CHAPTER

01

Reproduction in Organisms

Lifecycle The life cycle of an organism encompasses the sequence of changes and developments it undergoes from birth to death.

Lifespan An organism's lifespan refers to the time period between its birth and natural death. It is not necessarily related to body size.

Reproduction is a biological process by which an organism produces offspring that are similar to itself. It is crucial for the maintenance of life on Earth, the continuity of a species, and the creation of variations among populations.

Reproduction can be classified into two types:

****Asexual Reproduction***

****Sexual Reproduction***

Asexual Reproduction

Asexual reproduction is the production of offspring by a single parent without the formation and fusion of gametes. This method involves only mitotic cell division, resulting in offspring that are identical and exact copies
(clones) of their parent.

Asexual Reproduction in Animals, Asexual reproduction is the primary means of reproduction among *protists, cnidarians, and tunicates. I*t occurs through various methods such as ;

* Binary fission *Budding

*sporulation/ sporogenesis

*fragmentation * regeneration.

(i) ***Binary fission*** involves the division of the parent body into two equal halves, as seen in organisms like Amoeba and Paramecium.

(ii) ***Budding*** is the process in which an outgrowth is produced from the parent's body that separates to give rise to a new individual, as seen in organisms like yeast and Hydra. If the bud grows externally on the surface of the body, it is known as external (exogenous) budding, and if it grows within the parental body, it is known as internal (endogenous) budding or gemmule formation, as seen in sponges and Marchantia.

(iii) ***Sporogenesis/Sporulation*** involves the production of spores, which are capable of producing daughter cells through their growth. Algae and fungi have different types of spores such as zoospores and conidia.

(iv) ***Fragmentation*** involves breaking the parent body into several fragments, each of which develops into mature individuals, as seen in organisms like Spirogyra and sea stars.

(v) ***Regeneration*** involves the formation of a whole new body of an organism from a cut or broken part of the parent's body, as seen in organisms like Hydra and Planaria.

:B. **Asexual Reproduction in Plants:** Plants have the ability to reproduce asexually through vegetative propagation, where certain parts such as roots, stems, leaves, and meristematic tissues can grow into new plants.

Natural Vegetative Propagation:

(i) Definition: A natural method of propagation where vegetative propagules of plants develop into new plants under suitable conditions.

(ii) Examples:

Roots (e.g. sweet potato)

Underground stems including, ***rhizomes*** (e.g. banana, ginger)

Bulbs (e.g. garlic, onion)

Tubers (e.g. potato)

Corms (e.g., Colocasia)

Creeping stems including:

Sucker, root that grows from the base of a plant or from its roots.e.g. (Chrysanthemum), ***Runner***: ***The*** stem grows laterally on the surface of the soil, breaks up to produce roots where it touches the ground to give rise to new plants.(e.g. lawn grass or Cynodon), and ***Stolon*** :Stolon is a slender branch of the stem that grows upwards to some distance and then bends towards the ground. Upon touching the ground, it gives rise to a new plant .e.g.(wild strawberry, Vallisneria)

Offsets (e.g., Pistia)

Aerial stems (e.g., Opuntia)

Leaves (e.g., Bryophyllum, Kalanchoe, Begonia)

Bulbils (e.g., Agave, Oxalis, Allium sativum, lily)

Artificial Vegetative Propagation:

Artificial vegetative propagation is a method of plant propagation that involves the use of various techniques to create new plants from vegetative structures such as leaves, stems, and roots.

This process can be achieved through four different types of propagation methods: ***cutting, layering, grafting, and micropropagation***

Cutting: This involves cutting a stem, root or leaf from a parent plant and then placing it in a suitable growing medium to develop roots and grow into a new plant.

Layering: This involves bending a branch or stem of a parent plant to the ground and burying a section of it, which will then develop roots and grow into a new plant.

Grafting: This involves joining two different plants together to create a new plant that combines the desirable traits of both. This method is often used in fruit tree production.

