Biology · Structure and Function in Living Organisms · Reproduction in Living Organisms

Methods of Reproduction in Living Organisms

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Multiple choice questions — 84 questions

1 What distinguishes reproduction from the other vital functions?

(A) It is necessary for the life of the individual

(B) It secures the other vital functions

(C) It secures the life of individuals

(D) It ensures the survival of the species

---

2 Klinefelter's syndrome is a genetic condition that appears only in human males due to an extra sex chromosome (X) above the normal number, which leads to atrophy of the sex organs.
Which of the following is correct about this condition?

(A) The person dies because his reproductive system does not develop completely

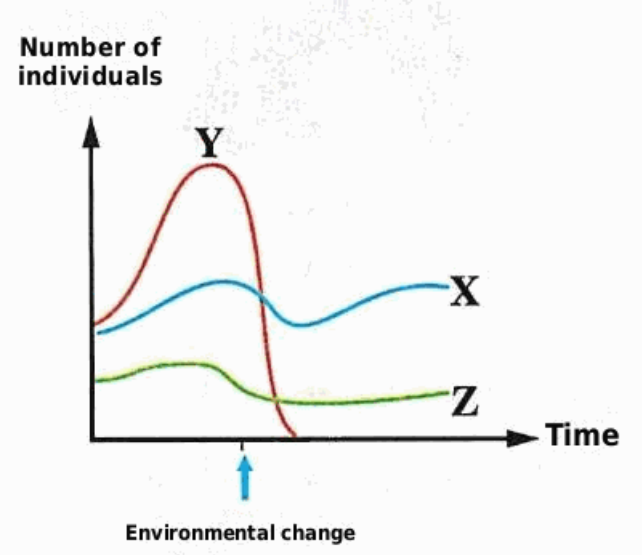
(B) His life continues

(C) He passes the trait to his male children

(D) All his children are normal

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3 The opposite graph represents three types of living organisms (X), (Y), (Z) living in the same environmental conditions at the same time:
Which of these types failed to reproduce after the environmental change?

