

# Solved Paper 2013

## Science CLASS-X

Time : 3 Hours

Max. Marks : 80

### General Instructions:

- (i) The questions paper comprises of **two** Sections, **A** and **B**. You are attempt both the sections.
- (ii) All questions are **compulsory**.
- (iii) All questions of **Section-A** and all questions of **Section-B** are to be attempted separately.
- (iv) Questions numbers **1 to 3** in **Section-A** are **one** mark questions. These are to be answered in one word or in one sentence.
- (v) Questions numbers **4 to 7** in **Section-A** are **two** marks questions. These are to be answered in about **30** words each.
- (vi) Questions numbers **8 to 19** in **Section-A** are **three** marks questions. These are to be answered in about **50** words each.
- (vii) Question numbers **20 to 24** in **Section-A** are **five** marks questions. These are to be answered in about **70** words each.
- (viii) Question numbers **25 to 42** in **Section-B** are multiple choice questions based on practical skills. Each question is a **one** mark question. You are to select **one** most appropriate response out of the **four** provided to you.

Delhi Set I

Code No. 31/1/1

### SECTION - A

- \* 1. How many vertical columns are there in the modern periodic table and what are they called ?
- \* 2. What is speciation?
3. Why should biodegradable and non-biodegradable wastes be discarded in two separate dust bins ?

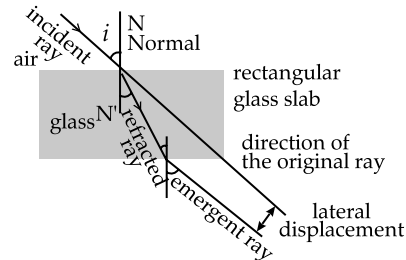
**Ans.** The biodegradable and non-biodegradable wastes should not be mixed and should be separated before discarding. This will prevent environmental pollution and be recycled accordingly. The biodegradable waste can be converted to manure while the non-biodegradable waste can be used to make new product.

4. "The chromosomes number of the sexually reproducing parents and their offspring is the same." Justify this statement.

**Ans.** During the sexual reproduction, the genetic material DNA constitutes both gametes of male and female. The zygote is formed due to the combination of the male and the female gametes. As the gametes contain only half numbers of chromosomes, it carries half of the male chromosomes and half of the female chromosomes. Due to this the chromosomes number of the sexually reproducing parents and their offspring is same.

5. "A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself." Draw labelled ray diagram to justify the statement.

**Ans.** When the ray of light enters from a rarer medium to a denser medium it bends towards the normal. And when the ray of light leaves the denser medium and enters the rarer medium it bends away from the normal. In the following diagram the ray of light enters from a rarer medium i.e. air to a denser medium i.e., glass and leaves the glass medium and goes into the air.



6. We often observe domestic waste decomposing in the bylanes of residential colonies. Suggest ways to make people realise that the improper disposal of waste is harmful to the environment.

**Ans.** The ways to make people realise that the improper disposal of waste is harmful to the environment are listed below.

- (i) To spread awareness about the benefits of keeping the society clean.
  - (ii) This can be done through by organising campaigns in the localities.
7. List and explain any two advantages associated with water harvesting at community level.

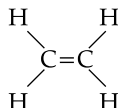
**Ans.** Two advantages of water harvesting at community level are as follows:

- (i) Revives the ground water.
- (ii) Lessens floods and famines.
- (iii) Brings rivers and wells back to life and reduces water shortage.

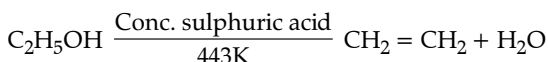
**8. Write the name and the structural formula of the compound formed when ethanol is heated at 443K with excess of conc. H<sub>2</sub>SO<sub>4</sub>. State the role of conc. H<sub>2</sub>SO<sub>4</sub> in this reaction. Write chemical equation for the reaction.**

**Ans.** When ethanol is heated at 443 K with excess of conc. Sulphuric acid. Ethene is formed.

The structural formula of ethene is given as,



Sulphuric acid acts as a dehydrating agent which removes the water molecule from ethanol to form ethene.

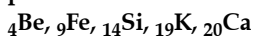


**9. Why homologous series of carbon compounds are so called? Write chemical formula of two consecutive members of a homologous series and state the part of these compounds that determines their (i) physical properties, and (ii) chemical properties.**

**Ans.** The functional group in carbon compounds determine the properties of the compounds irrespective of the length of carbon chain. Thus, they are known as homologous series of carbon compounds.

