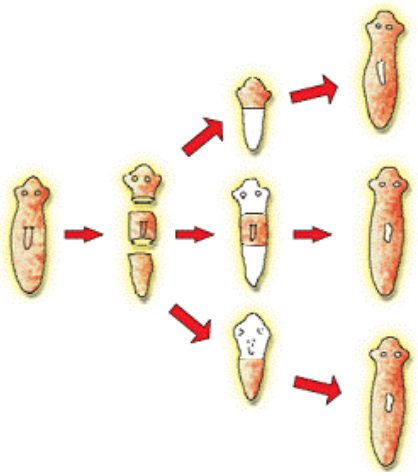
iii. Determining DNA sequences

iv. Studying fossils

22.

(a) Planaria can be cut into any number of pieces and each piece grows into a complete organism. This process is called regeneration. It is carried out by specialized cells in the organism.

Regeneration in Planaria

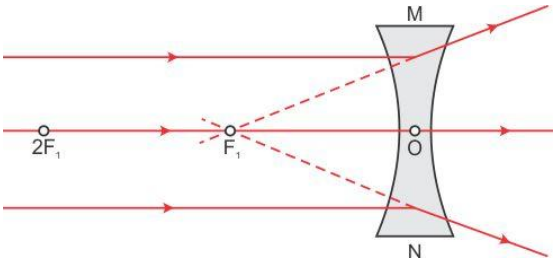


(b) The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta. It provides a large space area for glucose and oxygen to pass from the mother to the embryo. The developing embryo also produces waste substances which can be moved by transferring them into the mother's blood through the placenta.

(c) The ovule develops a tough coat and is gradually converted into a seed. The ovary grows rapidly and ripens to form a fruit.

23.

(a)



(b) A convex mirror always forms a virtual image which is erect. Therefore, mirror A is a convex mirror. On the other hand, a concave mirror may form a real as well as a virtual image. A real image is inverted and virtual image is erect. Therefore, mirror B is a concave mirror.

(c) The focal length of a spherical mirror is equal to half of its radius of curvature. If 'f' is the focal length of a spherical mirror and 'R' is its radius of curvature, then

$f = R/2$

Given: Radius of curvature, R = 25 cm

So, focal length, $f = 25/2$ cm

$= 12.5$ cm

24.

(a) The farthest point up to which an eye can see clearly is called the far point of the eye.

(b) For a normal eye, image distance in the eye is fixed, being equal to the distance of the retina from the eye lens. When we increase the distance of an object from the eye, the focal length of the eye lens changes on account of the accommodating power of the eye, so as to keep the image distance constant.

(c) A person who is blind to red-green colours may be deficient in cone shaped cells having red and green pigment in the retina of his eyes. It is a genetic disorder and not a refractive defect of vision. That is why, the person has normal vision.

SECTION B

25. (d) Formation of daughter cells in Amoeba
The given figure represents formation of daughter cells in Amoeba

26. (c) Homologous organs have similar function.
Homologous organs have similar origin but dissimilar functions.

27. (b) Unicellular fungi
Yeast is a unicellular fungus.

28. (b) Hydrogen
Hydrogen gas is released when ethyl alcohol reacts with sodium.

29. (d) The device X is a convex lens of focal length 40 cm.
Since the light gets refracted two times at different angles, the emergent ray bends at an angle to the direction of incident ray.

30. (b) CH_3COOH
CH_3COOH will have the lowest pH since it is an acid (pH < 7).
NaOH is a base (pH > 7)
CH_3COONa is a basic salt (pH > 7)
$NaHCO_3$ is a base (pH > 7).

31. (d) Keep both the mirror and the screen in suitable stands with the screen put in front of the mirror.
Placing the mirror and screen in a stand will avoid any type of disturbance and inaccuracy during the experiment. Due to the reflecting nature of the mirror, the screen should be kept in front of the mirror.

32. (c) iii
Ethanoic acid reacts with sodium hydrogen carbonate to produce carbon dioxide which is a non-supporter of combustion.

33. (d) All the test tubes
Ethanoic acid is soluble in water and forms a clear solution when dissolved in it.

34. (c) Both, before and after placing them in water

35. (d) The device X is a convex lens of focal length 40 cm.

The parallel rays from the distant object fall on the convex lens and converge at its second principal focus (i.e., where the screen is placed). Then, the distance between the screen and the convex lens gives the approximate focal length of the lens i.e. 40 cm

36. Ethanoic acid reacts with methanol to give methyl ethanoate.

Reaction: $CH_3COOH + CH_3OH \xrightarrow{Conc.H_2SO_4} CH_3COOCH_3 + H_2O$