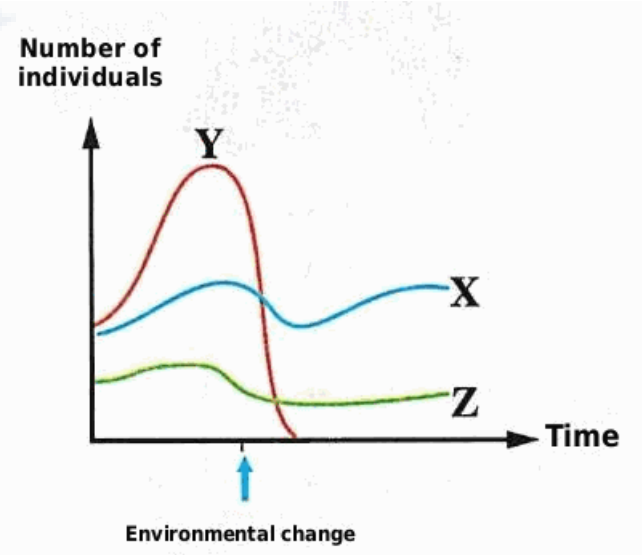


(A) X (B) Y (C) Z (D) Z , X

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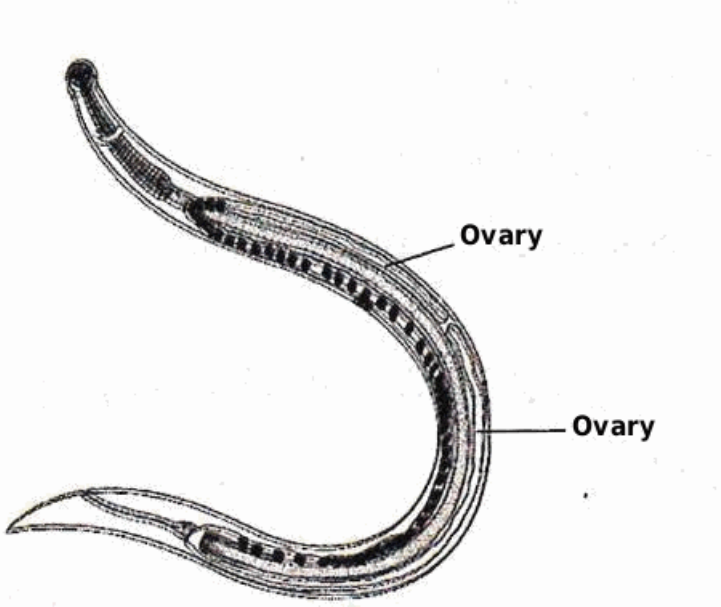
4 The opposite graph represents three types of living organisms (X), (Y), (Z) living in the same environmental conditions at the same time:

Which of these types is the most able to reproduce after the environmental change?



(A) (X) only (B) (Z) only (C) (Z) , (Y) (D) (Y) , (X)

5 The opposite diagram shows one of the parasitic worms known as "Ancylostoma", which infects humans and lives in the small intestine. Which of the following is correct about the two ovaries of the Ancylostoma worm compared to the two ovaries of a female mouse?



(A) They produce the same number of ova

(B) Their activity in producing ova is less than that of the female mouse

(C) They do not contribute to producing new offspring

(D) Their activity in producing ova is higher than that of the female mouse

6 From the two opposite figures, which of the following choices expresses what may happen to each of (X) and (Y) respectively?



(A) Meiotic division / mitotic division

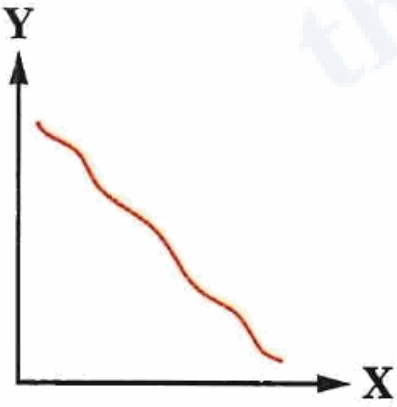
(B) Mitotic division / meiotic division

(C) Reproduction by regeneration / replacement of the amputated part

(D) Replacement of the amputated part / reproduction by regeneration

---

7 From the opposite graph, which of the following may represent (X) and (Y) respectively?



(A) Risks / production of new individuals

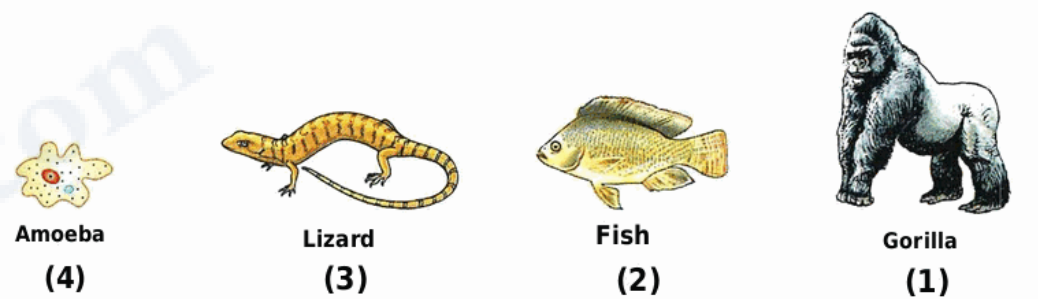
(B) Advancement of the organism / number of new individuals

(C) Advancement of the organism / parental care

(D) Risks / size of the organism

---

8 Which of the following represents the correct order of the following organisms from the least able to the most able to reproduce?



