Goa Board
Class X Science
Term II
Sample Paper – 10 Solution

SECTION A

1.

(a) Convex mirror has positive focal length.
(b) Convex mirror always forms a virtual image.

2. Lithium belongs to Group 1 of the periodic table.

3. To maintain ecological balance in nature and to preserve the gene pool.

4.

i. They may produce foul smell during decomposition process.
ii. They may produce some harmful gases such as ammonia, methane, carbon dioxide, etc. which can further cause global warming.

5. Stars appear very small to us. So, stars can be considered as point source. The continuously changing atmosphere is able to cause variations in the light coming from a point-sized star because of which the star appears to be twinkling. However, planets appear to be quite big to us. So, planes can be a collection of a very large number of point sources of light. The dimming effect produced by some of the point sources of light in one part of the planet are nullified by the brighter effect produced by the point source of light in its other part. Hence, the brightness of a planet always remains the same and it does not appear to twinkle.

6. The size of carbon atom is small as compared to that of silicon. Therefore, C-C bond is smaller and stronger than Si-Si bond. As a result, any number of carbon atoms can be linked to each other resulting in a large number of carbon compounds.

7. To save our environment and to maintain ecological balance in nature, the rule of 3R's should be implemented while using resources. It means:

i. Reduce - We have to reduce the excess use of resources when not required to avoid their wastage.
ii. Recycle - Used resources like plastic, paper etc. should be recycled.
iii. Reuse - Reuse of sources should be encouraged as it will also conserve the resources.

8.

(a) Speed of light in a medium $\propto \frac{1}{\text{refractive index of the medium}}$

As refractive index of medium A is the least, so speed of light in A is maximum.

The refractive index of medium D with respect to medium A = $\frac{1.65}{1.33}$ =1.24

(b) The effects of atmospheric refraction of light are pressure, twinkling of stars, advanced sunrise and sunset.

9.

(a) P_1=+3.5 D

P_2=-2.5 D

Power of combination, P = P_1 + -2.5 D

P = 3.5 - 2.5 = 1 D

Focal length, f = $\frac{1}{P}$ = 1 m

(b) Given:

R = 3 m

F = R/2 = 3/2 = 1.5 m

U = -5 m

Mirror formula is given as,

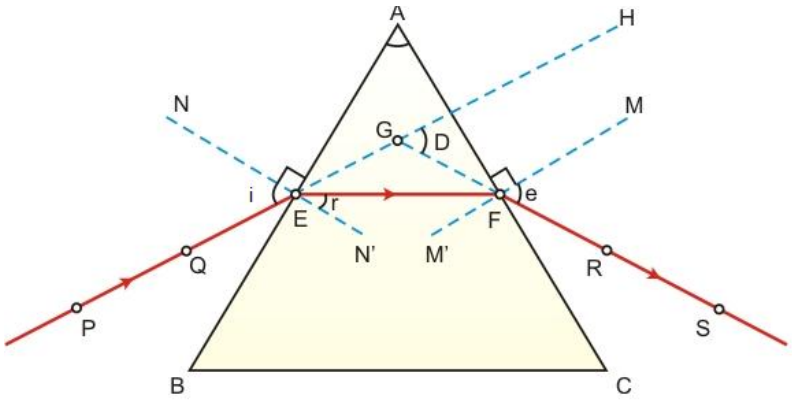
$$\frac{1}{f}=\frac{1}{v}+\frac{1}{u}$$

$$\frac{1}{1.5}=\frac{1}{v}+\frac{1}{-5}$$

$$\frac{1}{v}=\frac{1}{5}+\frac{2}{3}=\frac{10+3}{15}$$

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

10.



When a ray of light passes through a glass prism, refraction of light occurs both, when it enters the prism as well as when it leaves the prism.

i. A glass prism ABC has been kept on its base BC.
ii. Consider a light ray incident on one of its lateral surface.
iii. Here, PE is the incident ray, EF is the refracted ray and FS is the emergent ray. A ray of light enters from air into glass at the first surface AB. The light ray on refraction bends towards the normal. At the second surface AC, the light ray enters from glass into air. Hence, it bends away from the normal.
iv. The emergent ray is bent at an angle with the direction of the incident ray. This angle is called the angle of deviation.

11. When the sun is overhead, the light coming from the sun has to travel a relatively shorter distance through the atmosphere to reach us. During this shorter journey of sunlight, only a little of the blue colour of the white light is scattered. Since the light coming from the overhead sun has almost all its component colours in the right proportion, the sun in the sky overhead appears white to us.

