

CBSE
Class X Science
Sample Paper – 3 Solution
Term II

SECTION A

1.
 - i. Ketone group
 - ii. Aldehyde group
2. In the visible spectrum, the red colour has the largest wavelength. The red colour is least scattered by fog or dust particles. So we can observe red colour easily even in foggy conditions. Hence, stop signals on roads are in red colored light.
3. Principles of inheritance were first explained by Gregor Johann Mendel.
4. Mendeleev's Periodic Table was based on the law that the properties of elements are the periodic function of their atomic masses. So, cobalt with atomic mass 58.93 should be placed after nickel with atomic mass 58.71. However, to maintain similarity in properties, it had to be placed before nickel in Mendeleev's Periodic Table.
Modern Periodic Table is based on the law that the properties of elements are the periodic functions of their atomic numbers. So, the problem was resolved because cobalt has a lower atomic number (27) than that of nickel (28).
5.
 - (a) Coal and petroleum are called fossil fuels because they are formed from the preserved remains of organisms that lived millions of years ago and are used as fuels.
 - (b) Elements present in fossil fuels in addition to carbon are:
Hydrogen, Nitrogen and Sulphur (Any two)
6. Stars emit light on their own; when this light travels through the earth's atmosphere which has variable optical density, the continuously changing atmosphere refracts the light from the stars in different amounts from one moment to the next. The light seems to be bright and dim as it keeps changing due to continuous refraction through the different layers of the atmosphere of the Earth. Hence, we say light twinkles at night.

7. 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 that are released on burning fossil fuels are acidic oxides. These lead to acid rain which affects our water and soil resources.
 - Green house gases like carbon dioxide released during consumption of fossil fuels enhance the process of global warming.
 - Fossil fuels were formed over millions of years ago and there are only limited reserves. If we were to continue consuming these sources at such alarming rates, we would soon run out of energy.

8.

- (a) Atomic number gives the number of electrons in a neutral atom. The number of electrons in an atom decides its electronic configuration and thus, the number of valence electrons.

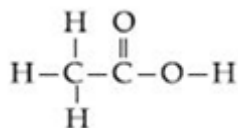
The valence electrons decide the chemical properties of an element.

Thus, atomic number is more important than atomic mass in determining chemical properties.

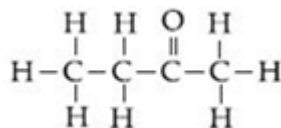
- (b) The cause of periodicity is the reoccurrence of similar outer electronic configuration after certain fixed intervals of atomic numbers.

9.

- (a) Ethanoic acid (CH_3COOH)



Butanone ($\text{C}_2\text{H}_5\text{COCH}_3$)



- (b) Ethanoic acid has one oxygen atom more and two hydrogen atoms less than ethanol; so, the conversion of ethanol to ethanoic acid is an oxidation reaction in which oxygen is added and hydrogen is removed.

10. X = 2nd period and 17th group.

Y = 3rd period and 15th group.

Z = 3rd period and 18th group.

11.

- (a) According to Snell's law, the ratio of the sine of the angle of incidence to the sine of the angle of refraction for a given pair of media is constant. This constant is called refractive index (n) of a second medium with respect to the first medium.

$$n = \frac{\sin i}{\sin r}$$

- (b) Medium A is optically denser than medium B. A ray bends away from the normal only on entering a rarer medium from a denser medium.

12.

- (a) Given:

Size of object, $u = -15$ cm,

Focal Length, $f = -10$ cm,

$v = ?$

Now, putting these values in the mirror formula:

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

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

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

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

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

image distance = -30 cm

Thus, the position of the image is 30 cm to the left side of the mirror or 30 cm in front of the mirror.

- (b) The focal length of the plane mirror is infinite.

13. During sunrise and sunset, the Sun is red in color while at noon, the Sun appears white.

At the time of sunrise and sunset, the Sun is near the horizon. The rays from the Sun have to travel through a much larger part of the atmosphere to reach an observer on the Earth. So, most of the blue light is scattered away. The red colour which has the largest wavelength is scattered the least and enters into our eyes. Hence, the Sun appears red at the time of sunrise and sunset. At noon, the sun is nearly overhead. The sunlight has to pass through a much smaller portion of the Earth's atmosphere. The scattering is much less and hence, the Sun looks white.

14.

(a) Given:

Focal length, $f = +40 \text{ cm} = +0.4 \text{ m}$

Power of lens $P = \frac{1}{f}$

$$P = \frac{1}{+0.4} = 2.5 \text{ D}$$

(b) Myopia or short sightedness can be rectified using a concave lens.