(A) (1) → (2) → (4) → (3)
(B) (2) → (4) → (3) → (1)
(C) (1) → (2) → (3) → (4)
(D) (1) → (3) → (2) → (4)

9 Which of the following is one of the advantages of asexual reproduction?

(A) Genetic variation among the individuals of the same species
(B) The ability of the offspring to adapt quickly to environmental changes
(C) It requires parental care for the produced individuals
(D) Increasing the numbers of produced individuals in short periods of time

10 Mitotic division leads to ..... of the number of chromosomes in the produced cells.

(A) constancy (B) reduction (C) doubling (D) variation

11 Which of the following organisms forms a thick wall around its body in unsuitable conditions?

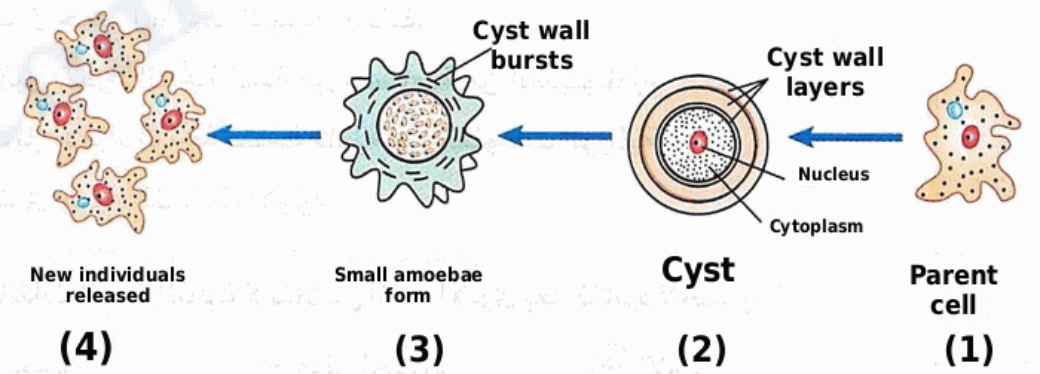
(A) Hydra (B) Yeast fungus (C) Amoeba (D) Sponge

12 Binary fission in bacteria is a division that is .....

(A) equal for the genetic material and unequal for the cytoplasm
(B) equal for both the genetic material and the cytoplasm
(C) unequal for the genetic material and equal for the cytoplasm
(D) unequal for both the genetic material and the cytoplasm

13 The following figure shows some stages of one form of asexual reproduction in amoeba. Study it, then answer:

What is the main factor for the change from (2) to (3)?

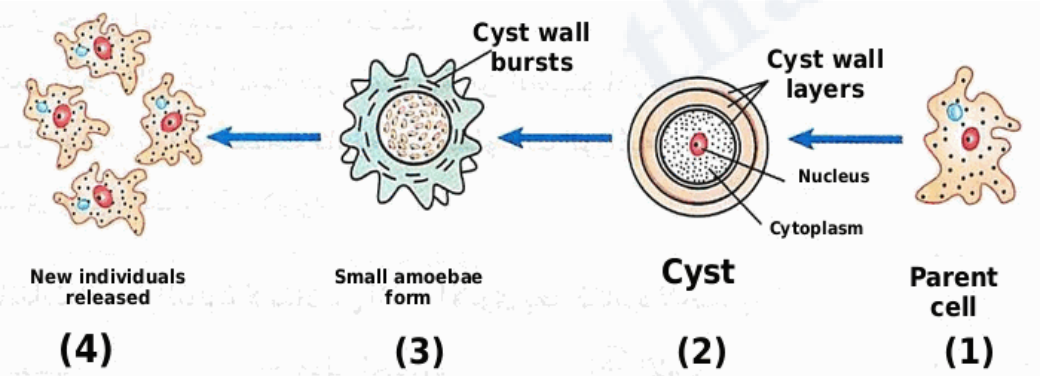


(A) Scarcity of water
(B) Lack of oxygen
(C) Lack of nutrients
(D) Availability of water

---

14 The following figure shows some stages of one form of asexual reproduction in amoeba. Study it, then answer:

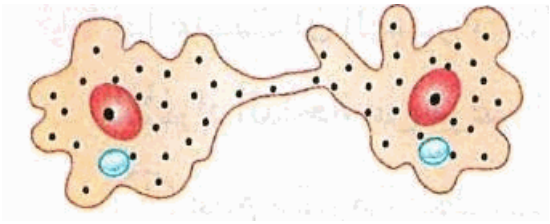
What is the similarity between (1) and (4)?