Micropropagation: . This method allows for the rapid production of large numbers of genetically identical plants that are free from disease.

Parthenogenesis

Parthenogenesis is a form of asexual reproduction in which an unfertilized egg develops into an offspring without any genetic contribution from a male gamete. This process is observed in many invertebrates, such as aphids and bees, and some vertebrates, such as lizards and fish.

Sexual Reproduction

Sexual reproduction involves the creation of male and female gametes, which are generated either by the same organism or by two different organisms of opposite *sex.*

Phases of life cycle

The life cycle of organisms Is characterized by three stages: the juvenile phase, the reproductive phase, and the senescent phase. Depending on the species, animals can either be continuous breeders, like humans, or seasonal breeders, like dogs, birds, frogs, and lizards. Non-primate animals undergo an estrous cycle during their reproductive phase, while primates experience menstruation.

Important events in sexual reproduction

The process of sexual reproduction involves a sequence of events that can be broadly classified into three main stages: ***pre-fertilization, fertilization, and post-fertilization***.

Th***e pre-fertilization*** stage encompasses events that occur prior to the fusion of gametes. This includes ***gametogenesis***, which is the process of producing haploid gametes. Gametes that are morphologically similar are referred to as *isogametes* whereas those that differ in appearance are called *heterogametes*.

Another important pre-fertilization event is ***gamete transfer***, which involves the physical association of male and female gametes to facilitate fertilization. In *animals*, this can occur through *mating*, while in *plants*, it can occur through *pollination*.

The second stage of sexual reproduction is ***fertilization***, which is the fusion of male and female gametes.

In some organisms, such as humans, fertilization occurs internally, called *internal fertilization* while in others, such as fish and amphibians, it occurs externally, called *external fertilization* The successful fusion of gametes during fertilization results in the formation of a ***zygote***, which develops into an ***embryo***.

Finally, th***e post-fertilization*** stage includes events such as ***embryogenesis, seed development, and seed dispersal*** and ***fetal development*** and ***birth*** in animals. processes ensure the propagation of the next generation of oorganisms

Embryogenesis in ***animals*** can be of following two types based on whether development of zygote takes place iinside (viviparous) or outside(oviparous) of female parent body.

Oviparous: *animals are those that lay eggs to reproduce. The eggs are fertilized internally by a male and then laid outside the body. The development of the embryo inside the egg can vary depending on the species, with some animals laying eggs with hard, protective shells and others laying eggs with soft, jelly-like membranes.*