The two consecutive members of homologous series are CH<sub>3</sub>CHO (methanal) and C<sub>2</sub>H<sub>5</sub>CHO (ethanal) belonging to aldehyde group. In CH<sub>3</sub>CHO, CH<sub>3</sub> determines the physical properties while the CHO determines the chemical properties. This pattern follows for ethanal also.

**10. Given below are some elements of the modern periodic table:**



- (i) Select the element that has one electron in the outermost shell and write its electronic configuration.
- (ii) Select two elements that belong to the same group. Give reason for your answer.
- (iii) Select two elements that belong to the same period. Which one of the two has bigger atomic size?

**Ans.** (i) Potassium has one electron in the outermost shell. Its electronic configuration is 2,8,8,1.

(ii) The two elements that belong to the same group are beryllium and calcium. They both have 2 electrons in their outermost shells; therefore, they belong to group 2 and are alkaline earth metals.

(iii) The 2 elements that belongs to the same periods are potassium and calcium.

They are the fourth period elements. Potassium has the bigger size because on moving from left to right across a period atomic radius decreases.

**11. Write the number of periods the modern periodic table has. How do the valency and metallic character of elements vary on moving from left to right in a period? How do the valency and atomic size of elements vary down a group ?**

**Ans.** There are seven periods in the modern periodic table. On moving from left to right in a period, valency of the elements increases from 1-4 and then decreases from 4-0.

The metallic character of the elements decreases from left to right in a period. Atomic radius increases down the group due to the addition of new shells. While the number of valance electrons undergoes no change.

**12. (a) Explain the process of regeneration in *Planaria*.**

**(b) How is regeneration different from reproduction?**

**Ans.** (a) On cutting the *planaria* into small pieces, each of the body part can be regenerated and a complete *planaria* can be formed. This occurs due to growth and development due to multiplication of cells to form tissues and then these tissues result in the formation of organ and finally another *planaria* is generated.

(b) Regeneration is different from reproduction as in case of regeneration the body of the parent gets segregated to form a new offspring and in this process the parent is lost whereas in reproduction no parents are lost.

**13. Write two examples each of sexually transmitted diseases caused by (i) virus, (ii) bacteria. Explain how the transmission of such diseases be prevented?**

**Ans.** The two examples of sexually transmitted diseases are as follows:

- (i) Virus – Warts and HIV AIDS
- (ii) Bacteria – Gonorrhoea and Syphilis

**The following preventive measures can be taken:**

The blood sample should be tested before transfusion.

Needles and syringes must not be shared.

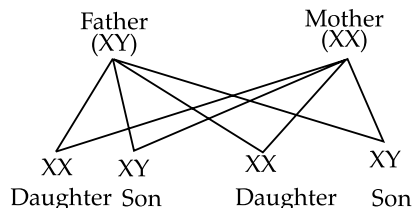
**14. Tabulate two distinguishing features between acquired traits and inherited traits with one example of each.**

**Ans.**

Acquired Traits	Inherited Traits
Causes no change in the DNA of the germ cell.	Causes change in the DNA of the germ cell.
Fails to cause evolution.	Can direct evolution.
Cannot be transferred to the progeny.	Can be transferred to the progeny.
<b>Example:</b> Gaining knowledge, gaining, or losing weight.	<b>Examples:</b> Colour of eyes and skin.

**15. "The sex of a newborn child is a matter of chance and none of the parents may be considered responsible for it." Justify this statement with the help of flow chart showing determination of sex of a newborn.**

Ans. The flow chart is as follows:



Here the female has two X chromosomes and the male has one X chromosome and one Y chromosome. The gametes produced by the male are X and Y and that by female are X and X. During fertilisation if the sperms carrying Y chromosomes fuses with the egg that has X chromosomes the offspring is a boy with XY chromosomes and if the sperms carrying X chromosomes fuses with the egg that has X chromosomes the offspring is a girl with XX chromosomes. Therefore, there is a 50 – 50 chance that the offspring will be a boy or a girl.

16. Mention the types of mirrors used as (i) rear view mirrors, (ii) shaving mirrors. List two reasons to justify your answers in each case.