(A) The chromosome number
(B) The size of the produced cells
(C) Genetic variation
(D) Inability to resist environmental conditions

---

15 Which of the following is NOT one of the characteristics of the reproduction shown in front of you?



(A) It depends on mitotic division

(B) It takes place in all environmental conditions

(C) The number of chromosomes is equal in the cells produced by reproduction

(D) The contents of the parent individual are distributed to the produced individuals

---

16 In which form of asexual reproduction does the parent individual disappear?

(A) Parthenogenesis (B) Binary fission (C) Spore formation (D) Budding

---

17 What is the difference between asexual reproduction in amoeba and in yeast fungus?

(A) The occurrence of nuclear division (B) The type of division

(C) The occurrence of cytoplasmic division (D) The form of reproduction

---

18 Which of the following pairs is NOT correct about the organism and its form of reproduction?

(A) Bacteria – binary fission (B) Sponge – budding

(C) Hydra – regeneration (D) Shrimp – regeneration

---

19 Which of the following is correct about the honey bee?

(A) The number of chromosomes differs between the male and female gametes

(B) All males have identical genetic traits

(C) The number of chromosomes in the queen differs from that of the worker

(D) The type of division differs for producing the male and female gametes

---

20 Which of the following is correct about repeated binary fission?

(A) It takes place in all different environmental conditions

(B) The produced individuals receive unequal amounts of cytoplasm

(C) The produced individuals receive a complete copy of the genetic information

(D) It takes place in all primitive organisms

21 In which of the following organisms does the parent individual NOT vanish after reproducing asexually?

(A) Paramecium (B) Yeast fungus (C) Amoeba (D) Bacteria

22 In unicellular organisms, in which of the following does reproduction by budding differ from reproduction by binary fission?

(A) The number of new cells

(B) The method of reproduction

(C) The constancy of the number of chromosome sets in the produced cells

(D) The type of division

23 Which of the following must be present to complete reproduction by budding in hydra?

(A) Interstitial cells (B) The central disc

(C) The chitinous cyst (D) Gametes

24 If you know that hydra reproduces asexually in pure water and sexually in polluted water, which of the following is a similarity between the individuals produced by the two types of reproduction?

(A) Inability to resist environmental conditions

(B) The number of chromosome sets

(C) The type of division

(D) Genetic variation

25 Which of the following pairs differ from each other in their chromosome sets?

(A) Honey bee males and bread mould spores

(B) Females of both honey bee and aphid

(C) Aphid males and honey bee workers

(D) Males of both honey bee and aphid

---

26 Some amphibians can replace an amputated organ by regeneration, while regeneration in higher vertebrates is limited to healing wounds in some tissues. What is the reason for that?

(A) The rate of mitotic cell division in amphibians is higher than in higher vertebrates

(B) The rate of meiotic cell division in amphibians is higher than in higher vertebrates

(C) The ability of some amphibian cells to divide mitotically and differentiate

(D) The ability of some cells of higher vertebrates to divide mitotically and differentiate

---

27 Reproduction by regeneration takes place in planaria and hydra if each of them is cut respectively .....

(A) longitudinally only / transversely only

(B) transversely or longitudinally / longitudinally only

(C) transversely or longitudinally / transversely or longitudinally

(D) transversely only / longitudinally only

---

28 The opposite figure represents regeneration in one of the living organisms. What is the purpose of regeneration in this organism?



(A) Healing the wound of (X)

(B) Decomposition of (Y)

(C) Reproduction of (Y)

(D) Reproduction of (X)

---

29 Which of the following organisms reproduces by regeneration?

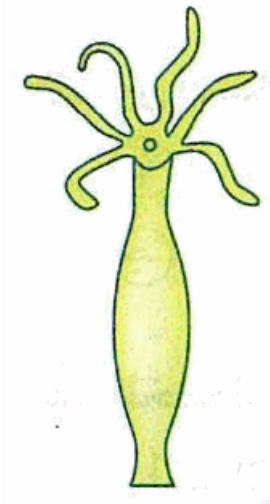
(A) Shrimp (B) Frog (C) Salamander (D) Sponge

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30 Which of the following represents the number of chromosome sets for the stages of natural parthenogenesis in aphids?