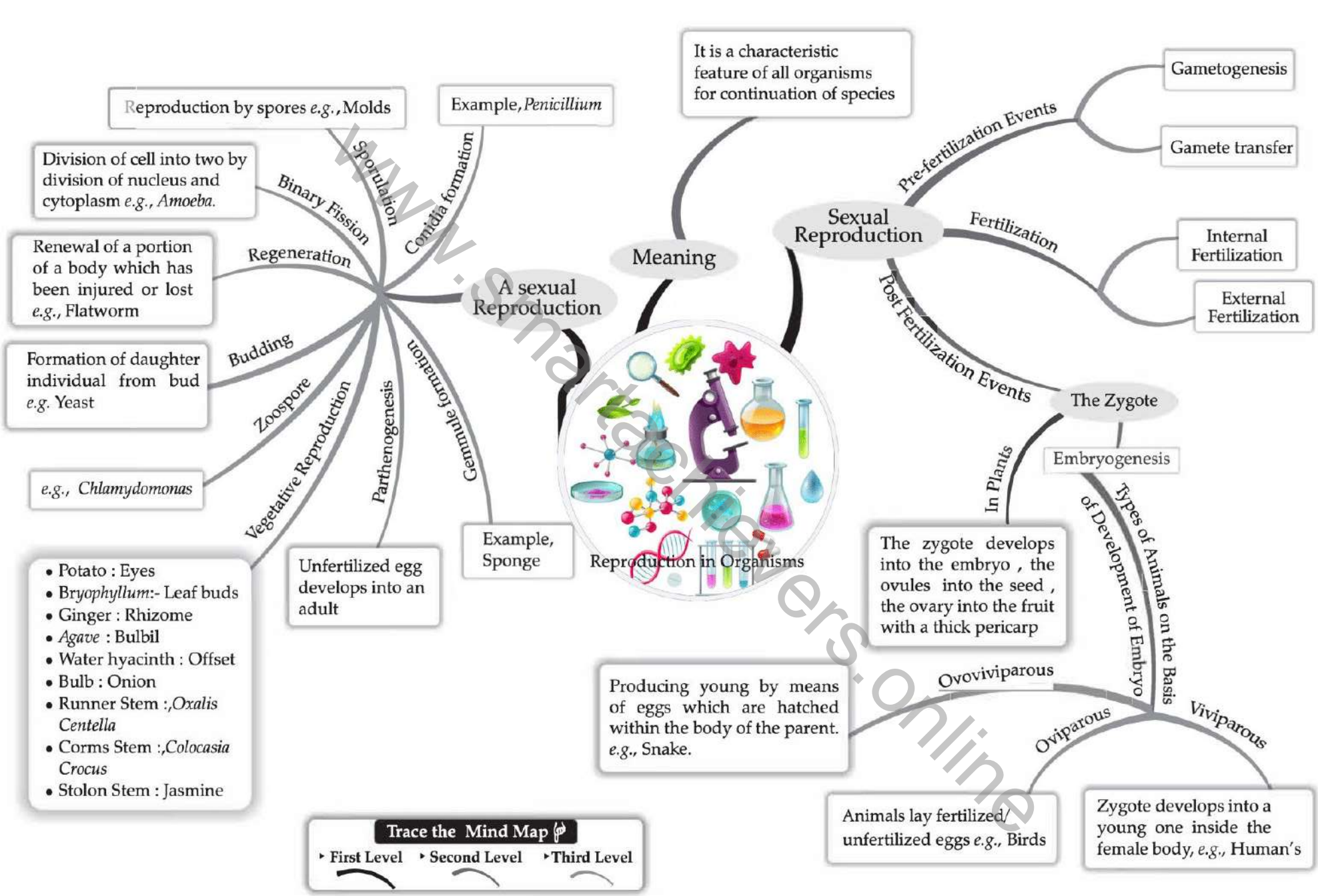
Example: reptiles

Viviparous reproduction is a reproductive strategy used by certain animals where offspring develop within the mother's body and are born alive.

Example: mammals

Embryogenesis in plants begins with the formation of a zygote inside the ovule, and subsequently, the sepals, petals, and stamens of the flower wither and fall off. After fertilization, the zygote undergoes a series of developmental changes to form an embryo, while the ovules transform into seeds and the ovary into a fruit. Once dispersed, the seed will germinate under favorable conditions and the embryo will continue to grow and develop into a mature plant.

This process of embryogenesis is essential for the survival and reproduction of flowering plants, and its success ensures the continued propagation of plant life across the globe.



Practice Questions

1.Which of the following is an example of asexual reproduction?

a) Fertilization of an egg by a sperm cell

b) The production of gametes in the testes and ovaries

c) Budding in hydra

d) The fusion of sperm and egg cells to form a zygote

2.The menstrual cycle in humans is an example of:

a) Asexual reproduction b) Sexual reproduction

c) Ovulation d) Fertilization

3.In sexual reproduction, the genetic material from two parents combines to form:

a) A haploid cell b) A diploid cell c) A gamete d) A zygote

4.Which of the following organisms commonly reproduces through gemmule formation?

