

MULTIPLE-CHOICE QUESTIONS

1. A few statements describing certain features of reproduction are given below:

- i. Gametic fusion takes place
- ii. Transfer of genetic material takes place
- iii. Reduction division takes place
- iv. Progeny have some resemblance with parents

Select the options that are true for both asexual and sexual reproduction from the options given below:

- (a) i and ii; (b) ii and iii; (c) ii and iv; (d) i and iii.

Solution:

Option (c) is the answer.

2. The term 'clone' cannot be applied to offspring formed by sexual reproduction because:

- a. Offspring do not possess exact copies of parental DNA
- b. DNA of only one parent is copied and passed on to the offspring
- c. Offspring are formed at different times
- d. DNA of parent and offspring are completely different.

Solution:

Option (a) is the answer.

3. Asexual method of reproduction by binary fission is common to which of the following?

- i. Some eukaryotes
- ii. All eukaryotes
- iii. Some prokaryotes
- iv. All prokaryotes

Choose the correct option from the following:

- (a) i and ii; (b) ii and iii; (c) i and iii; (d) iii and iv.

Solution:

Option (c) is the answer.

4. A few statements with regard to sexual reproduction are given below:

- i. Sexual reproduction does not always require two individuals
- ii. Sexual reproduction generally involves gametic fusion
- iii. Meiosis never occurs during sexual reproduction
- iv. External fertilisation is a rule during sexual reproduction

Choose the correct statements from the options below:

- (a) i and iv (b) i and ii (c) ii and iii (d) i and iv

Solution:

Option (b) is the answer.

5. A multicellular, filamentous alga exhibits a type of sexual life cycle in which the meiotic division occurs after the formation of zygote. The adult filament of this alga has

- a. haploid vegetative cells and diploid gametangia
- b. diploid vegetative cells and diploid gametangia

- c. diploid vegetative cells and haploid gametangia
- d. haploid vegetative cells and haploid gametangia

Solution:

Option (d) is the answer.

6. The male gametes of rice plant have 12 chromosomes in their nucleus. The chromosome number in the female gamete, zygote and the cells of the seedling will be, respectively,

- a. 12, 24, 12
- b. 24, 12, 12
- c. 12, 24, 24
- d. 24, 12, 24.

Solution:

Option (c) is the answer.

7. Given below are a few statements related to external fertilization. Choose the correct statements.

- i. The male and female gametes are formed and released simultaneously
 - ii. Only a few gametes are released into the medium
 - iii. Water is the medium in a majority of organisms exhibiting external fertilization
 - iv. Offspring formed as a result of external fertilization have a better chance of survival than those formed inside an organism
- (a) iii and iv (b) i and iii (c) ii and iv (d) i and iv

Solution:

Option (b) is the answer.

8. The statements given below describe certain features that are observed in the pistil of flowers.

- i. A pistil may produce more than one seed
- ii. Each carpel may have more than one ovule
- iii. Each carpel has only one ovule
- iv. The pistil has only one carpel

Choose the statements that are true from the options below:

- (a) i and ii (b) i and iii (c) ii and iv (d) iii and iv

Solution:

Option (a) is the answer.

9. Which of the following situations correctly describe the similarity between an angiosperm egg and a human egg?

- i. Eggs of both are formed only once in a lifetime
- ii. Both the angiosperm egg and human egg are stationary
- iii. Both the angiosperm egg and human egg are mobile
- iv. Syngamy in both results in the formation of zygote

Choose the correct answer from the options given below:

(a) ii and iv (b) iv only (c) iii and iv (d) i and

Solution:

Option (b) is the answer.

10. The appearance of vegetative propagules from the nodes of plants such as sugarcane and ginger are mainly because:

- a. Nodes are shorter than internodes
- b. Nodes have meristematic cells
- c. Nodes are located near the soil
- d. Nodes have non-photosynthetic cells

Solution:

Option (b) is the answer.

11. Which of the following statements, support the view that an elaborate sexual reproductive process appeared much later in the organic evolution.

- i. Lower groups of organisms have simpler body design
- ii. Asexual reproduction is common in lower groups
- iii. Asexual reproduction is common in higher groups of organisms
- iv. The high incidence of sexual reproduction in angiosperms and vertebrates

Choose the correct answer from the options given below:

(a) i, ii and iii; (b) i, iii and iv (c) i, iii and iv (d) ii, iii and iv

Solution:

Option (c) is the answer.

