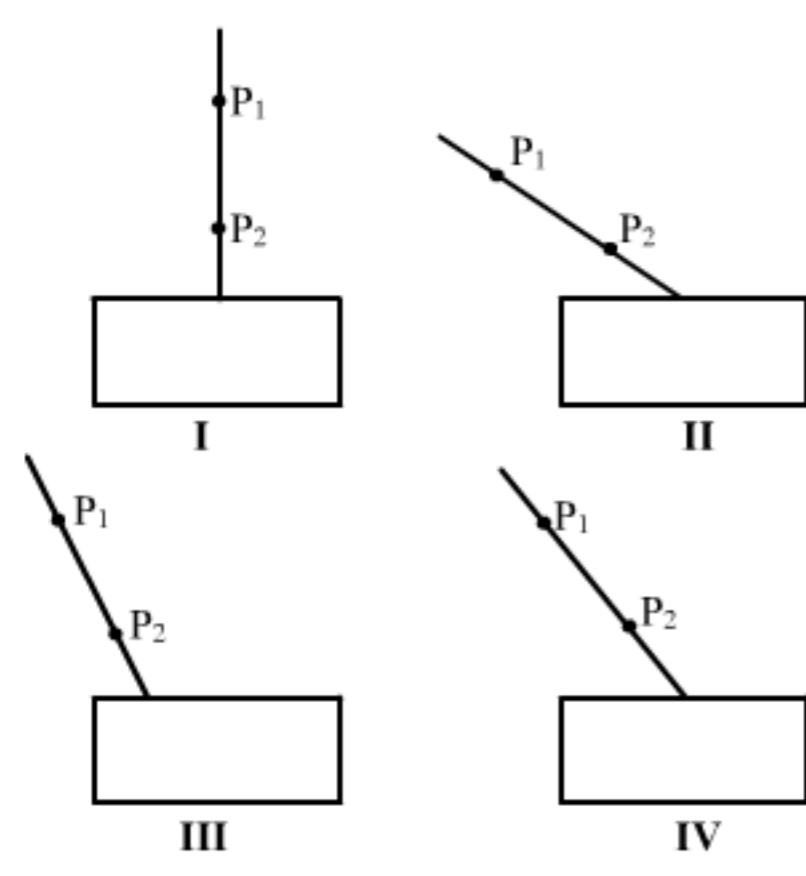


- Q31** On the basis of the experiment, "To trace the path of a ray of light through a rectangular glass slab", students of a class arrived at which one of the following conclusions?
 (A) Angle of incidence is greater than the angle of emergence.
 (B) Angle of emergence is smaller than the angle of refraction.
 (C) Emergent ray is parallel to the refracted ray.
 (D) Incident ray and emergent ray are parallel to each other.

Solution:

The correct conclusion is that the incident ray and emergent ray are always parallel to each other.
 Hence, the correct option is D.

- Q32** Study the following four experimental set-ups I, II, III and IV for the experiment, "To trace the path of a ray of light through a rectangular glass slab."



Which of the marked set-ups is likely to give best results (P₁ and P₂ are the positions of pins fixed on the incident ray)?

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

Solution:

Experiment II will give the best result because it has the largest angle of incidence, due to which the lateral displacement between the incident ray and emergent ray will be maximum.

Hence, the correct option is B.

- Q33** You are asked by your teacher to study the different parts of an embryo of a gram seed. Given below are the steps to be followed for the experiment.

- I. Soak the gram seeds in plain water and keep them overnight.
 II. Cut open a soaked seed and observe its different parts.
 III. Take some dry gram seeds in a petri dish.
 IV. Drain the excess water.
 V. Cover the soaked seeds with a wet cotton cloth and leave them for a day.

The correct sequence of these steps is :

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

Solution:

First of all, take some dry gram seeds in a petri dish. Then, soak the seeds in plain water and keep them overnight. Drain the excess water. After that, cover the soaked seeds with a wet cotton cloth and leave them for a day. Finally, cut open a soaked seed and observe its different parts.

Hence, the correct option is D.