a) Hydra b) Sponge c) Penicillium d) Amoeba

5. In potatoes, dahlias, ginger, and bananas, where do new plantlets typically originate?

a) Floral buds present on the stem b) Internodes of modified stem

c) Nodes of modified stem d) Adventitious buds present on the root

6 Why some organisms switch from asexual to sexual reproduction under stressful conditions?

a) Sexual reproduction is simple and more rapid, allowing larger numbers of offspring to be produced

b) Sexual reproduction requires two separate individuals who can mutually provide nutrient support during stress

c) Sexual reproduction produces individuals with new combinations of recombined chromosomes, increasing diversity

d) Asexual reproduction requires more energy

7. In sexual reproduction, male and female gametes are formed by:

a) The same individual

b) Different individuals of opposite sexes

c) Both a) and b)

d) All of the above

8.Whichhe following sequences correctly represents the phases of an organism's life cycle?

a) Juvenile phase → Senescent phase → Reproductive phase

b) Juvenile phase → Reproductive phase → Senescent phase

c) Reproductive phase → Juvenile phase → Senescent phase

d) Pre-reproductive phase → Reproductive phase → Senescent phase

9. Which of the following is true about zoospores?

a) They are motile gametes of Chlamydomonas

b) They are non-motile gametes of sponges

c) They are motile gametes of Hydra

d) They are non-motile gametes of Penicillium

10. Which of the following is an example of external fertilization?

a) The fusion of sperm and egg inside the female reproductive tract of a human

b) The release of eggs and sperm into water by fish

c) The transfer of pollen from the stamen to the stigma of a flower

d) The fusion of sperm and egg inside a bird's reproductive tract

11.Which of the following is a characteristic of a zygote?

a) It is haploid b) It is formed by mitosis

c) It contains two sets of chromosomes d) It is produced by meiosis

12. Which type of individuals have a higher chance of survival for their young ones?

(a) oviparous (b) viviparous (c)ovoviviparous (d) None of these

13.Which of the following pair is incorrect?

(a) Cell division in embryo – Increase the number of cells

(b) Cell differentiation – Form specialized tissues and organs

c) Eggs covered by hard calcareous shell – Oviparous animals

(d) Zygote develops outside the body – Viviparous animals

14.Which of the following is the correct statement about the beginning of life in sexually reproducing organisms?

(a) single-celled zygote (b) double-celled zygote

c) thick-walled zygote (d) All of these

15.In which type of reproduction, two genetically identical daughter cells are produced?

(a) sexual reproduction (b) asexual reproduction

(c) both (d) none

16.Which of the following is not a method of asexual reproduction in organisms?

(a) fragmentation (b) budding (c) regeneration (d) fertilization

17.What is the process called in which male and female gametes fuse to form a zygote?

(a) fertilization (b) meiosis (c) mitosis (d) replication

18.What is the function of the female reproductive system's ovaries?

(a) produce and store eggs (b) secrete hormones

(c) transport eggs to the uterus (d) all of the above

19.What is the process of formation of gametes in organisms called?

(a) meiosis (b) mitosis (c) replication (d) fertilization

20. Which of the following is not a method of sexual reproduction?

(a) fertilization (b) budding (c) internal fertilization (d) external fertilization

21.What is the process of development of an embryo outside the body of the mother called?

(a) oviparous (b) viviparous (c) external fertilization (d) internal fertilization

22.Which of the following is an advantage of asexual reproduction in organisms?

(a) genetic variation

(b) increased genetic diversity

(c) efficient reproduction

(d) requires two individuals

23.Single-celled animals have been referred to as immortal due to their ability to:

(a) exhibit indefinite growth

(b) tolerate extreme temperature changes

c) engage in continuous reproduction throughout their lifespan

(d) persist through their daughter cells

24.Cell division serves as the primary mode of reproduction in:

(a) monerans

(b) protists

(c) Both monerans and protists

(d) Neither monerans nor protists

25.Zoospores are:

(a) motile gametes of Chlamydomonas

(b) non-motile gametes of sponges

(c) motile gametes of Hydra

(d) non-motile gametes of Penicillium

26.Reproduction can be defined as:

(a) a biological process

(b) a cyclical process involving birth, growth, and death

(c) a process that ensures the continuity of species

(d) All of the above

27. In humans, the union of a sperm and an egg occurs in the:

(a) Ovary (b) Uterus (c) Cervix (d) Fallopian tube

28. Which of the following is an example of external fertilization?

(a) Humans (b) Fish (c) Birds (d) Reptiles

29.Which of the following statements best describes sexual reproduction?