12. Offspring formed by sexual reproduction exhibit more variation than those formed by Asexual reproduction because:

- a. Sexual reproduction is a lengthy process
- b. Gametes of parents have qualitatively different genetic composition
- c. Genetic material comes from parents of two different species
- d. The greater amount of DNA is involved in sexual reproduction.

Solution:

Option (b) is the answer.

13. Choose the correct statement from amongst the following:

- a. Dioecious (hermaphrodite) organisms are seen only in animals
- b. Dioecious organisms are seen only in plants
- c. Dioecious organisms are seen in both plants and animals
- d. Dioecious organisms are seen only invertebrates

Solution:

Option (c) is the answer.

14. There is no natural death in single-celled organisms like Amoeba and bacteria because:

- a. They cannot reproduce sexually
- b. They reproduce by binary fission

- c. The parental body is distributed among the offspring
- d. They are microscopic

Solution:

Option (c) is the answer.

15. There are various types of reproduction. The type of reproduction adopted by an organism depends on:

- a. The habitat and morphology of the organism
- b. Morphology of the organism
- c. Morphology and physiology of the organism
- d. The organism's habitat, physiology and genetic makeup

Solution:

Option (d) is the answer.

16. Identify the incorrect statement.

- a. In asexual reproduction, the offspring produced are morphologically and genetically identical to the parent
- b. Zoospores are sexual reproductive structures
- c. In asexual reproduction, a single parent produces offspring with or without the formation of gametes
- d. Conidia are asexual structures in *Penicillium*

Solution:

Option (b) is the answer.

17. Which of the following is a post-fertilisation event in flowering plants?

- a. Transfer of pollen grains
- b. Embryo development
- c. Formation of flower
- d. Formation of pollen grains

Solution:

Option (b) is the answer.

18. The number of chromosomes in the shoot tip cells of a maize plant is 20.

The number of chromosomes in the microspore mother cells of the same plant shall be:

- a. 20
- b. 10
- c. 40
- d. 15

Solution:

Option (a) is the answer.

VERY SHORT ANSWER TYPE QUESTIONS

1. Mention two inherent characteristics of Amoeba and yeast that enable them to reproduce asexually.

Solution:

- a. Their structural organisation is simple.
- b. An only single parent is involved, that is they are single parental

2. Why do we refer to offspring formed by the asexual method of reproduction as clones?

Solution:

In the process of asexual reproduction, and only a single parent is involved so no genetic and morphological variation takes place so that we refer to offspring formed by the asexual method of reproduction as clones.

3. Although potato tuber is an underground part, it is considered as a stem. Give two reasons.

Solution:

They have leaf shoots arising from the nodes. The tuber has internodes.

4. Between an annual and a perennial plant, which one has a shorter juvenile phase? Give one reason.

Solution:

As the annual plant has a shorter life span than the perennial plants, its juvenile phase is also shorter than the perennial plants.

5. Rearrange the following events of sexual reproduction in the sequence in which they occur in a flowering plant: embryogenesis, fertilization, gametogenesis, and pollination.

Solution:

The sequence is as follows:

Pollination → Gametogenesis → Fertilization → Embryogenesis

6. The probability of fruit set in a self-pollinated bisexual flower of a plant is far greater than a dioecious plant. Explain.

Solution:

A bisexual flower has both male and female flower themselves but in the dioecious plant they are unisexual they need an agent for the transfer of pollen grain were in bisexual the transfer of pollen is easier.

7. Is the presence of a large number of chromosomes in an organism a hindrance to sexual reproduction? Justify your answer by giving suitable reasons.

Solution:

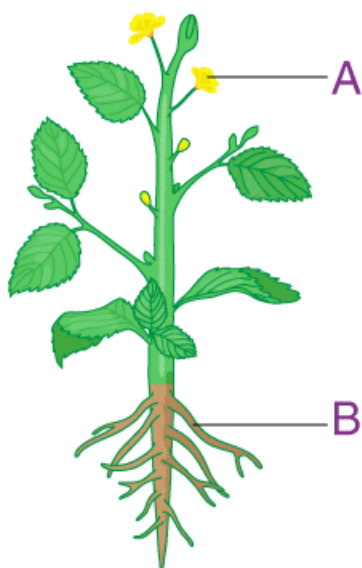
The basis of sexual reproduction is the generation of haploid gamete only so, the presence of a greater number of gametes does not affect the reproduction. For example, Fern plant has 1260 chromosomes but still, it reproduces sexually.

8. Is there a relationship between the size of an organism and its life span? Give two examples in support of your answer.

