

**Question 1:**

Why is reproduction essential for organisms?

Answer

Reproduction is a fundamental feature of all living organisms. It is a biological process through which living organisms produce offspring's similar to them. Reproduction ensures the continuance of various species on the Earth. In the absence of reproduction, the species will not be able to exist for a long time and may soon get extinct.

Question 2:

Which is a better mode of reproduction sexual or asexual? Why?

Answer

Sexual reproduction is a better mode of reproduction. It allows the formation of new variants by the combination of the DNA from two different individuals, typically one of each sex. It involves the fusion of the male and the female gamete to produce variants, which are not identical to their parents and to themselves. This variation allows the individual to adapt to constantly changing and challenging environments. Also, it leads to the evolution of better suited organisms which ensures greater survival of a species. On the contrary, asexual reproduction allows very little or no variation at all. As a result, the individuals produced are exact copies of their parents and themselves.

Question 3:

Why is the offspring formed by asexual reproduction referred to as clone?

Answer

A clone is a group of morphologically and genetically identical individuals.

In the process of asexual reproduction, only one parent is involved and there is no fusion of the male and the female gamete. As a result, the offsprings so produced are morphologically and genetically similar to their parents and are thus, called clones.

**Question 4:**

Offspring formed due to sexual reproduction have better chances of survival. Why? Is this statement always true?

Answer

Sexual reproduction involves the fusion of the male and the female gamete. This fusion allows the formation of new variants by the combination of the DNA from two (usually) different members of the species. The variations allow the individuals to adapt under varied environmental conditions for better chances of survival.

However, it is not always necessary that the offspring produced due to sexual reproduction has better chances of survival. Under some circumstances, asexual reproduction is more advantageous for certain organisms. For example, some individuals who do not move from one place to another and are well settled in their environment. Also, asexual reproduction is a fast and a quick mode of reproduction which does not consume much time and energy as compared to sexual reproduction.

Question 5:

How does the progeny formed from asexual reproduction differ from those formed by sexual reproduction?

Answer

Progeny formed from asexual reproduction	Progeny formed from sexual reproduction
1. Asexual reproduction does not involve the fusion of the male and the female gamete. Organisms undergoing this kind of reproduction produce offspring's that are morphologically and genetically identical to them.	Sexual reproduction involves the fusion of the male and the female gamete of two individuals, typically one of each sex. Organisms undergoing this kind of reproduction produce offspring's that are not identical to them.



2.	Offsprings thus produced do not show variations and are called clones.	Offspring's thus produced show variations from each other and their parents.
-----------	--	--

Question 6:

Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?

Answer

Sexual reproduction		Asexual reproduction
1	It involves the fusion of the male and female gamete.	It does not involves the fusion of the male and the female gamete
2.	It requires two (usually) different individuals.	It requires only one individual.
3.	The individuals produced are not identical to their parents and show variations from each other and also, from their parents.	The individuals produced are identical to the parent and are hence, called clones.
4.	Most animals reproduce sexually. Both sexual and asexual modes of reproduction are found in plants.	Asexual modes of reproduction are common in organisms having simple organizations such as algae and fungi.
5.	It is a slow process.	It is a fast process.

Vegetative propagation is a process in which new plants are obtained without the production of seeds or spores. It involves the propagation of plants through certain vegetative parts such as the rhizome, sucker, tuber, bulb, etc. It does not involve



the fusion of the male and the female gamete and requires only one parent. Hence, vegetative reproduction is considered as a type of asexual reproduction.

Question 7:

What is vegetative propagation? Give two suitable examples.

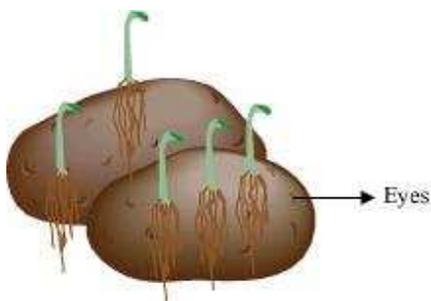
Answer

Vegetative propagation is a mode of asexual reproduction in which new plants are obtained from the vegetative parts of plants. It does not involve the production of seeds or spores for the propagation of new plants. Vegetative parts of plants such as runners, rhizomes, suckers, tubers, etc. can be used as propagules for raising new plants.

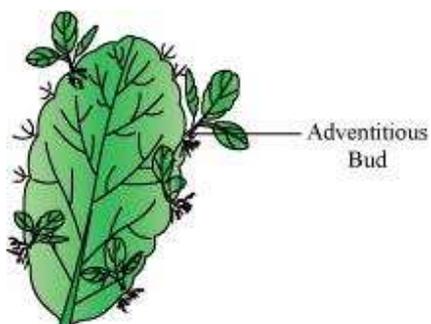
Examples of vegetative reproduction are:

1. Eyes of potato:

The surface of a potato has several buds called eyes. Each of these buds when buried in soil develops into a new plant, which is identical to the parent plant.