(a) It involves the fusion of gametes from two different individuals.

(b) It produces genetically identical offspring.

c) It is a form of asexual reproduction.

(d) None of the above.

30.Strobilanthes kunthiana is also called

(a)Neela kurinji (b) Peela kuranji c) Hara kuranji (d) Kala kuranji

31.Product of sexual reproduction generally generates:

a)Prologned dormancy

b)New genetic combination leading to variation

c)Large biomass

d)Longer viability of seeds

32.When mature anthers of are cultured in a culture medium supplemented with phytohormone named kinetin, coconut milk and plum juice, several embryos can be obtained floating inside the microsporangia. These embryos can develop into plants that are:

a)Haploid b)Diploid c)Tetraploid d)Both (A) and (B)

33.In papaya, the flowers, are:

a) Unisexual b) Bisexual c) Neuter d) Flowers are not formed

34.In oviparous individuals the fertilized egg is covered by

a) Calcareous shell b) Phosphorus cell c) Both (a) and (b) d) Hard shell

35.Improved method of grafting is:

a)Both scion and stock plants are allowed to remain intact

b) Stock and scion are given oblique cuts

c)Both (A) and (B)

d)None of the above

36.Banana is multiplied by means of:

a)Seeds b)Leaf margins c)Rhizome d)Offsets

37.Transverse binary fission occurs in

a)Euglena b)Amoeba c)Hydra d)Paramecium

38.In vegetative propagation, characters of parent plants are:

a)Changed b)Not preserved c)Preserved d)Exchanged

39..Asexual reproduction is a method of reproduction in which participation of …… takes place

a)One individual b)Two individuals c)Multi-individuals d)Meiosis

40.Common mode of reproduction in is

a) Conidia b)Buds c)Gemmules d)Zoospore

41.An example of corm is

a) Ginger b) Colocasia c) Onion d) Potato

42.Which of the following have haploid plant body in most of organisms?

a) Monera b) Fungi c) Algae and Bryophytes d) All of above

43.Clone is a group of individuals got through:

a) Self-pollination b) Cross pollination c) Vegetative propagation d) Hybridization

44.Zoospores are

a) Motile gametes b) Female motile gametes

c)Sessile gametes d)Female sessile gametes

45.In oviparous individuals' development of zygote takes place

a) Outside the body b) Inside the body

c)Inside the freshwater d) Inside the marine water

46.Which is correct about anthers. They are:

a) Haploid b) Diploid

c)Diploid as well as triploid d) Haploid, diploid and triploid

47.In grafting scion forms:

a) Shoot system b)Root system c)New plant d)Hybrid plant

48.Vegetative propagation in mint occurs by:

a)Runner b)Offset c)Rhizome d)Sucker

49.Division in a bacterial cell is carried out through

a)Multiple fission b)Binary fission c)Budding d)Plasmotomy

50.During oogenesis, each diploid oocyte produces:

a)Four functional ova

b)Two functional eggs and two polar bodies

c)Four functional polar bodies

d)One functional egg and three polar bodies

Answers

1. C) Budding in hydra
2. (b) sexual reproduction
3. (d) zygote
4. (b)sponges
5. C) Nodes of modified stem
6. C) Sexual reproduction
7. (b) Different individuals of different sex
8. (b) Juvenile phase, reproductive, senescent phase
9. (a) they are motile gametes of Chlamydomonas
10. (b) the release of eggs and sperm into water by fish
11. (b) formed by mitosis
12. (b) viviparous
13. (D) Zygote develops outside the body – Viviparous animals
14. (a) single-celled zygote
15. (b) asexual reproduction
16. (d) fertilization
17. (a) fertilization
18. (d) all of the above
19. (a) meiosis
20. (b) budding
21. (a) oviparous
22. C)efficient reproduction
23. (d) persist through their daughter cells
24. C) Both monerans and protists
25. (a) motile gametes of Chlamydomonas
26. (d) All of the above
27. (d) Fallopian tube
28. (b) Fish
29. (a) It involves the fusion of gametes from two different individuals.
30. (a) Neela kurinji
31. (b) New genetic combination leading to variations
32. (a) haploid
33. (a) unisexual
34. (a) calcareous shell
35. C) Both a and b
36. C) Rhizome
37. (d) paramecium
38. C) Preserved
39. (a) one individual
40. (a) conidia
41. (b) Colocasia
42. (c) Algae and bryophytes

43. (b) binary

43. C) Vegetative propagation
44. (a) Motile gametes
45. (a) outside the body
46. (a) Haploid
47. (a) shoot system
48. C) Rhizome
49.
50. (b) two functional eggs and two polar bodies

Explanation

1.c) Budding in hydra is an example of asexual reproduction, as new individuals are formed from the parent organism through the process of budding, without the involvement of gametes or fertilization.

2. b) The menstrual cycle in humans is an example of sexual reproduction because it involves the production and fusion of gametes (egg and sperm cells) from two separate individuals, leading to the formation of a zygote.

3. d) sexual reproduction, the genetic material from two parents combines to form a zygote, which is a diploid cell containing two sets of chromosomes.

4.b) Sponges commonly reproduce through gemmule formation, which involves the formation of specialized cells (gemmules) that can grow into new individuals under favourable conditions.

5.c) In potatoes, dahlias, ginger, and bananas, new plantlets typically originate from nodes of modified stem structures called tubers, which can produce buds that grow into new plants.

6.c) Organisms may switch from asexual to sexual reproduction under stressful conditions because sexual reproduction produces individuals with new combinations of recombined chromosomes, which can increase genetic diversity and enhance the species' ability to adapt to changing environments.

7.b) In sexual reproduction, male and female gametes are formed by different individuals of opposite sexes, such as in the case of animals or plants with separate male and female individuals.

8.b) The correct sequence of phases in an organism's life cycle is juvenile phase → reproductive phase → senescent phase.

9. a) Zoospores are gametes produced by some organisms, such as certain types of algae and water Molds.

10. b)fertilization occurs when the release of eggs and sperm by aquatic organisms into the surrounding water allows the gametes to meet and fuse outside of the body.

11. b)zygote contains two sets of chromosomes and is formed by the fusion of gametes during sexual reproduction.

12.b) Viviparous individuals have a higher chance of survival for their young ones because they can provide them with nutrients and protection within their bodies before giving birth, whereas oviparous individuals lay eggs that may be vulnerable to predation or environmental hazards.

13.D) Zygote develops outside the body is an incorrect pair, as viviparous animals carry their developing embryos inside their bodies until birth.

14. a)The beginning of life in sexually reproducing organisms typically involves the formation of a single-celled zygote, which results from the fusion of gametes from two separate individuals.

15 b) Asexual reproduction is the only type of reproduction in which two genetically identical daughter cells are produced.

16 d) is not a method of asexual reproduction, as it involves the fusion of gametes from two separate individuals.

17. a)The process in which male and female gametes fuse to form a zygote is called fertilization.

18.D) The ovaries of the female reproductive system produce and store eggs, secrete hormones, and transport eggs to the uterus.

19. a)The process of formation of gametes in organisms is called meiosis, which involves the division of cells to produce gametes with half the number of chromosomes as the parent cell.

20.b) Budding is not a method of sexual reproduction, as it involves the formation of a new individual from a portion of the parent organism without the involvement of gametes or fertilization.