Ans. For a rear view mirror, we use a convex mirror because the image formed by a convex mirror is virtual and erect and as they are curved outwards, they produce a wider range of view.

For shaving mirrors concave mirrors are used because they form virtual and erect and magnified image of the object closer to them.

17. An object of height 6 cm is placed perpendicular to the principal axis of a concave lens of focal length 5 cm. Use lens formula to determine the position, size and nature of the image if the distance of the object from the lens is 10 cm.

Ans. Given the height of the object,  $h_1 = 6$  cm

Focal length of the concave mirror,  $f = -5$  cm

The object distance,  $u = -10$  cm

Let the position of the image be  $v$  cm and the size of the image be  $h_2$ .

According to the lens formula:

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

$$\frac{1}{v} - \frac{1}{-10} = \frac{1}{-5}$$

$$\frac{1}{v} = -\frac{3}{10}$$

Therefore,  $v = -\frac{10}{3} = -3.3$  cm

And  $M = \frac{h_2}{h_1} = \frac{v}{u}$ ,  $h_2 = +2$  cm

The nature of the image is virtual, erect and diminished and is formed on the same side of the object.

18. State the difference in colours of the sun observed during sunrise/sunset and noon. Give explanation for each.

Ans. During the sunrise or sunset the rays coming from the sun has to travel to a longer distance so the lights with the shorter wavelengths are scattered away and the light with the longer wavelength which is reddish in colour is seen and the sun appears to be reddish-orange in colour.

At noon the sun appears to be white in colour. The rays travel shorter length at the noon which contains lights of all the wavelength due to the combination of which it appears white.

19. (a) What is an ecosystem? List its two main components.

(b) We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain.

Ans. (a) An ecosystem is a self-contained unit of living and non-living things in an environment.

The two main components of the ecosystem are:

Abiotic components comprises of the non-living things and biotic components comprises of all the living things.

(b) Natural ponds and lakes need not be cleaned but we need to clean the miniature form of it that is the aquarium because it lacks the natural decomposers and the water in it is stagnant. It forms an incomplete ecosystem so manual cleaning is essential.

20. (a) Define the term 'isomers'.

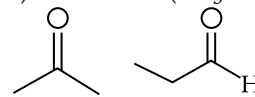
(b) Draw two possible isomers of the compound with molecular formula

$C_3H_6O$  and write their names.

(c) Give the electron dot structures of the above two compounds.

Ans. (a) Isomers are the molecules that have same molecular formula but different structural formula.

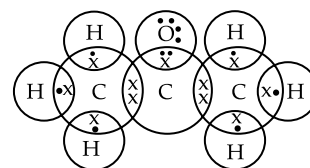
(b) The two possible isomers of  $C_3H_6O$  are propanal ( $CH_3CH_2CHO$ ) and acetone ( $CH_3COCH_3$ ).



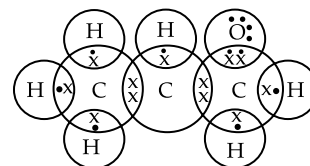
Acetone

Propanal

(c) The electron dot structure for acetone is shown below:



The electron dot structure for propanal is shown below:



21. (a) List three distinguishing features between sexual and asexual types of reproduction.  
 (b) Explain why variations are observed in the offsprings of sexually reproducing organisms.

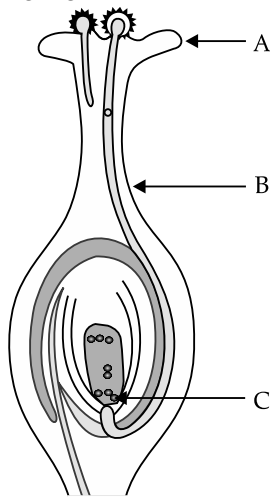
Ans. (a)

Asexual Reproduction	Sexual Reproduction
Uni-parental in nature.	Bi-parental in nature.
Fertilisation does not take place.	Fertilisation take place.
The offspring are identical to the parent.	The offspring are not identical to the parent.

(b) There is a variation in the offspring of sexually reproducing organisms because it involves both the parents which have unique set of chromosomes carrying DNA. It involves the fusion of the male and the female gametes which gives rise to variation in the genes of the offspring.

22. (a) Identify A, B and C in the given diagram and write their functions.

(b) Mention the role of gamete and zygote in sexually reproducing organisms.