- Q34** Four students P, Q, R and S differently reported the following set of organs to be analogous :

- P. Forelimb of a frog and forelimb of a lizard
 Q. Forelimb of a bird and forelimb of a human
 R. Wings of a parrot and wings of a butterfly
 S. Wings of a bird and wings of a bat

The two students who have reported correctly are :

- (A) P and Q
 (B) Q and R
 (C) R and S
 (D) P and S

Solution:

Organs that are different in origin but similar in function are known as analogous organs.
 Examples of analogous organs:

- (i) Wings of a parrot and wings of a butterfly.
 (ii) Wings of a bird and wings of a bat

Thus, the two students who have reported correctly are R and S.

Hence, the correct option is C.

- Q35** Which one of the following pairs of vegetables is an example of homologous structures?

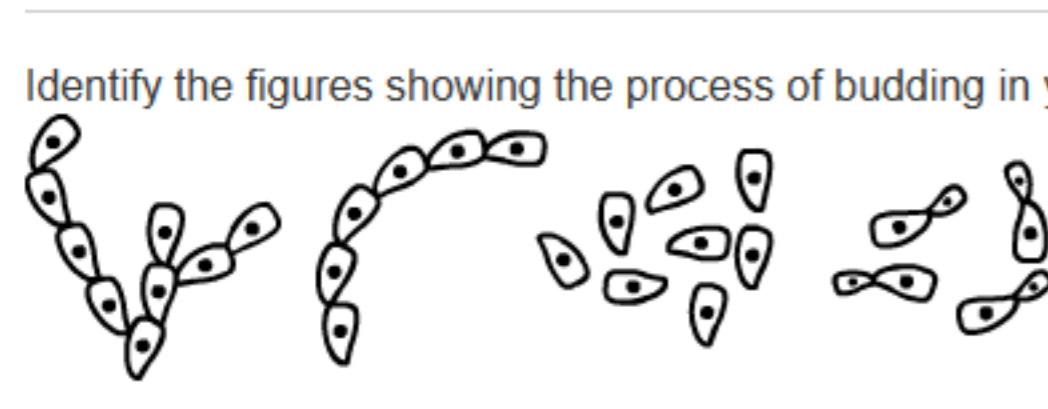
- (A) Potato and sweet potato
 (B) Carrot and radish
 (C) Carrot and tomato
 (D) Tomato and radish

Solution:

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

Hence, the correct option is B.

- Q36** Identify the figures showing the process of budding in yeast.



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

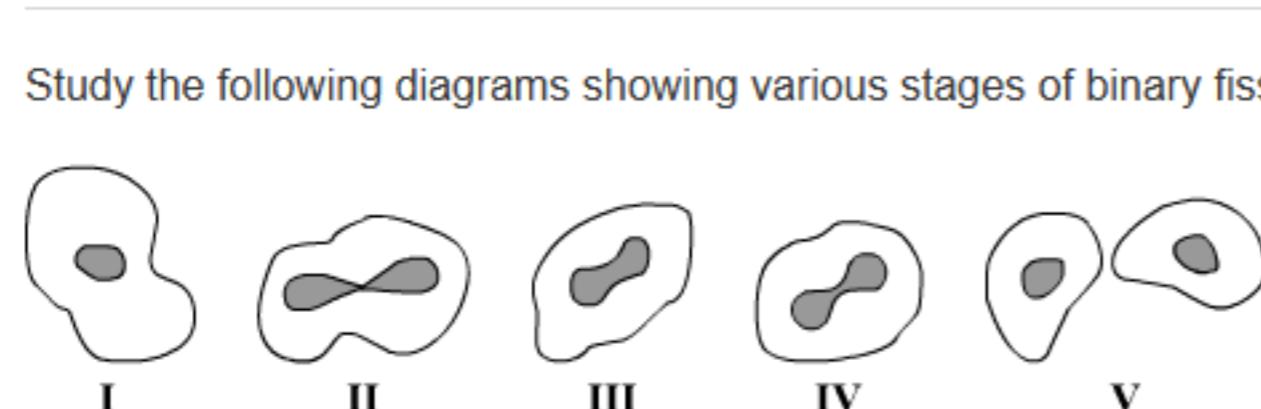
Solution:

III, IV and I are showing the process of budding in yeast.