**2. Leaf buds of Bryophyllum:**

The leaves of *Bryophyllum* plants bear several adventitious buds on their margins. These leaf buds have the ability to grow and develop into tiny plants when the leaves get detached from the plant and come in contact with moist soil.

**Question 8:**

Define

- (a) Juvenile phase,
- (b) Reproductive phase,
- (c) Senescent phase.

Answer

- (a) Juvenile phase:

It is the period of growth in an individual organism after its birth and before it reaches reproductive maturity.

- (b) Reproductive phase:

It is the period when an individual organism reproduces sexually.

- (c) Senescent phase:

It is the period when an organism grows old and loses the ability to reproduce.

Question 9:

Higher organisms have resorted to sexual reproduction in spite of its complexity.

Why?

Answer

Although sexual reproduction involves more time and energy, higher organisms have resorted to sexual reproduction in spite of its complexity. This is because this mode of reproduction helps introduce new variations in progenies through the combination of the DNA from two (usually) different individuals. These variations allow the



individual to cope with various environmental conditions and thus, make the organism better suited for the environment. Variations also lead to the evolution of better organisms and therefore, provide better chances of survival. On the other hand, asexual reproduction does not provide genetic differences in the individuals produced.

Question 10:

Explain why meiosis and gametogenesis are always interlinked?

Answer

Meiosis is a process of reductional division in which the amount of genetic material is reduced. Gametogenesis is the process of the formation of gametes. Gametes produced by organisms are haploids (containing only one set of chromosomes), while the body of an organism is diploid. Therefore, for producing haploid gametes (gametogenesis), the germ cells of an organism undergo meiosis. During the process, the meiocytes of an organism undergo two successive nuclear and cell divisions with a single cycle of DNA replication to form the haploid gametes.

Question 11:

Identify each part in a flowering plant and write whether it is haploid (n) or diploid ($2n$).

- (a) Ovary —————
- (b) Anther —————
- (c) Egg —————
- (d) Pollen —————
- (e) Male gamete —————
- (f) Zygote —————

Answer

- (a) Ovary Diploid ($2n$)
- (b) Anther Diploid ($2n$)
- (c) Egg Haploid (n)



(d) Pollen Haploid (n)

(e) Male gamete Haploid (n)

(f) Zygote Diploid ($2n$)

Question 12:

Define external fertilization. Mention its disadvantages.

Answer

External fertilization is the process in which the fusion of the male and the female gamete takes place outside the female body in an external medium, generally water. Fish, frog, starfish are some organisms that exhibit external fertilization.

Disadvantages of external fertilization:

In external fertilization, eggs have less chances of fertilization. This can lead to the wastage of a large number of eggs produced during the process.

Further, there is an absence of proper parental care to the offspring, which results in a low rate of survival in the progenies.

Question 13:

Differentiate between a zoospore and a zygote.

Answer

Zoospore		Zygote
1.	A zoospore is a motile asexual spore that utilizes the flagella for movement.	A zygote is a non-motile diploid cell formed as a result of fertilization.
2.	It is an asexual reproductive structure.	It is formed as a result of sexual reproduction.

Question 14:

Differentiate between gametogenesis from embryogenesis.

Answer



Gametogenesis	Embryogenesis
It is the process of the formation of haploid male and female gametes from diploid meiocytes through the process of meiosis.	It is the process of the development of the embryo from the repeated mitotic divisions of the diploid zygote.

Question 15:

Describe the post-fertilization changes in a flower.

Answer

Fertilization is the process of the fusion of the male and the female gamete to form a diploid zygote. After fertilization, the zygote divides several times to form an embryo. The fertilized ovule forms a seed. The seed contains an embryo, enclosed in a protective covering, called the seed coat. As the seed grows further, other floral parts wither and fall off. This leads to the growth of the ovary, which enlarges and ripens to become a fruit with a thick wall called the pericarp.

Question 16:

What is a bisexual flower? Collect five bisexual flowers from your neighborhood and with the help of your teacher find out their common and scientific names.

Answer

A flower that contains both the male and female reproductive structure (stamen and pistil) is called a bisexual flower. Examples of plants bearing bisexual flowers are:

- (1) Water lily (*Nymphaea odorata*)
- (2) Rose (*Rosa multiflora*)
- (3) Hibiscus (*Hibiscus Rosa-sinensis*)
- (4) Mustard (*Brassica nigra*)
- (5) Petunia (*Petunia hybrida*)

**Question 17:**

Examine a few flowers of any cucurbit plant and try to identify the staminate and pistillate flowers. Do you know any other plant that bears unisexual flowers?