Ans. (a)

	Name	Function
A	Stigma	During pollination it receives the pollen grains from the anther of the stamen.
B	Pollen tube	It carries the pollen grains to the egg cell for fertilization.
C	Egg cell	It fuses with the male gametes and forms the zygote.

The gametes carry the entire genetic information of the organism. Zygote is formed by the fusion of the gametes which further develops into new individual.

23. (a) State the laws of refraction of light. Give an expression to relate the absolute refractive index of a medium with speed of light in vacuum.

(b) The refractive indices of water and glass with respect to air are  $\frac{4}{3}$  and  $\frac{3}{2}$  respectively. If the speed of light in glass is  $2 \times 10^8 \text{ ms}^{-1}$ , find the speed of light in (i) air, (ii) water.

- Ans. (a) The Snell's law of refraction of light states that:  
 (i) The incident ray, the refracted ray and the normal lies in the same plane.  
 (ii) The ratio of the sine of the angle of incidence in medium 1 to that of the angle of refraction in medium 2 is equal to the ratio of the refractive index of the medium 2 to that of 1.

$$\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$$

The relation between the absolute refractive index  $n$  of an optical medium is given as the ratio of the speed of light in vacuum,  $c$  and the speed of light  $v$  in that medium.

$$n = \frac{c}{v}$$

For glass:  $n_{\text{glass}} = \frac{c}{v_{\text{glass}}}$

$$\frac{3}{2} = \frac{c}{2 \times 10^8 \text{ m/s}}$$

$$c = 3 \times 10^8 \text{ m/s}$$

For water:

$$n_{\text{water}} = \frac{c}{v_{\text{water}}}$$

$$\frac{4}{3} = \frac{3 \times 10^8 \text{ m/s}}{v_{\text{water}}}$$

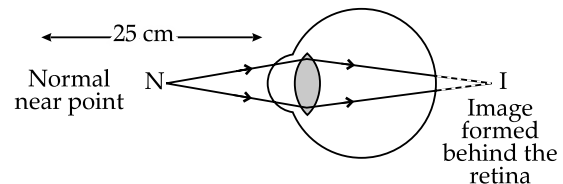
$$v_{\text{water}} = \frac{9}{4} \times 10^8 \text{ m/s}$$

24. A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length.

(b) We see advertisements for eye donation on television or in newspapers. Write the importance of such advertisements.

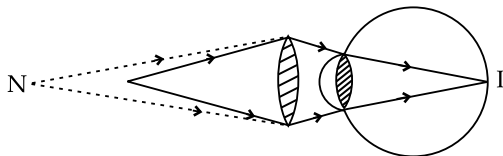
Ans. (a) The person is suffering from hypermetropia the other name of which is far-sightedness.

The ray diagram to illustrate this defect is shown below:



The two possible causes are increase in the focal length of the eye lens and decrease in the length of the eyeball.

To correct the defect, a convex lens of appropriate focal length is used.



- (b) The importance of such advertisements is to make people aware about the fact that when a person dies his/her eyes can be donated within 4 – 6 hours of a person's death. This will motivate the masses for eye donation and help a blind person see the beautiful world.

**SECTION - B\*\***

25. A student takes 2 mL acetic acid in a dry test tube and adds a pinch of sodium hydrogen carbonate to it. He makes the following observations:

- I. A colourless and odourless gas evolves with a brisk effervescence.
- II. The gas turns lime water milky when passed through it.
- III. The gas burns with an explosion when a burning splinter is brought near it.
- IV. The gas extinguishes the burning splinter that is brought near it.

The correct observations are:

- (A) I, II, and III      (B) II, III and IV  
(C) III, IV and I      (D) IV, I and II

26. In an experiment to study the properties of acetic acid a student takes about 2 mL of acetic acid in a dry test tube. He adds about 2 mL of water to it and shakes the test tube well. He is likely to observe that:

- (A) the acetic acid dissolves readily in water  
(B) the solution becomes light orange  
(C) water floats over the surface of acetic acid  
(D) acetic acid floats over the surface of water

27. A student prepared 20% sodium hydroxide solution in a beaker containing water. The observations noted by him are given below.

- I. Sodium hydroxide is in the form of pellets.
- II. It dissolves in water readily.
- III. The beaker appears cold when touched from outside.
- IV. The red litmus paper turns blue when dipped into the solution.

