CBSE Examination Paper - March 2014
SET - II
Science

SECTION – A

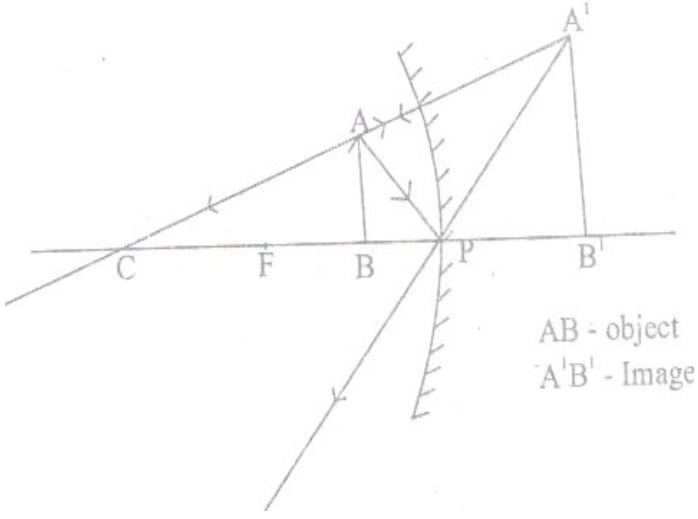
1. Atomic number of X = 2 + 8 + 2 = 12
   Atomic number of Y = 2 + 8 + 6 = 16

2. The transmission of characteristics from one generation to another is known as heredity.

3. Steel cans and paper can be easily recycled, but we generally throw them in dust bins.

4. The first step in sexual reproduction is gamete formation. In this step, the number of chromosomes get halved. Thus, each gamete receives half the number of chromosomes to that of somatic cells. During fertilization, the fusion of male and female gametes takes place, which results in the number of chromosomes in the zygote to be equal to that of somatic cells. Thus, the chromosomal number of the sexually producing parents and their offspring is the same.

5. The position of the object should be in between focus and pole of the concave mirror.



6. Decomposers including microorganisms such as bacteria and fungi that obtain nutrients by breaking down the remains of dead plants and animals.

Role of Decomposers

1. They help in the breakdown of organic matter into simple inorganic raw materials such as CO_2, H_2O and nutrients.
2. They help in the natural replinishment of soil and recycling of materials.

7. Water shed management is the study of characteristics of water shed. It helps to manage water quality, supply, drainage and rain water flows. It also ensures sustainable maintenance planning of a water shed.

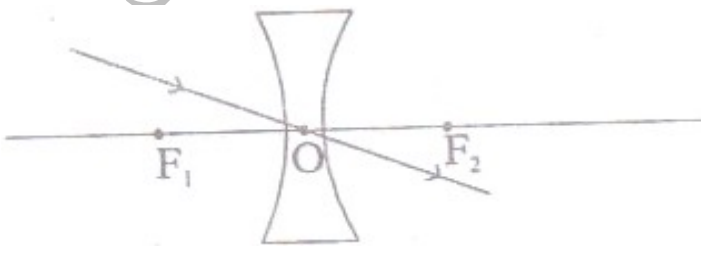
Benefits of water shed management system

1. Water quality is strictly maintained.
2. Controlling the flow of rain water can help protect the land in flood conditions.

8. The producers convert solar energy into chemical energy in the form of organic compounds. The primary consumers derive their nutrition from the producers. According to the energy transfer law, only 10% of energy is transferred from one trophic level to the other. So, the energy that is captured by the producers does not revert back to the sun and the energy transferred tot he herbivore does not come back to the producers. It just keeps on moving to the next trophic level in a unidirectional way. That is why the flow of energy in the food chain is always unidirectional.

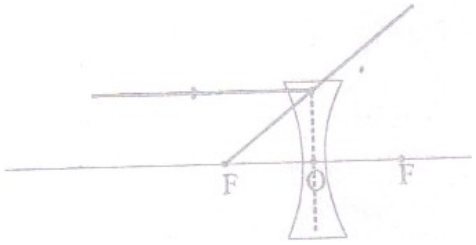
A large number of pesticides and chemicals are used to protect our crops from pests and disease. Some of these chemicals are washed down from the soil, while some enter the water bodies. From the soil and water, they are absorbed by plants along with water and minerals. Later they are taken up by aquatic plants and animals. This is how these chemicals enter the food chain. As these chemicals cannot decompose, they accumulate, progressively at each trophic level. This increase in the concentration of harmful chemicals with each step of the food chain is called biomagnification. As human being occupy the top level in any food chain, these chemicals get accumulated in our bodies.