15.

(a) Differences between autotrophs and heterotrophs are:

Autotrophs	Heterotrophs
The organisms that can prepare their own food using inorganic materials from the environment are called autotrophs.	The organisms that cannot prepare their own food and depend on others (producers) for their food are called heterotrophs.
Autotrophs use CO_2 and release O_2 in the environment.	Heterotrophs use O_2 and release CO_2 in the environment.
E.g. green plants.	E.g. animals and human beings.

(b) Producers (green plants) constitute the first trophic level in a food chain.

16.

(a) Genes are segments of the DNA which are responsible for the characteristic features of an organism.

(b) Genes are located on chromosomes in linear sequence and at fixed positions.

(c) Chemically, genes are acidic in nature since they are nucleic acids which constitute the DNA.

17.

- i. Homologous organs, analogous organs or vestigial organs help to identify evolutionary relationships.
- ii. Homologous organs are those organs having similar basic structure but have been modified to perform different functions. E.g. forelimbs of reptiles, frog, lizard, bird and human (amphibians and mammals) are homologous organs. Such homologous characteristics help to identify an evolutionary relationship between apparently different species.
- iii. Analogous organs are those organs which are different in basic structure but perform the same function. Example: wings of birds and wings of bats.
- iv. Vestigial organs are certain reduced and non-functional organs present in some organisms. Example: vermiform appendix in human body.

18.

- (a) The process of fusion of male gamete (sperm) with the female gamete (egg) to produce zygote is called fertilization.

(b)

External Fertilization	Internal Fertilization
The fusion of a male gamete with a female gamete outside the body of a female is called external fertilization. Example- fish, frog, etc.	The fusion of a male gamete with a female gamete inside the body of female is called internal fertilization. Example - birds and mammals.

- (c) The site of fertilization in female human beings is the fallopian tube.

19.

- (a) Potato tuber has depressions called "eyes" on its surface. These eyes have vegetative buds in them which germinate to produce a new potato plant. Similarly, the fleshy leaves of Bryophyllum bear vegetative buds in the notches along the leaf margin. These buds germinate to form small plantlets which form new plants on being detached.
- (b) Grafting can be used to grow good quality mango plant in which a part of the graft of a good quality mango called scion and the part of an inefficient mango tree called stock are tied together so that the lower part of the stock provides nourishment to the growing plant.

20.

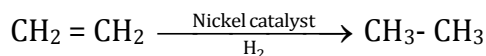
(a)

- i. Ethanol
- ii. 2-Bromopropane

(b) The formula of two successive members of a homologous series differs by $-\text{CH}_2$ unit.

(c) Unsaturated hydrocarbons will give a yellow flame with lots of black smoke.

(d) Hydrogenation of vegetable oils in the presence of nickel as a catalyst is an example of addition reaction.



21.

(a) The linear magnification produced by a mirror is defined as the ratio of the height of the image to the height of the object.

(b) The power of the lens has a positive sign; so, it is a convex lens.

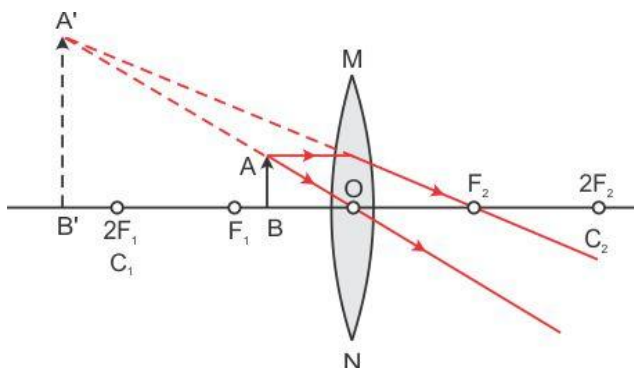
$$\text{Power, } P = \frac{1}{f}$$

$$f = \frac{1}{P} = \frac{1}{2.5}$$

$$f = 0.4 \text{ m} = 40 \text{ cm}$$

so, focal length, $f = 40 \text{ cm}$

(c)



When the object is between the focus and the optical centre of a convex lens then the image formed is:

- i. Beyond focus
- ii. Virtual and erect
- iii. Enlarged

22.

(a)

- i. The sky appears dark from the surface of the moon because there are no atmospheric particles to scatter the light.
- ii. No water vapour is present at the moon's surface. No clouds are formed. There are no rains on the moon. So, a rainbow is never observed.