Answer



Cucurbit plant bears unisexual flowers as these flowers have either the stamen or the pistil. The staminate flowers bear bright, yellow coloured petals along with stamens that represent the male reproductive structure. On the other hand, the pistillate flowers bear only the pistil that represents the female reproductive structure.

Other examples of plants that bear unisexual flowers are corn, papaya, cucumber, etc.

Question 18:

Why are offspring of oviparous animals at a greater risk as compared to offspring of viviparous animals?

Answer

Oviparous animals lay eggs outside their body. As a result, the eggs of these animals are under continuous threat from various environmental factors. On the other hand, in viviparous animals, the development of the egg takes place inside the body of the female. Hence, the offspring of an egg-laying or oviparous animal is at greater risk as compared to the offspring of a viviparous animal, which gives birth to its young ones.

CHAPTER 1

REPRODUCTION IN ORGANISMS

POINTS TO REMEMBER

Clone: A group of organism derived from a single individual and hence morphologically and genetically similar.

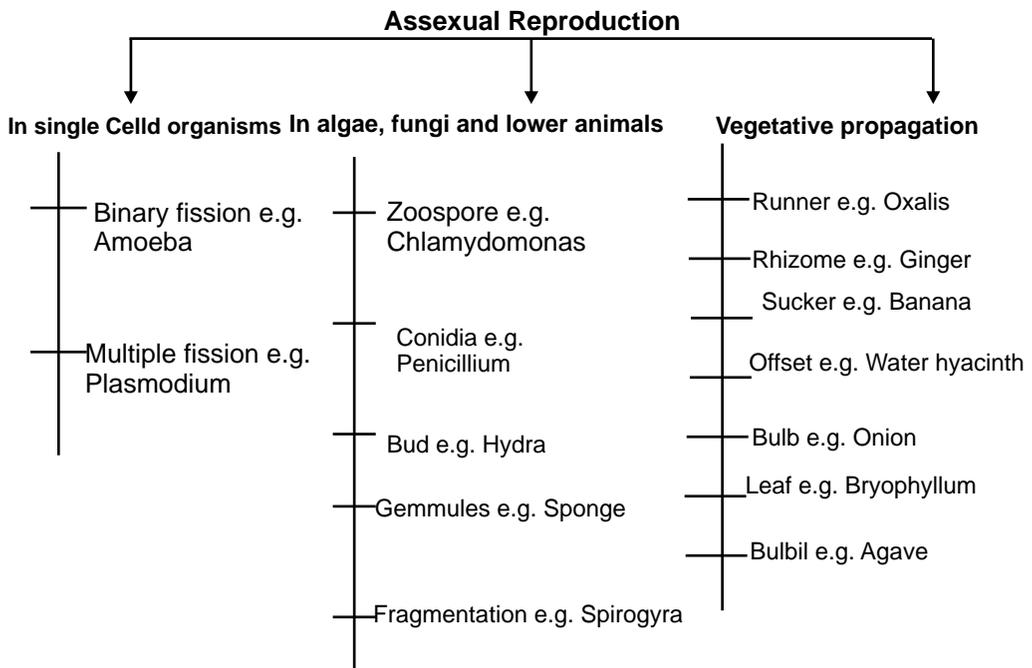
Embryogenesis: The process of development of embryo from zygote.

Juvenile Phase: It is the period of growth before maturity when sex organs are not functional.

Meiocytes : These are specialized cells of diploid organisms which undergo meiosis.

Pericarp: It is the protective covering of fruit, may be divided into epicarp, mesocarp and endocarp.

Parthenogenesis : Development of an egg into an embryo without fertilisation.



Gamete Transfer

1. **In Algae, Bryophytes and Pteridophytes** : The male and female gametes are flagellated and motile, need a medium (water) to reach the egg.
2. **In seed Plants** : Pollen grains are transferred to stigma of flower of same species by various agents.
3. **In animals** :
 - (a) By Copulation . e.g., Reptiles, Birds and Mammals.
 - (b) By External medium . e.g., Fishes and Amphibians.

Sporulation :- During unfavorable conditions organisms like *Amoeba* surrounded by resistant coat (three layered - hard covering) or cyst. This is called encystation . Within cyst a number of spores are formed . On returning favourable conditions, the cyst bursts and spores are liberated and gradually grows into adults. This process is known as sporulation.

Fragmentation : It is a type of asexual reproduction where an organism splits into fragments. These fragments develop into fully grown individuals. eg. Spirogyra, fungi and some annelids.

Regeneration: It is a process of renewal, restoration and growth. It can occur at the level of the cell, tissue and organ . It is common in Hydra , Planaria and echinoderms .

- In human, liver has power of regeneration, if it is partially damaged.
- During danger a lizard discards a part of tail which can regenerate later.