21. a) The process of development of an embryo outside the body of the mother is called oviparous, which is common in animals that lay eggs.

22.The advantage of asexual reproduction in organisms is © efficient reproduction. Asexual reproduction does not require the production of gametes or the involvement of two individuals, thus making the process faster and more efficient. However, it does not result in genetic variation or increased genetic diversity as seen in sexual reproduction.

23.Single-celled animals have been referred to as immortal due to their ability to (d) persist through their daughter cells. Single-celled organisms, such as bacteria and protists, are able to divide and produce daughter cells indefinitely, as long as the environmental conditions are favourable for their survival.

24. Cell division serves as the primary mode of reproduction in © both monerans and protists. Monerans are unicellular organisms, such as bacteria, that reproduce asexually by binary fission. Protists are also unicellular organisms, but they can reproduce asexually by various methods, such as binary fission, multiple fission, and budding.

25.Zoospores are (a) motile gametes of Chlamydomonas. Zoospores are a type of reproductive cell found in some algae and fungi. They are motile and have flagella that allow them to swim in search of a suitable environment for growth and development. Chlamydomonas is a genus of unicellular green algae that produces zoospores as part of its life cycle.

26.Reproduction can be defined as (d) all of the above. Reproduction is a biological process that involves the production of new individuals of the same species. It is a cyclical process involving birth, growth, and death, and it ensures the continuity of species.

27.In humans, the union of a sperm and an egg occurs in the (d) Fallopian tube. The Fallopian tubes, also known as oviducts, are a pair of tubes that connect the ovaries to the uterus in females. The union of a sperm and an egg, known as fertilization, usually occurs in the Fallopian tube.

28.An example of external fertilization is (b) fish. External fertilization occurs when the fusion of gametes occurs outside the body of the organism. Fish reproduce through external fertilization, where the male releases sperm into the water and the female releases eggs. The eggs are then fertilized by the sperm in the water.

29.Sexual reproduction involves the fusion of gametes from two different individuals, making (a) the best description. Sexual reproduction involves the production of gametes by males and females, which fuse during fertilization to form a zygote. This process results in genetic diversity and variation among offspring, unlike asexual reproduction.

30.Strobilanthes kunthiana is also called (a) Neelakurinji. Strobilanthes kunthiana, also known as Neelakurinji, is a shrub that is native to the Western Ghats of India. It is known for its mass flowering that occurs once every 12 years, covering the hills in a blue-purple hue.

31. Sexual reproduction involves the fusion of gametes (sperm and egg) from two different individuals, resulting in a new combination of genes in the offspring. This leads to genetic variation, which is important for adaptation and evolution.

32. Haploid

The culture of mature anthers in a nutrient medium is called anther culture and is used to produce haploid plants. The phytohormone kinetin, coconut milk and plum juice are added to the culture medium to stimulate the development of haploid embryos from the microspores inside the anthers.

33. (a)Bisexual

Papaya flowers are typically bisexual, meaning they have both male and female reproductive structures. The male structures are the stamens, which produce the pollen, and the female structure is the pistil, which contains the ovary and the stigma.

34.In oviparous individuals the fertilized egg is covered by: (a)Calcareous shell

Oviparous animals lay eggs outside the body where the embryo develops and hatches. In many species, including birds, reptiles, and some insects, the fertilized egg is covered by a hard, calcareous shell that protects the developing embryo from damage and dehydration and allows for gas exchange with the external environment.

35.(a)Stock and scion are given oblique cuts

Grafting is a horticultural technique used to propagate plants, where a part of one plant (the scion) is joined to another plant (the stock) to form a single, composite plant. The improved method of grafting involves making oblique cuts on both the stock and the scion to create a larger contact area between the two tissues. This improves the success rate of the graft and allows for better integration of the two tissues.