9. (i) A ray of light passing through the optical centre of a lens will emerge without any deviation.

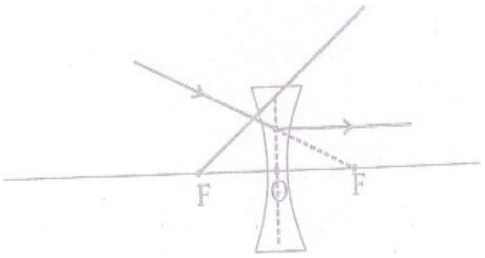


(ii) A ray of light parallel to the principal axis is incident on a concave lens and

after refraction the ray appears to come from the principal focus located on the same side of the lens.



(iii) A ray of light directed towards the principal focus of a concave lens, after refraction, will emerge parallel to the principal axis.

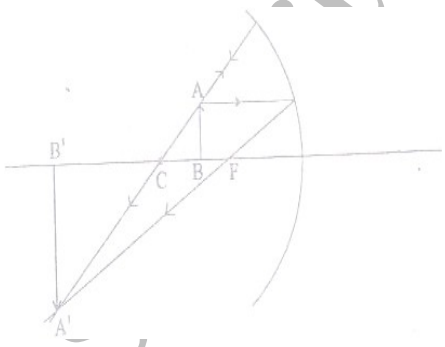


10. a. Concave mirror
b. u = - 12 cm
v = - 48 cm

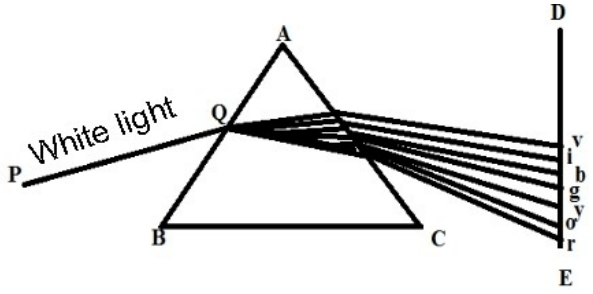
Linear magnification, $m = \frac{v}{u}$

$= \frac{-48}{-12}$

$= -4$



11.



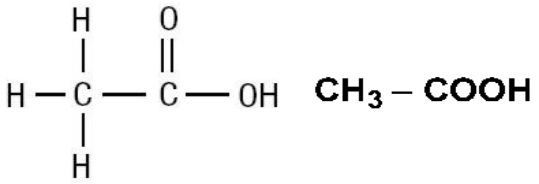
(i) Dispersion

White light is made up of seven colours. As every colours has different wavelengths, they bend through different angles with respect to the incident ray while passing through the prism. The red light bends the least while the violet the most. This rays each colour emerge along different paths and thus become distinct.

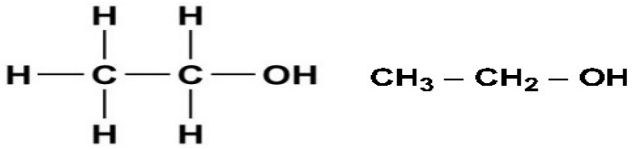
(ii) When sunlight falls on the rain drops suspended in the atmosphere after rainfall rainbow is formed due to dispersion of light.

(iii) Constituents of white light are violet, Indigo, Blue, Green, Yellow, Orange and Red (VIBGYOR)

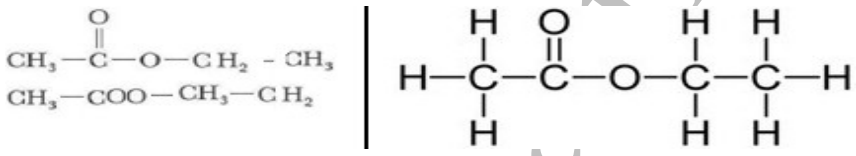
12.The carboxylic acid is ethanoic acid



The alcohol is ethyl alcohol (ethanol)



The compound X is ethyl ethanoate (ester)

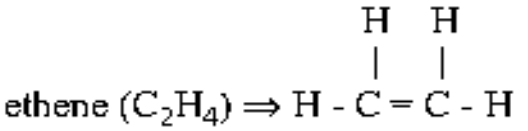


13. A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called homologous series. The successive compound differ by a -CH_2 group.