QUESTIONS

VSA (1 MARK)

1. Offspring produced by asexual reproduction are referred to as clones. Why?
2. Name the most invasive aquatic plant weed which is called as 'Terror of Bengal'.
3. How does Zygote usually differ from Zoospore in terms of ploidy?
4. Mention the main difference between the offspring produced by asexual reproduction and progeny produced by sexual reproduction.

5. Which characteristic property of Bryophyllum is exploited by gardeners and farmers?

SA II (2Marks)

6. Higher organisms have resorted to sexual reproduction inspite of its complexity. Why?
7. Tapeworms possess both male and female reproductive organs. What is the name given to such organisms? Give two more examples of such organisms.
8. Study the relationship between first two words and suggest a suitable word for fourth place.
- (a) Male flower : Stamens :: Female Flower :
- (b) Birds : oviparous :: Primates :
- (c) *Chlamydomonas* : Zoospores :: *Penicilium* :
- (d) Ginger : Rhizome :: Agave :
9. Bryophytes and Pteridophytes produce a large number of male gametes but relatively very few female gametes. Why?

SA I (3 Marks)

10. Mention the site of zygote formation in the ovule of a flowering plant. What happens to sepals, petals and stamens after fertilisation? State the fate of zygote, ovule and ovary in these plants.
11. Distinguish between gametogenesis and embryogenesis.
12. Fill the blank spaces a, b, c, and d given in the following table.

Organism	Organ	Gamete
a	Testes	Spermatozoa
Human female	b	Ovum
Plant (Angiosperm)	c	Pollen grains
Plant (Pteridophyte)	antheridium	d

LA (5 MARKS)

13. (a) Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?
- (b) Which is better mode of reproduction : Sexual or Asexual? Why?

VSA (1Mark) Answer

1. Because offsprings produced by Asexual reproduction is morphologically and genetically identical to parent.
2. Water hyacinth (*Eicchornia*)
3. Zygote . diploid, zoospore . haploid.
4. Offspring produced by asexual reproduction are genetically similar while progeny produced by sexual reproduction exhibit genetic variation.
5. Adventitious bud arising from margin of the leaf.

SA (II 2 MARKS)

6. Because of variations, gene pool, vigour and vitality and parental care.
7. Hermaphrodite; Examples : Earthworm, Leech.
8. (a) Carpel (b) Viviparous
(c) Conidia (d) Bulbil
9. Because, male gamete need medium (water) to reach egg/female gamete. A large number of the male gametes fail to reach the female gamete.

SA . I (3 MARKS)

10. Embryo sac
Sepals, Petals and Stamens dry and fall off. Zygote develops into embryo. Ovule develops into seed and ovary into fruit.

- | | | |
|-----|-----------------------------|------------------------------|
| 11. | Gametogenesis | Embryogenesis |
| | 1. Formation of gametes | 1. Formation of embryo |
| | 2. Produces haploid gametes | 2. Embryo is diploid |
| | 3. Cell division is meiotic | 3. Cell division is mitotic. |
| 12. | a = Human male | b = ovary |
| | c = Anther | d = Antherozoid |

LA (5 Marks)

13. (a)
- | | |
|--|---|
| Asexual Reproduction | Sexual Reproduction |
| (i) Uniparental | (i) Biparental |
| (ii) Gametes are not involved | (ii) Gametes are involved |
| (iii) Only mitotic division takes | (iii) Meiosis at the time of gamete place formation and mitosis after fertilisation |
| (iv) Offspring genetically similar to parent | (iv) Offspring different from parent. |

Vegegate propagation takes place when new individuals arise from vegetative part of parent and have characters similar to that of parent plant.

- (b) Sexual reproduction introduces variations in offsprings and has evolutionary significance. It helps offsprings to adjust according to the changes in environment. It produces better offsprings due to character combination.

CHAPTER 2

SEXUAL REPRODUCTION IN FLOWERING PLANTS

POINTS TO REMEMBER

Autogamy : When pollen grains of a flower are transferred from anther to stigma of the same flower.

Coleorhiza : A protective sheath of radicle in monocot seed.

Coleoptile : A protective sheath of plumule in monocot seed.

Endothecium : A fibrous layer in the anther next to epidermis.

Geitonogamy : Self pollination between flowers of the same plant.

Micropyle : A small pore in the ovule through which the pollen tube enters.

Nucellus : Multicellular tissue in the centre of ovule where embryo sac is present.

Tapetum : Inner most layer of cells in pollen sac which provide nutrition to developing pollen grains

Viability of Seed : Ability of seed to retain the power of germination.

1. **Microsporangium (Pollen sac)** :

Outermost layer = Epidermis

Second layer = Endothecium

Middle layer = 2 - 4 layers of cells

Innermost layer = Tapetum [Nourishes the developing pollen grains (Microspores)]

2. **Microsporogenesis** : Process of formation of microspores from a pollen mother cell.