During budding in a yeast, a single cell develops a protrusion, wherein the nucleus divides to give rise to two daughter nuclei. One of the daughter nuclei migrates into a protrusion to form a bud. This bud then grows in size and may undergo budding while attached to the parent cell. Thus, budding results in a chain of cells.

Thus, the correct option is D.

- Q37** Study the following diagrams showing various stages of binary fission in Amoeba:



The correct sequence of these diagrams should be:

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

Solution:

During binary fission, the nucleus of the parent cell elongates and divides initially. Then a constriction starts to appear on the cell membrane, the constriction starts widening and finally divides the parent cell into two almost equal halves or daughter cells. The daughter cells are identical to the parent cell.

Hence, the correct option is B.

- Q38** A student takes about 6 ml of distilled water in each of the four test tubes P, Q, R and S. He then dissolves an equal amount of four different salts namely, sodium chloride in 'P', potassium chloride in 'Q', calcium chloride in 'R' and magnesium chloride in 'S'. Next, he then adds 10 drops of soap solution to each test tube and shakes its contents. The test tubes in which scum (insoluble substance) is formed with soap are:

- (A) P and Q
 (B) Q and R
 (C) R and S
 (D) Q and S

Solution:

Scum is formed by reaction of soap with calcium and magnesium salts in water. Test tubes R and S contain calcium chloride and magnesium chloride, respectively. Therefore, scum will be formed in these two tubes.

Hence, the correct option is C.

- Q39** A student adds a few drops of ethanoic acid to test tubes X, Y and Z containing aqueous solutions of sodium chloride, sodium hydroxide and sodium carbonate, respectively. If he now brings a burning splinter near the mouth of the test tubes immediately after adding ethanoic acid in each one of them, in which of the test tube or test tubes the flame will be extinguished?

- (A) X and Y
 (B) Y and Z
 (C) X and Z
 (D) only Z

Solution:

The chemical reactions in test tubes X, Y and Z can be written as:

Test tube X:
 $\text{CH}_3\text{COOH} + \text{NaCl} \rightarrow \text{No reaction}$

Test tube Y:
 $\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$

Test tube Z:
 $2 \text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2 \text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$

Thus, the flame will be extinguished when test tube Z is brought near a burning splinter due to evolution of carbon dioxide gas, which does not support combustion.

Hence, the correct option is D.

- Q40** When you add about 2 ml of acetic acid to a test tube containing an equal amount of distilled water and leave the test tube to settle after shaking its contents, what will you observe in the test tube after about 5 minutes?

- (A) A white precipitate settling at its bottom
 (B) A clear colourless solution
 (C) A layer of water over the layer of acetic acid
 (D) A layer of acetic acid over the layer of water

Solution:

When acetic acid and distilled water are mixed, they form a clear solution because acetic acid is completely miscible with water.

Hence, the correct option is B.

- Q41** In order to study saponification reaction, we first prepare 20% solution of sodium hydroxide. If we record the temperature of this solution just after adding sodium hydroxide flakes to water and also test its nature using litmus, it may be concluded that the process of making this solution is

- (A) exothermic and the solution is alkaline
 (B) endothermic and the solution is alkaline
 (C) endothermic and the solution is acidic
 (D) exothermic and the solution is acidic

Solution:

Dissolution of sodium hydroxide in water evolves large amount of heat. Thus, it is an exothermic reaction. Since sodium hydroxide is a base, its solution in water will be alkaline when tested with litmus paper (red litmus turns blue).

Hence, the correct option is A.

- Q42** While studying saponification reaction for the preparation of soap, a teacher suggested to a student to add a small quantity of common salt to the reaction mixture. The function of common salt in this reaction is to

- (A) reduce the alkalinity of the soap
 (B) reduce the acidity of the soap
 (C) enhance the cleansing capacity of soap
 (D) favour precipitation of soap

Solution:

Common salt is added in saponification reaction, as it helps in the precipitation of soap by decreasing the solubility of soap.

Hence, the correct option is D.