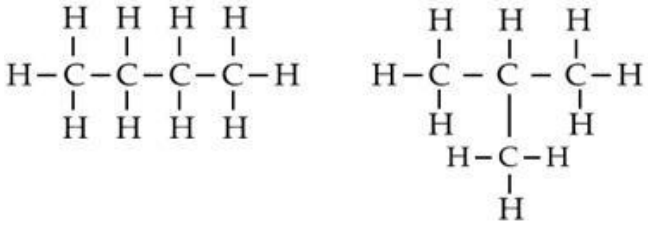
12.

(a) The achievements of Mendeleev's periodic table were:

i. Mendeleev adjusted few elements with a slightly greater atomic mass before the elements with a slightly lower atomic mass, so that, the elements with similar properties could be grouped together.
ii. Mendeleev left some empty gaps in his periodic table. He predicted the existence of some elements that had not been discovered at that time. His predictions were quite true as elements like scandium were discovered later.

(b) Mendeleev took the formulae of oxides and hydrides formed by elements as the basic properties of the elements for their classification in the form of periodic table.

13. Compounds having the same molecular formula but different structural formula are known as isomers and the phenomenon is called structural isomerism.
Eg: 4 carbon atoms in C_4H_{10} can be arranged in 2 different ways. C_4H_{10} has two isomers. These are n-butane and iso-butane



14.

(a) Group I elements form alkalis when they react with water; hence, they are called alkali metals.

(b) N - 2, 5
P - 2, 8, 5
Nitrogen is more electronegative than phosphorus because of its smaller size and high nuclear charge.

15. The accumulation of harmful chemicals in the body of living organisms at different trophic levels in a food chain is called biological magnification.
Yes, the concentration of these harmful chemicals will be different at different levels of the ecosystem.
It will be maximum at the last trophic level which is mostly the top carnivores (quaternary consumers).

16. Regeneration is the ability of an organism to grow into a complete individual when its body is divided into any number of pieces. It can be seen in Hydra and Planaria.

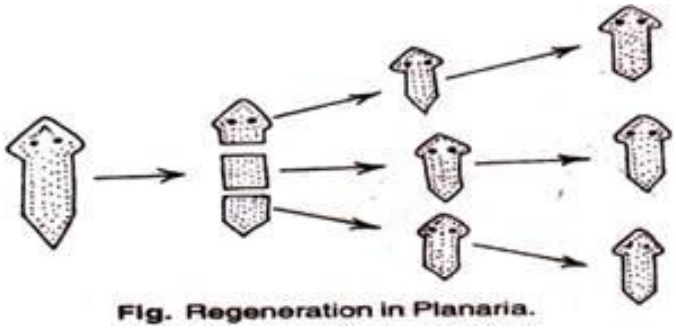


Fig. Regeneration in Planaria.

Regeneration is carried out by specialized cells which proliferate and further make a large number of cells. From this mass of cells, different cells undergo changes to become various cell types and tissues. These changes take place in an organized sequence referred to as development.

17. The organs which are similar in function or appearance but differ in structure and development are called analogous organs.

The wings of a bird and an insect are developmentally and structurally different from each other. Skeleton, flesh and feathers support bird's wings. The insects have a fold of membrane as wing, which is associated with a few muscles. Wings of birds and insects are structurally different but perform the same function of flying. They are therefore, termed as analogous organs.

18.

(a) The doctor should not tell the sex of the foetus.

(b) No, it is not ethical to determine the sex of a child.

(c) The government should ban the process of sex determination and should punish or fine whosoever does so.

19.

i. In the body cells of human males, one X and one Y chromosome is present. 50 percent male gametes (sperms) carry X-chromosome and the remaining 50 percent carry Y-chromosome.

ii. The body cells of human female carry two X-chromosomes. Females produce gametes (ova) with similar type of chromosomes, all carry one X-chromosome.

iii. Sex chromosomes in males are XY type while in female they are XX type. When a sperm carrying X- chromosome fertilizes an egg, the zygote develops into a female (XX condition). When sperm carrying Y chromosome fertilizes an egg, the zygote develops into a male (XY condition).

20.

(a) Spectacles having bifocal lens should be worn by a person having the defect of myopia as well as hypermetropia.

(b)

i. Rods are rod-shaped cells present in the retina of an eye which are sensitive to the intensity of light.

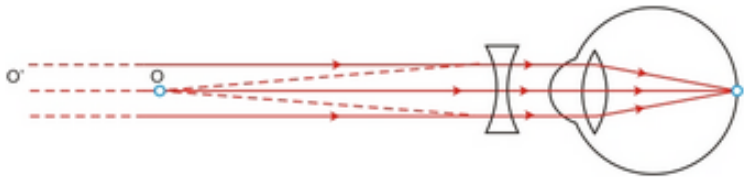
ii. Cones are the cone-shaped cells present in the retina of an eye which are sensitive to the colour of light.

iii. Our night vision is relatively poor compared to the night vision of an owl due to the presence of a relatively smaller number of rod cells in the retinas of our eyes.