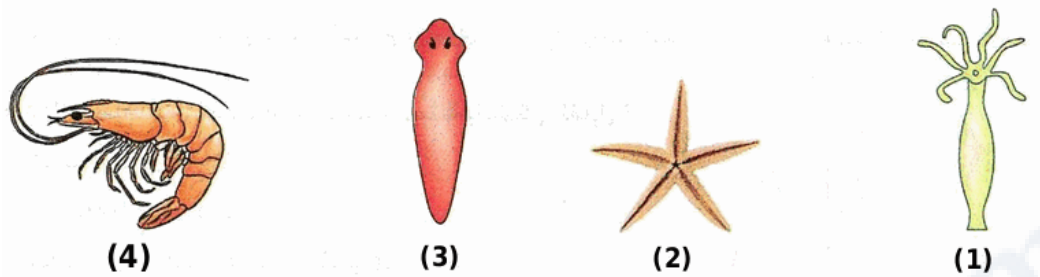
(A) (2n) → (2n) → (2n)
(B) (2n) → (n) → (n)
(C) (2n) → (n) → (2n)
(D) (2n) → (2n) → (n)

31 When the organism shown in front of you is cut longitudinally into two parts, what happens if they are placed in conditions suitable for reproduction?



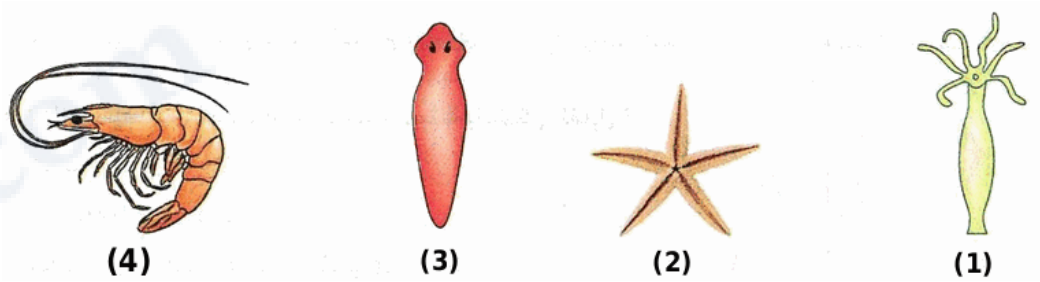
(A) Two genetically identical individuals are produced
(B) No reproduction by regeneration happens for this organism
(C) Two genetically different individuals are produced
(D) This organism dies

32 The following figures show four different living organisms in which regeneration takes place: Which of these organisms is the least able to regenerate?



(A) (1)
(B) (2)
(C) (3)
(D) (4)

33 The following figures show four different living organisms in which regeneration takes place: Which of these organisms are the most able to regenerate?



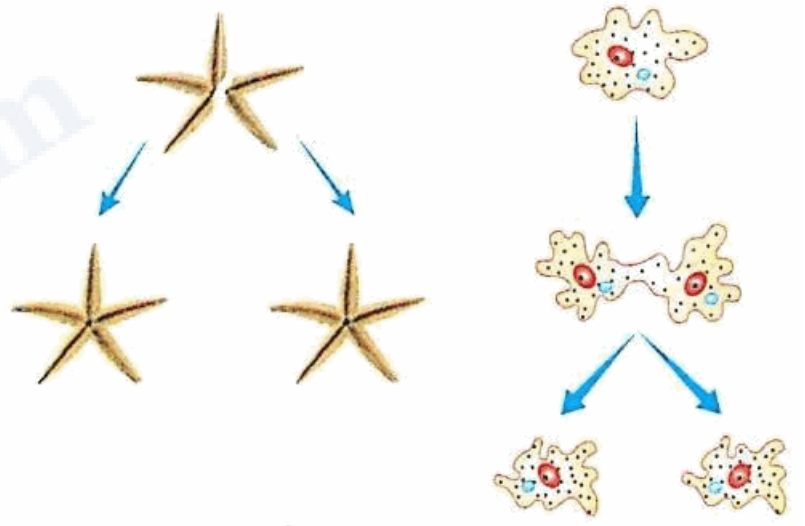
(A) (1) only (B) (2) only (C) (1) , (3) (D) (2) , (4)