Solution:

There is no relationship between the size of an organism and its life span. For example, Mango tree and banyan tree have the same size but they differ in their life span.

9. In the figure given below the plant bears two different types of flowers marked 'A' and 'B'. Identify the types of flowers and state the type of pollination that will occur in them.



Solution:

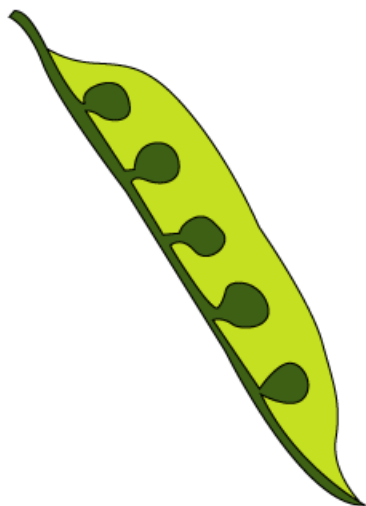
'A' is a chasmogamous flower. Self-pollination or cross-pollination occurs while 'B' is a cleistogamous flower which is self-pollinated.

10. Give reasons as to why cell division cannot be a type of reproduction in multicellular organisms.

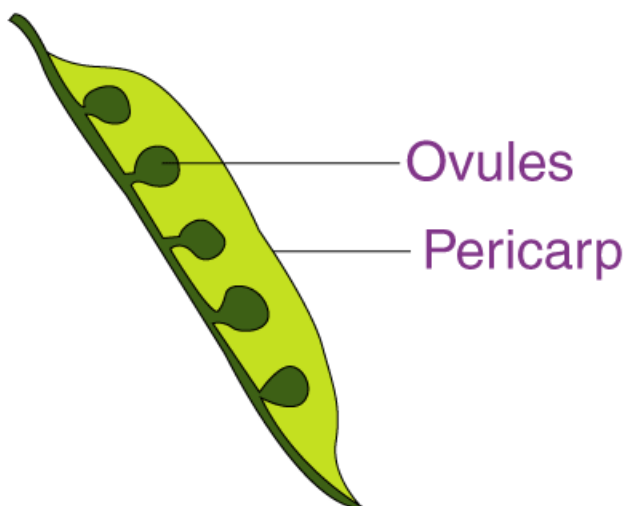
Solution:

In unicellular organisms, cell division takes place because each parent body forms a daughter cell where multicellular not because no differentiation occurs.

11. In the figure given below, mark the ovule and pericarp



Solution:



12. Why do gametes produced in large numbers in organism's exhibit external fertilisation?

Solution:

Gametes produced in large numbers in organism's exhibit external fertilization because gametes are released in an open environment. This causes them to expose constantly to predators and thus reduces the number of gametes.

13. Which of the followings are monoecious and dioecious organisms?

- a. Earthworm _____
b. Chara _____
c. Marchantia _____
d. Cockroach _____

Solution:

- a. Earthworm “monoecious”
b. Chara “monoecious”
c. Marchantia “dioecious”
d. Cockroach “dioecious”

14. Match the organisms given in Column-'A' with the vegetative propagules given in column 'B'

| Col. A | Col. B |
|--------------------|--------------|
| i. Bryophyllum | a) offset |
| ii. Agave | b) eyes |
| iii. Potato | c) leaf buds |
| iv. Water hyacinth | d) bulbils |

Solution:

- i is c
ii is d
iii is b
iv is a

15. What do the following parts of a flower develop into after fertilization?

- a. Ovary _____
b. Ovules _____

Solution:

- a. Ovary “Fruit”
b. Ovules” Seeds”

SHORT ANSWER TYPE QUESTIONS

1. In haploid organisms that undergo sexual reproduction, name the stage in the life cycle when meiosis occurs. Give reasons for your answer.

Solution:

These haploid cells only show meiotic division, not meiosis when the formation of zygote takes place as the zygote is the only diploid cell in their life cycle.

2. The number of taxa exhibiting asexual reproduction is drastically reduced in higher plants (angiosperms) and higher animals (vertebrates) as compared with lower groups of plants and animals. Analyse the possible reasons for this situation.

Solution:

The higher plants and higher animals have a complex structural organization that allows them to use the sexual mode of reproduction and then produce genetically variable offspring. They have more superior survival and adaptation capability than those which are produced asexually.

3. Honeybees produce their young ones only by sexual reproduction. Despite this, in a colony of bees, we find both haploid and diploid individuals. Name the haploid and diploid individuals in the colony and analyse the reasons behind their formation.