(b) In old age, the crystalline lens of some people becomes hazy or even opaque due to the development of a membrane over it. This condition 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.

(c) The rod shaped cells respond to brightness/intensity of light.

23. The law of independent assortment states that during dihybrid cross, when two characters are studied simultaneously then factors for a particular trait (character) are inherited in the new progeny, irrespective of each other.

For example, when a pea plant with round and yellow seeds (RRYY) is cross bred with a plant having wrinkled and green seeds (rryy).

	ry	ry
RY	RrYy	RrYy
RY	RrYy	RrYy

The new progeny (F1 generation) has all plants with round and yellow seeds. When these are self pollinated, a ratio of 9:3:3:1 is obtained which depicts their independent inheritance.

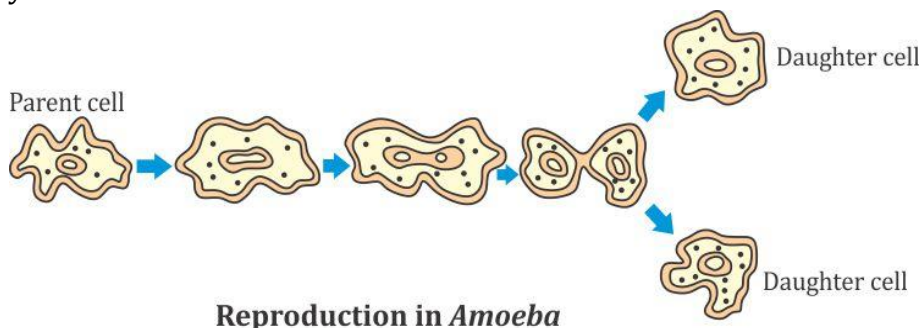
	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

24.

(a) Advantages of vegetative propagation:

- i. It helps in producing identical clones.
- ii. It helps in producing such plants which do not produce viable seeds, or produce very few seeds.

(b) Binary Fission in Amoeba:



(c) Fertilization occurs in the female reproductive tract in the fallopian tube or the oviduct.

SECTION B

25.(d) Bends at an angle to the direction of incident ray

As the light get refracted two times at different angles, the emergent ray bends at an angle to the direction of the incident ray.

26.(b) 2, 3 and 4

Rays (2), (3) and (4) obey the laws of refraction.

Ray (2) is parallel to the principal axis and passes through the second focus of the lens.

Ray (3) is passing through the optical center and goes undeflected.

Ray (4) is passing through the first focus of the lens and goes parallel to the principal axis.

27.(a) Weight of wet raisins-weight of dry raisins.

Weight of wet raisins - weight of dry raisins gives amount of water absorbed.

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

The correct sequence of steps for focusing the object under a microscope are:

- (a) Place the slide on the stage, look through the eye-piece and adjust the mirror to get proper illumination.
- (d) Look through the eye-piece and move the slide till the object is visible.
- (c) Look through the eye-piece and raise the objective lens using coarse adjustment screw till the object is focused.
- (b) Focus the slide sharp, using fine adjustment screw.

29.(c) Hypertonic

Fresh grapes shrink when placed in a hypertonic solution as the salt concentration in the solution is more than that in the grapes; thus, water will move out of the grapes.

30. (d) Vinegar

The odour of ethanoic acid resembles vinegar.

31. (a) Observe brisk effervescence

Brisk effervescence is observed due to evolution of carbon dioxide gas.

32. (a) Alkaline KMnO_4

Alcohols react with oxidising agents such as alkaline KMnO_4 and get oxidised to carboxylic acid.

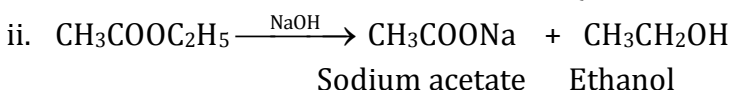
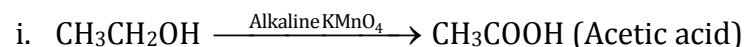
33. (a) Ester

Ethanoic acid forms ester on reacting with alcohol in the presence of conc. H_2SO_4 .

34. (d) neither the screen nor the lens

As the distance of the object increases, the image formed by a convex lens will be closer to its focus.

35.



36.(d) $\frac{8\text{g} - 5\text{g}}{5\text{g}} \times 100$

The percentage of water absorbed by raisins =

$\frac{\text{Mass of raisins after soaking} - \text{Mass of raisins before soaking}}{\text{Mass of raisins before soaking}} \times 100$