34 When all the arms of the starfish shown in the picture are cut so that each arm contains a part of the central disc, and then they are thrown into sea water, what is the maximum number of starfish formed within a year?



(A) Zero (B) 5 (C) 7 (D) 10

35 Which of the following is a difference between the two processes shown in front of you?



(A) The type of reproduction
(B) The form of reproduction
(C) The biological cost
(D) The type of cell division

36 What is the aim of regeneration in the seagull?

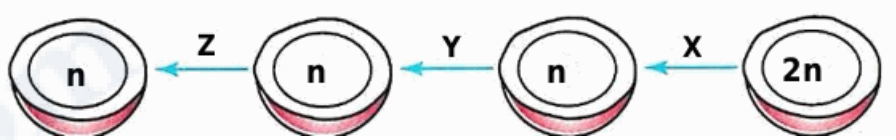
(A) Asexual reproduction
(B) Replacing amputated parts
(C) Healing wounds
(D) Sexual reproduction

37 From the opposite figure, how many complete starfish are produced?



(A) 1
(B) 3
(C) 4
(D) 5

38 The opposite chart shows the stages of reproduction in one of the organisms you studied. What do the processes (X), (Y), (Z) represent respectively?



(A) Meiotic division / tissue culture / parthenogenesis

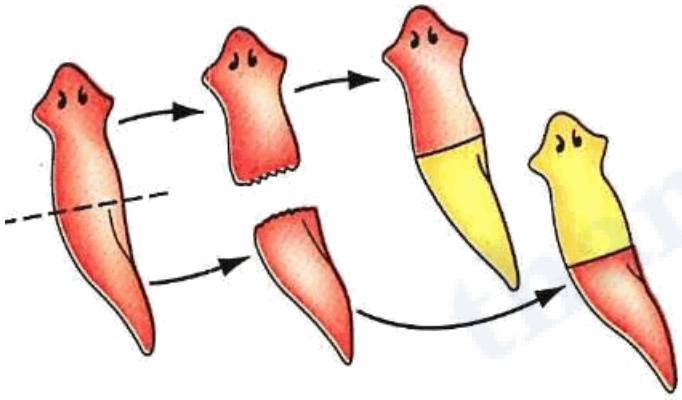
(B) Fertilization / mitotic division / mitotic division

(C) Meiotic division / parthenogenesis / mitotic division

(D) Tissue culture / mitotic division / meiotic division

---

39 What type of division does the process represented in the opposite figure depend on?



(A) Meiotic division only

(B) Mitotic division only

(C) Meiotic division, then mitotic division

(D) Mitotic division, then meiotic division

---

40 Which of the following statements is NOT correct?

(A) All fungi reproduce by spores

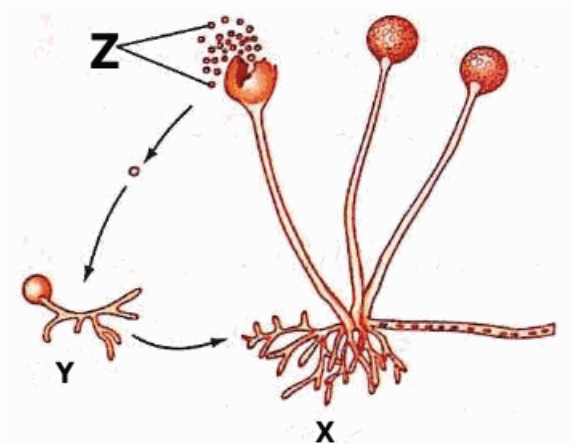
(B) Reproduction by spores is one of the best forms of asexual reproduction

(C) The spore is a modified cell

(D) Spores germinate in suitable conditions

---

41 The opposite figure shows one of the methods of reproduction in bread mould fungus:
Which of the following statements is correct?