General formula of alkenes = C_nH_{2n}

General formula of alkynes = C_nH_{2n-2}

Where n - number of carbon atoms.



ethyne $(C_2H_4) \Rightarrow H - C \equiv C - H$

14. (i) - E
(ii) - D
(iii) -B
(iv) - D, On moving from left to right in a period nuclear charge increase which ends to pull the electrons closer to the nucleus and reduces the size of atom
(v) Noble gas family

15. The modern periodic table has 18 vertical columns known as groups.
(i) Number of valence electrons will be the same.
(ii) Increases
(iii) Increases, because new shells are being added down the group
(iv) Increases - The tendency to lose electrons increases because outermost electrons are farther away from the nucleus.
(v) Decreases, because the outermost electrons are farther away from the nucleus.

16. Two modes of asexual reproduction in animals are
1. Binary fission
In binary fission, the single cell divides in to halves. A few organisms that divide by binary fission are bacteria and amoeba.
2. Budding
It involves the formation of a new individual from a protrusion called bud. It is very common in Hydra, Yeast etc.
Vegetative propagation is placed under asexual reproduction. It is the ability of the plants to reproduce by producing new plants from the vegetative parts such as leaf, stem or roots under favourable conditions. This method is mainly the means of reproduction for some seedless plants and is also used in agricultural for commercial production of some plants.

Advantages of vegetative reproduction
1. Plants which do not produce seeds are propagated by this method. E.g. Potato
2. The trait of the parent plant is preserved and the offsprings are genetically identical.

17. Four methods of contraception used by human are following.

1. Natural method

Sexual act is avoided form day 19^{th} to 17^{th} menstrual cycle, to avoid chances of meeting of sperm and ova.

2. Barrier Method

Fertilization is prevented with the help of Barriers such as Condoms, diaphragm etc.

3. Oral Contraceptives

Tablets or drugs are taken orally, it contain small dos of hormones that prevents releases of egg.

4. Implants

Contraceptive devices such as the loop or copper - T are placed in the uterus to prevent pregnancy.

Effects of contraception on the health and prosperity of a family

1. It help in preventing unwanted pregnancies, frequent pregnancies
2. It helps in family planning by controlling the number of children in a family, thus reducing the chances of poverty
3. Reduce the chances of transmission of STD's and AIDS.

18. Sex of child is dependent on the type of the male gamete fusing with the female gamete. In man possess 23 pairs of chromosomes. Out of 23 pairs, 22 pairs are known as autosomes, remaining one pair is sex chromosome (XX in females and XY in males)

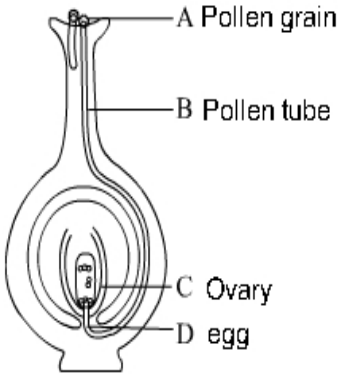
If the egg cell carrying X chromosome fuses with the sperm carrying X chromosome, the resulting child would be girl. If the egg cell carrying an X chromosome fuse with the sperm carrying a Y chromosome, the resulting child would be boy.

19. Lets take the following example to justify the above statement. Mendel crossed tall pea plants with dwarf pea plants Mendel's observations are:

The F_1 generation contained all tall plants. When F_1 generation underwent selfing, the trait that was unexpressed in F_1 (dwarf) was observed in F_2 progeny. Thus, both traits, tall and dwarf, were expressed in F_2 generation in the ratio 3:1

The above experiment indicates that both the tallness and shortness traits were inherited in the F_1 plants, but only the tallness trait was expressed. This shows that traits might not show up in an individual but were passed on to the next generation.

20.a.



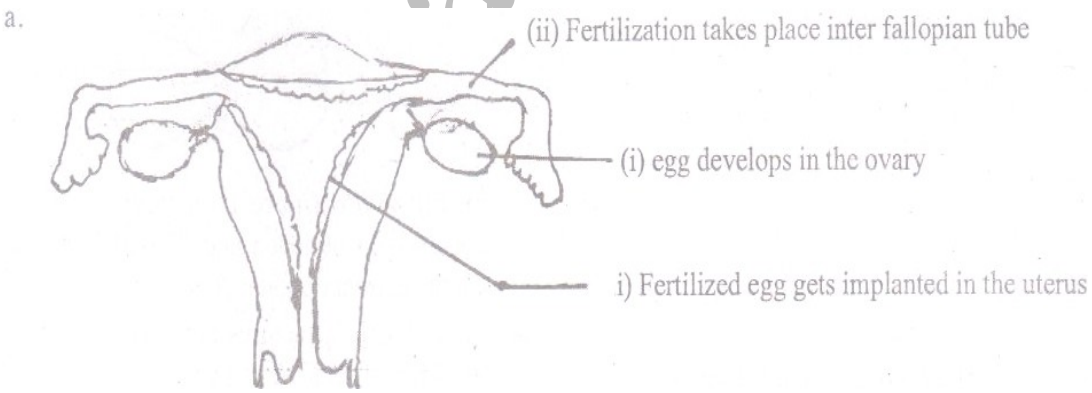
b. The transfer of pollen grains from anther to the stigma of the flower is known as pollination.