Solution:

A honeybee hive has three kinds of members which are

1. Diploid Queen which are fertile females
2. Worker bees are sterile females.
3. Drones which are haploid males.

Both gametes combine to produce offspring which can either produce diploid or haploid males.

4. With which type of reproduction do we associate the reduction division? Analyze the reasons for it.

Solution:

Meiosis is known as reduction division because Meiosis is involved in the gamete production which occurs in sexual reproduction. The gametes will have half the number of chromosomes as its nature is haploid.

5. Is it possible to consider vegetative propagation observed in certain plants like Bryophyllum, water hyacinth, ginger etc., as a type of asexual reproduction? Give two/three reasons.

Solution:

1. It involves only one parent.
2. No gamete formation takes place.
3. The offspring has the same genetic composition as the parent.

6. 'Fertilization is not an obligatory event for fruit production in certain plants'. Explain the statement.

Solution:

'Fertilization is not an obligatory event for fruit production in certain plants' because in some plants unfertilized egg grows into an embryo, this process is known as parthenogenesis.

7. In a developing embryo, analyse the consequences if cell divisions are not followed by cell differentiation.

Solution:

If in a developing embryo, cell divisions are not followed by cell differentiation the embryo would not grow into an organism as the cells would not differentiate to form tissues and then organs and would remain as a mass.

8. List the changes observed in an angiosperm flower after pollination and fertilization.

Solution:

| | |
|----------------------|-----------|
| 1. Ovary | Fruit |
| 2. Ovary wall | Pericarp |
| 3. Ovule | Seed |
| 4. Outer integument | Testa |
| 5. Inner integument | Tegmen |
| 6. Secondary nucleus | Endosperm |

| | |
|---------------------------------|-----------------|
| 7. Egg | Zygote |
| 8. Synergids and antipodals | Degenerate |
| 9. Hilum, Funicle and micropyle | Show no changes |

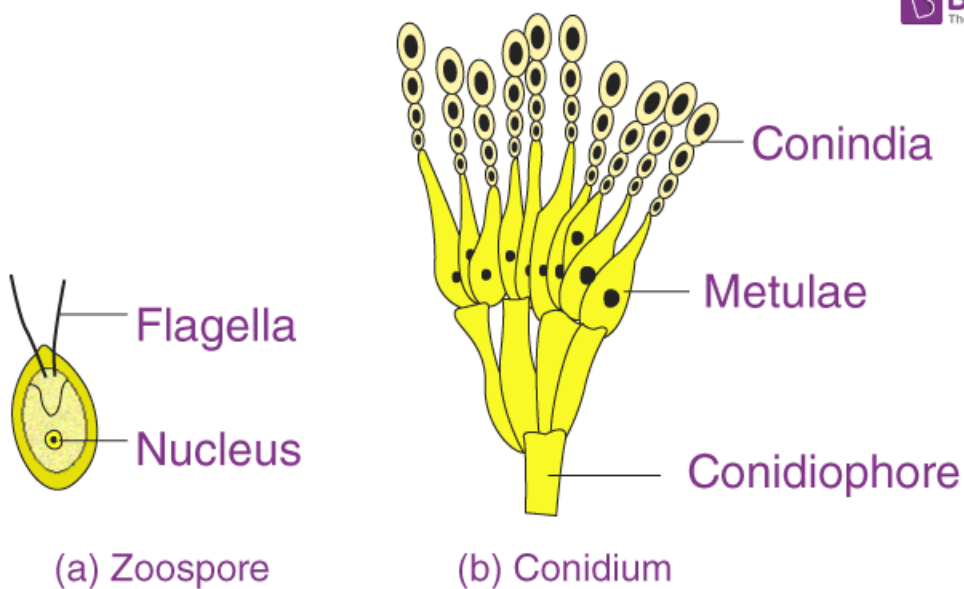
9. Suggest a possible explanation of why the seeds in a pea pod are arranged in a row, whereas those in tomato are scattered in the juicy pulp.

Solution:

Pea and tomato plants show different types of placentation which describes the type of arrangement of ovules inside the ovary. The pea plant shows Marginal Placentation which means that the ovules are arranged into two rows along the rigid ventricular suture, whereas the tomato plant shows Axileplacentation, that means the ovules are arranged along the central axis of the ovary.

10. Draw the sketches of a zoospore and a conidium. Mention two dissimilarities between them and at least one feature common to both structures.