(c)

i. A Myopic eye:

ii. Correction for myopia:



21.

(a) Given:

u = -15 cm

f = -10 cm

h = +1 cm

v = ?

h' = ?

Mirror formula,

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

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

$$\frac{1}{v}=\frac{1}{-10}-\frac{1}{-15}=-\frac{1}{30}$$

$$v=-30 \text{ cm}$$

Image is formed at a distance of 30 cm on the side of the object. Negative sign indicates that object and image are on the same side.

The image is in front of the mirror, it's real and inverted.

$$m=\frac{h'}{h}=-\frac{v}{u}$$

$$h'=1\times-\frac{-30}{-15}=-2 \text{ cm}$$

Size of image is 2 cm. It is magnified.

(b) The word AMBULANCE on the hospital vans is written in the form of its mirror image so that, any vehicle which is ahead of the ambulance van, can see the laterally inverted alphabets correctly from his rear view mirror and make way for it to pass through.

(c) The refractive index of a diamond is very high. The faces of diamond are cut in such a way that the light entering into the diamond suffers total internal reflection repeatedly. This gives the diamond its famous sparkle.

22.

(a)

Li	Be	B	C	N	O	F
152	111	88	77	74	66	64

(b) Yes, the elements are now arranged in the pattern of a period of the periodic table.

(c)

i. Li has the smallest atomic number

ii. F has the largest atomic number

(d) Atomic radius decreases on moving from left to right in a period of the periodic table.

(e) Metal: Li; Non-metal: C; Metalloid: B

(f) Atomic radius decreases from left to right in a period because the nuclear charge i.e. the atomic number increases from left to right; thereby, bringing the outermost shell closer to the nucleus.

23. 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.

24. Ovaries exhibit cycle of events at definite intervals. The ovarian follicles grow into mature follicles. Usually, one mature follicle develops to surround one ovum. The maturing ovum is from one of the two ovaries. The ovum is then released from the respective ovary by the process called ovulation. When the ovarian follicle matures, the inner wall of the uterus thickens to get prepared for receiving the developing zygote in case fertilization occurs. In case, fertilization does not take place, the thickened inner wall of the uterus breaks down along with its blood vessels, and moves out of the vagina in the form of bleeding, called menstrual flow (menstruation). It lasts for about 4 - 7 days. The cycle of events taking place in the ovaries and uterus every twenty eight days and marked by the menstrual flow, is called menstrual cycle (sexual cycle in human female). In a normal healthy woman, ovulation takes place in the mid of the menstrual cycle around the 14^{th} day. The menstrual cycle occurs every 28 to 38 days.

SECTION B

25. (a) Near the wall opposite to the window

The image obtained from the convex lens can be focused on or near the wall opposite to the window using it as the screen.

26. (c) Parallel to the base of the prism

In the minimum deviation position, refracted ray in the prism is parallel to its base.

27. (c) III

In case IV, nucleus is not present. In case II, additional wall is shown which resembles a cyst. In case I, nucleus is dividing.

28. (a) Observe strong effervescence

On adding sodium hydrogen carbonate to acetic acid, we immediately observe strong effervescence due to evolution of CO_2 gas.

29. (c) Orangish red

Acetic acid will turn pH paper orangish red because it is acidic in nature.

30. (a) Dehydrating agent, esterification

Conc. H_2SO_4 acts as dehydrating agent when acetic acid reacts with ethyl alcohol and this process is called esterification.

31. (a) H_2

Hydrogen gas is liberated in the experiment.

$2Na + 2CH_3COOH \rightarrow 2CH_3COONa + H_2$

32. (d) D

Budding in yeast is illustrated in diagram D as it shows a Yeast cell with an attached outgrowth called bud.

33. (c) a, d, c, b

The slide is placed and it is moved to make visible. Later, the objective lens is raised till the object is focused. Then the slide is made visible using fine adjustment screw.

34. (d) Carrot and Radish

Homologous structures are similar in origin but perform different functions. Carrot and radish are underground roots. So, they are considered homologous structures.

35. When potassium permanganate is added (in excess) to ethanol, it is oxidised to ethanoic acid.

The chemical reaction involved is:

$$CH_3CH_2OH \xrightarrow{\text{Alkaline } KMnO_4} CH_3COOH$$

36. (d) All are correct

In option A, a finite size object is kept at F_1.

In option B, a point size object is kept at F_1.

In both the cases, final image is formed at infinity; so, parallel beams of rays are obtained.

In option C, parallel rays coming from a distant object meet at principal focus after refraction through the lens.

Hence, all the three ray diagrams are correct.