The correct observation are:

- (A) I, II and III      (B) II, III and IV  
(C) III, IV and I      (D) I, II, and IV

28. Read the following statements:

- I. When a red litmus paper is dipped into reaction mixture of a saponification reaction, it turns blue and the reaction is exothermic.
- II. When a blue litmus paper is dipped into reaction mixture of a saponification reaction, its colour does not change and the reaction is exothermic.

III. When a red litmus paper is dipped into reaction mixture of a saponification reaction, its colour does not change and the reaction is endothermic.

VI. When a blue litmus paper is dipped into reaction mixture of a saponification reaction, its colour does not change and the reaction is endothermic.

Which of the above statements are correct:

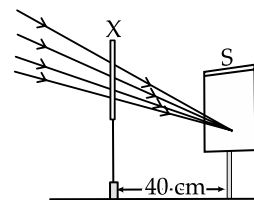
- (A) I and II      (B) II and III  
(C) III and IV      (D) I and IV

29. Hard water required for an experiment is not available in a school laboratory. However, following salts are available in the laboratory. Select the salts which may be dissolved in water to make it hard for the experiment.

- (1) Calcium Sulphate
- (2) Sodium Sulphate
- (3) Calcium Chloride
- (4) Potassium Sulphate
- (5) Sodium Hydrogen Carbonate
- (6) Magnesium Chloride

- (A) 1, 2 and 4      (B) 1, 3 and 6  
(C) 3, 5 and 6      (D) 2, 4 and 5

30. A student focussed the image of a distant object using a device 'X' on a white screen 'S' as shown in the figure. If the distance of the screen from the device is 40 cm, select the correct statement about the device.



- (A) The device X is a convex lens of focal length 20 cm.  
(B) The device X is a concave mirror of focal length 40 cm.  
(C) The device X is a concave mirror of radius of curvature 40 cm.  
(D) The device X is a convex lens of focal length 40 cm.

31. A student obtained a sharp image of a burning candle, placed at the farther end of a laboratory table, on a screen using a concave mirror. For getting better value of focal length of the mirror, the subject teacher suggested him for focussing a well illuminated distant object. What should the student do?

- (A) He should move the mirror away from the screen.  
(B) He should move the mirror slightly towards the screen.  
(C) He should move the mirror as well as the screen towards the newly selected object.

(D) He should move only the screen towards the newly selected object.

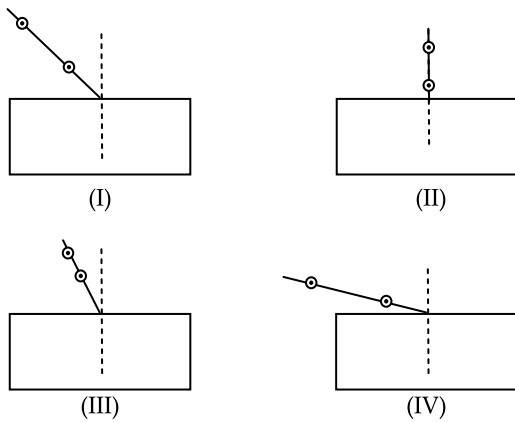
32. After tracing the path of rays of light through a glass slab for three different angles of incidence, a student measured the corresponding values angle of refraction  $r$  and angle of emergence  $e$  and recorded them in the table given below:

S. No.	$\angle i$	$\angle r$	$\angle e$
I	$30^\circ$	$20^\circ$	$31^\circ$
II	$40^\circ$	$25^\circ$	$40^\circ$
III	$50^\circ$	$31^\circ$	$49^\circ$

The correct observations are:

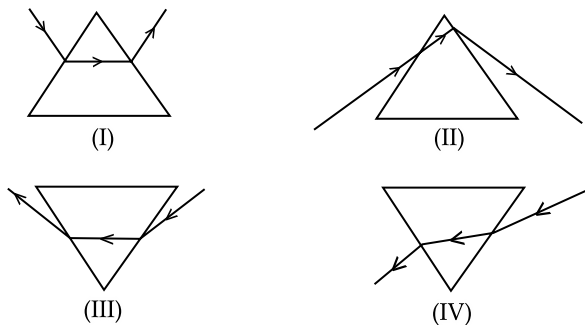
- (A) I and II                      (B) II and III  
(C) I and III                      (D) I, II and III

33. Select from the following the best set-up for tracing the path of a ray of light through a rectangular glass slab:



- (A) I                                      (B) II  
(C) III                                    (D) IV

34. While performing the experiment to trace the path of a ray of light passing through a glass prism, four students marked the incident ray and the emergent ray in their diagrams in the manner shown below.