Solution:



- Zoospore is endogenously formed inside a sporangium and flagellated
- Conidium is formed inside conidiophores exogenously and is non-flagellated.

11. Justify the statement 'Vegetative reproduction is also a type of asexual reproduction'.

Solution:

Vegetative reproduction is also a type of asexual reproduction because it involves only one parent. In this reproduction, the clone formation takes place that young one will be similar to that of the parent. Gamete formation does not take place and the offspring will have the same genetic composition as that of the parent.

LONG ANSWER TYPE QUESTIONS

1. Enumerate the differences between asexual and sexual reproduction. Describe the types of asexual reproduction exhibited by unicellular organisms.

Solution:

| Asexual reproduction | Sexual reproduction |
|--|---|
| 1. Only one parent is involved | Male and female parents are involved |
| 2. Gamete formation does not take place | Male and female gamete formation takes place |
| 3. Male gamete fusion does not take place | Male and female gamete fusion takes place |
| 4. Offspring will be an exact copy of their parents. | Offsprings are varied genetically and physically from parents |
| 5. Genetic variation does not take place. | The genetic variation takes place |

Asexual reproduction is different kinds they are:

1. Binary Fission: The parent cell divides its DNA into two, these DNA then incorporates into two identical daughter cells produced from the parent body, example: Amoeba
2. Budding: A small nod or growth on the surface of the parent body derives nutrition from the parent, then detaches and grow into another being. Example: Hydra, Yeast.
3. Fragmentation: The parent body divides into many fragments and every fragment develops into offsprings. Example: starfish
4. Parthenogenesis: The unfertilized eggs develop into an embryo to form an invertebrate like a fish, frog and other reptiles.

2. Do all the gametes formed from a parent organism have the same genetic composition (identical DNA copies of the parental genome)? Analyse the situation with the background of gametogenesis and provide or give a suitable explanation.

Solution:

In sexual reproduction the fusion of male and female gamete takes place. Therefore the gametes formed from a parent organism do not have the same genetic composition. Both female and male gamete will have different genetic makeup and their recombination leads to the formation of the gamete that has different DNA composition.

3. Although sexual reproduction is a long drawn, energy-intensive complex form of reproduction, many groups of organisms in Kingdom Animalia and Plantae prefer this mode of reproduction.

Give at least three reasons for this.

Solution:

1. Genetically varied offspring due to the recombination of the qualitatively different male and female DNA.
2. Due to recombination of DNA genetical variations are seen in the offsprings
3. This type of reproduction is useful as due to genetical variation the adaptation and survival compatibility increases

4. Differentiate between (a) oestrus and menstrual cycles; (b) ovipary and vivipary. Cite an example for each type

Solution:

| | |
|---------------|-----------------|
| OESTRUS CYCLE | MENSTRUAL CYCLE |
|---------------|-----------------|

| | |
|---|--|
| 1. Takes place in non-primates 2. The endometrium lining is reabsorbed 3. Blood does not flow down 4. Copulation happens in heat season only Example: Cow | 1. Takes place in primates only 2. The endometrium lining of the uterus breaks down and passes down 3. Blood flow takes place 4. Copulation takes place in any season. Example: Human beings |
|---|--|

| OVIPAROUS | VIVIPAROUS |
|--|--|
| 1. They lay eggs and do not give birth to young ones 2. The egg may be fertilized or unfertilized 3. The young ones are protected inside a hard-calcareous shell 4. Example: Fish, reptiles | 1. They give birth to the young ones only 2. The egg undergoes internal fertilization 3. The fertilized egg develops inside the female body 4. Example: Mammals |

5. Rose plants produce large, attractive bisexual flowers but they seldom produce fruits. On the other hand, a tomato plant produces plenty of fruits though they have small flowers. Analyse the reasons for the failure of fruit formation in rose.

Both these plants - rose and tomato - both selected by human beings for different characteristics, the rose for its flower and tomato for its fruit. Roses, being vegetative propagated do not need to produce seeds.

Solution:

Rose plants produce large, attractive bisexual flowers but they seldom produce fruits. On the other hand, a tomato plant produces plenty of fruits though they have small flowers. Because

1. The pollens produced by the rose plants may not be viable that means they may not have the compatibility to germinate; hence fertilization does not take place.
2. Pollen-pistil interaction may not take place
3. As the rose plants are hybrid the mitotic division in them may be abnormal, which may produce non-viable gametes.
4. A barrier is present in the pollen tube where the male gametes are restricted to reach the ovule.