Significance

It is significant event because it precedes of fertilization cross pollination introduces variations in the plants due to mixing of different genes. It increases the adaptability.

Double fertilization is a characteristic feature of flowering plants. In this process, out of the two sperm nucleus, one sperm nucleus fuses with the egg nucleus to form an embryo (process is called syngamy)and another fuse with polar nuclei to form an endosperm (process is called triple fusion). Since two kinds of fusion (syngamy and triple fusion) takes place, the process is known as double fertilization.

21.



b. (i) The uterus prepares itself every month to receive a fertilized egg (zygote). The inner uterus lining (endometrium) becomes thick and is supplied with blood to nourish the embryo.

(ii) If the egg is not fertilized, then the uterus lining is not required. Hence, it breaks down and is released in the form of blood and mucous through the vagina. This process lasts for 2-8 days. This cycle occurs every month and is known as menstruation.

22. a. Pupil is the perforation in the iris It is through which light enters our eyes. The relaxation and contraction of the muscular fibres of Iris regulates the opening and closing of the pupil. Hence, it is the pupil which finally controls the amount of light entering into our eyes.

b. Retina is the film of the eye, like the film of camera. The retina is the light sensing part of the eye. Retina is the light sensing part of the eye. Retina converts the incident light into electrical signals and sends this to the brain.

Eyes of a dead person can be donated to the person having corneal blindness. It will help him/Her to see the world. We can also register ourselves to eye donation camps who can preserve our eyes after our death and donate them to the needy.

23. a. Centre of curvature of the centre of the spheres of which the each surface of the lens forms a part.

b. Principal axis is the straight line passing through the two centres of curvature

c. Optical centre is the geometrical centre of the lens.

d. A point on the principal axis where all the rays of light parallel to the principal axis meet or appear to meet after passing through the lens is called principal focus of the lens

A concave lens always forms a virtual, erect image on the same side of the object

Focal length, f = -20 cm
Image distance v = -15 cm
Height of object h = 6 cm
Object – distance u = ?
Height of image h' = ?

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

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

$$= \frac{1}{-15} - \frac{1}{-20}$$

$$= \frac{1}{-15} + \frac{1}{20}$$

$$= \frac{-4+3}{60}$$

$$= \frac{-1}{60}$$

$$\therefore u = -60cm$$

Magnification, $m = \frac{h'}{h} = \frac{v}{u}$

$$\therefore h' = h \times \frac{v}{u}$$

$$= 6 \times \frac{-15}{-60}$$

$$= \frac{3}{2}$$

$$= 1.5cm$$

24. Carbon has four electrons in it's valence shell. In order to form ionic compound, carbon atom has to lose 4 electrons or gain 4 electrons and can attain noble gas configuration.

It cannot lose 4 electrons because this world require a large amount of energy. It cannot gain 4 electrons to form C^{4-} ion since this ion is highly unstable. The type of bond in the compounds formed by carbon is covalent bond.

All valence electrons made covalent bonding with neighbouring atoms. The covalent bonding is very strong. So there will be no free electrons in the carbon compounds are poor conductors of electricity.

SECTION - B

25. C. Convex lens of focal length 20 cm

26. A. $F_1 < F_2$ and concave

27. D. 2, 3, and 4

28. C. 20 cm on the other side of the lens and is of the same size, real and inverted.

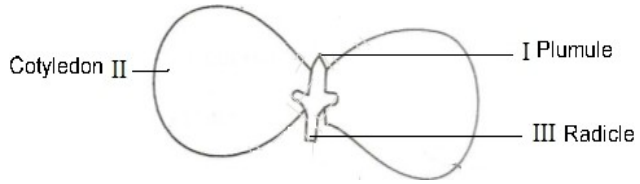
29. D. Y, Q and P

30. B

31. C

32. A

33.



In the given figure I represents Plumule, II represents Cotyledon and III represents Radicle. So the correct option is A.

34. Homologous structure are similar in origin but perform different functions Carrot and radish are underground roots (Tap roots)

Hence the correct option is D

35. C. Wings of bird and forelimbs of horse are homologus organs as they have same structure but perform different functions.

36. Correct option is C. (III, II, I, IV)

37. Correct option IS B. (II, I, IV, III)

38. A

39. D

40. B

41. C

42. C