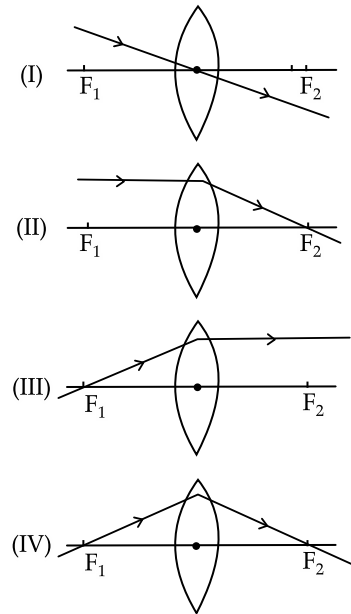
The correct path of the rays has been shown by:

- (A) I                                      (B) II  
(C) III                                    (D) IV

35. In an experiment to trace the path of a ray of light through a glass prism for different values of angle of incidence a student would find that the emergent ray:

- (A) is parallel to the incident ray  
(B) perpendicular to the incident ray  
(C) is parallel to the refracted ray  
(D) bends at an angle to the direction of incident ray

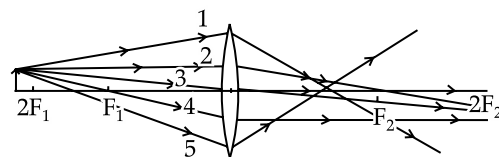
36. Study the following ray diagrams:



The diagrams showing the correct path of the ray after passing through the lens are:

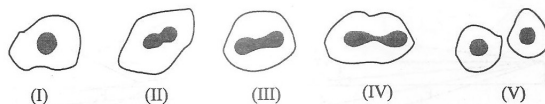
- (A) II and III only  
(B) I and II only  
(C) I, II and III  
(D) I, II and IV

37. Out of the five incident rays shown in the figure find the three rays that are obeying the laws of refraction and may be used for locating the position of image formed by a convex lens:



- (A) 1, 2 and 3                      (B) 2, 3 and 4  
(C) 3, 4 and 5                      (D) 1, 2 and 4

38. A student after observing a slide showing different stages of binary fission in Amoeba draws the following diagrams. However these diagrams are not in proper sequence:



The correct sequence is:

- (A) I, V, IV, III, II      (B) I, III, IV, V, II      (C) I, V, III, IV, II      (D) I, IV, V, III, II

39. Select the correct statements for the process of budding in yeast:

- I. A bud arises from a particular region on a parent body.
  - II. A parent cell divides into two daughter cells, here the parental identity is lost.
  - III. Before detaching from the parent body a bud may form another bud.
  - IV. A bud when detaches from the parent body grows into a new individual.
- (A) I, II and III      (B) II, III and IV  
(C) III, IV and I      (D) IV, I and II

40. Study the different conclusions drawn by students of a class on the basis of observations of preserved/available specimens of plants and animals.

- I. Potato and sweet potato are analogous organs in plants.
- II. Wings of insects and wings of birds are homologous organs in animals.
- III. Wings of insects and wings of bats are analogous organs in animals.
- IV. Thorns of citrus and tendrils of cucurbita are analogous organs in plants.

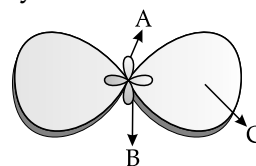
The correct conclusions are:

- (A) I and II      (B) II and IV  
(C) I and III      (D) III and IV

41. You have potato, carrot, radish, sweet potato, tomato and ginger bought from the market in your jute bag. Identify two vegetables to represent the correct homologous structures.

- (A) Potato and tomato  
(B) Carrot and tomato  
(C) Potato and sweet potato  
(D) Carrot and radish

42. In the figure, the parts marked A, B and C are sequentially:



- (A) Plumule, Radicle and Cotyledon  
(B) Radicle, Plumule and Cotyledon  
(C) Plumule, Cotyledon and Radicle  
(D) Radicle, Cotyledon and Plumule



## Don't Stop Reading !

You never know what might be asked in the exam.

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