36. (a)Offsets Bananas are propagated asexually, meaning they are not grown from seeds. One common method of propagation is through offsets, which are small plantlets that develop at the base of the parent plant. These can be separated and replanted to produce new banana plants that are genetically identical to the parent plant. Other methods of asexual propagation include tissue culture and division of rhizomes.

37.d) Paramecium. Transverse binary fission is a type of asexual reproduction that occurs in certain organisms, such as bacteria and protozoa. In Paramecium, a ciliate protozoan, the transverse binary fission is a process in which the cell divides into two daughter cells transversely, i.e., perpendicular to the longitudinal axis of the body. During this process, the macronucleus undergoes mitosis and cytokinesis to form two nuclei, and the cell divides into two identical daughter cells.

38.c) Preserved.

Vegetative propagation is a type of asexual reproduction in plants in which new individuals are formed from vegetative parts of the parent plant, such as stem, roots, or leaves. The offspring produced through vegetative propagation are genetically identical to the parent plant, and hence the characters of the parent plant are preserved in the offspring. This is because vegetative propagation does not involve the fusion of gametes, and the offspring are produced by mitosis.

39.a) One individual.

Asexual reproduction is a method of reproduction in which a single individual gives rise to offspring without the involvement of gametes or fertilization. In asexual reproduction, the offspring are genetically identical to the parent, as they are produced by mitosis. Examples of asexual reproduction in plants include vegetative propagation, budding, fragmentation, and spore formation, whereas in animals, examples include binary fission, budding, and regeneration.

40.Common mode of reproduction in is: a) Conidia.

Conidia are a type of asexual spores produced by fungi, lichens, and some algae, as a means of asexual reproduction. Conidia are formed by the fragmentation of specialized cells called conidiophores, and they are dispersed by air or water currents. Conidia can germinate and produce new individuals without the need for fertilization or fusion of gametes.

41.An example of corm is: b) Colocasia.

A corm is a modified underground stem that stores food and nutrients for the plant. Corms are similar to bulbs, but they lack the fleshy leaves or scales that cover bulbs. Corms are found in some plants, such as Colocasia (elephant ear), Gladiolus, and Crocus. Corms give rise to new plants through asexual reproduction, as they produce buds that develop into new plants.

42.c) Algae and Bryophytes.

Algae and bryophytes are two groups of nonvascular plants that have a haploid-dominant life cycle. In these organisms, the gametophyte (haploid) generation is the dominant phase of the life cycle, and the sporophyte (diploid) generation is reduced and dependent on the gametophyte. This is in contrast to vascular plants, where the sporophyte is the dominant phase of the life cycle. In algae and bryophytes, the haploid plant body produces gametes by mitosis, which then fuse to form a diploid zygote. The zygote undergoes meiosis to form haploid spores, which develop into the gametophyte

48.Vegetative propagation in mint occurs by:

c) Rhizome

Explanation: Vegetative propagation refers to asexual reproduction in plants, where new individuals arise from vegetative structures such as stems, roots, or leaves, rather than from sexual reproduction involving flowers and seeds. Mint plants can reproduce vegetatively by spreading through underground stems called rhizomes, which produce new shoots and roots.

49.Division in a bacterial cell is carried out through

b) Binary fission

Explanation: Bacteria reproduce asexually through a process called binary fission, in which the parent cell divides into two daughter cells. During binary fission, the bacterial chromosome is replicated, and the two copies separate to opposite ends of the cell. The cell then elongates, and a new cell wall is formed between the two chromosomes, resulting in two identical daughter cells.

50.During oogenesis, each diploid oocyte produces:

b) Two functional eggs and two polar bodies

Explanation: Oogenesis is the process by which female gametes (eggs) are produced. Each diploid oocyte (the immature egg cell) undergoes meiosis to produce one functional egg cell and three non-functional polar bodies. The egg cell contains the genetic material needed for fertilization, while the polar bodies contain excess genetic material that is discarded. Therefore, only one functional egg cell is produced from each oocyte.