(A) The numbers of chromosomes in the nuclei of structures (X) and (Y) are identical

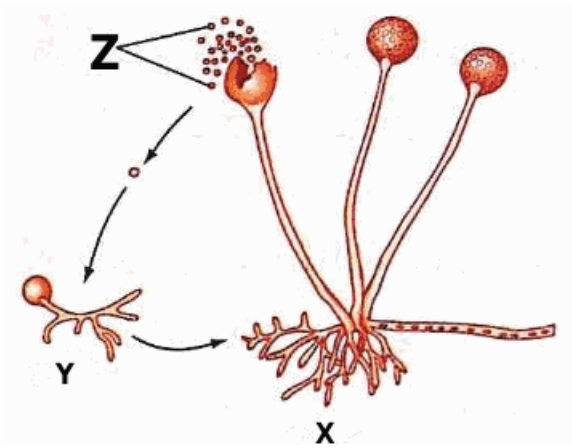
(B) The numbers of chromosomes in the nuclei of structures (X) and (Y) are different

(C) The number of chromosomes in the nuclei of structure (X) is double that in the nuclei of structure (Y)

(D) The number of chromosomes in the nuclei of structure (X) is half that in the nuclei of structure (Y)

---

42 The opposite figure shows one of the methods of reproduction in bread mould fungus:
What happens when (Z) falls on a piece of dry bread?



(A) It germinates and forms a new individual

(B) It does not germinate and dies

(C) Its thick wall bursts

(D) It neither germinates nor dies

---

43 Which of the following is NOT one of the characteristics of parthenogenesis in the honey bee?

(A) It takes place through one individual

(B) The produced individuals are haploid

(C) It takes place through the female gametes

(D) The produced individuals are genetically identical to the mother

---

44 If we assume that aphids reproduce sexually and asexually alternately and regularly, and assuming the numbers of individuals produced by sexual and asexual reproduction are equal, what is the probable ratio of the number of males to the number of females respectively?

(A) 1 : 1 (B) 1 : 2 (C) 1 : 3 (D) 1 : 4

---

45 Which of the following individuals CANNOT reproduce sexually?

(A) Honey bee queen (B) Honey bee male

(C) Honey bee worker (D) Aphid female

---

46 Which of the following organisms produces its gametes by both types of division?

(A) Honey bee males (B) Honey bee queens

(C) Aphid females (D) Aphid males

---

47 Which of the following represents the correct order of the divisions that take place to form honey bee males?

(A) Mitotic → mitotic (B) Mitotic → meiotic

(C) Meiotic → mitotic (D) Meiotic → meiotic

---

48 Which of the following is haploid in the honey bee?

(A) Wing cells of workers and sperms of males

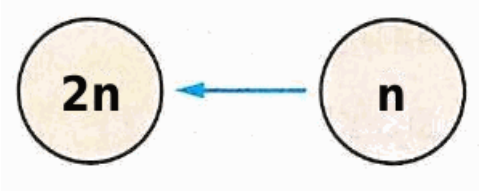
(B) Wing cells of both queens and males

(C) Wing cells of males and ova of queens

(D) Wing cells of both workers and queens

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49 Which of the following does NOT lead to the process shown in the opposite figure?



(A) Heat shock
(B) Fertilization
(C) Normal growth
(D) Pricking with needles

50 In what is the honey bee similar to the aphid?

(A) The females are diploid
(B) The individuals produced by parthenogenesis have the same chromosome set
(C) Sexual reproduction produces the same sex
(D) Parthenogenesis produces the same sex

51 Which of the following forms of asexual reproduction takes place through the female gamete?

(A) Reproduction by spores
(B) Parthenogenesis
(C) Tissue culture
(D) Budding

52 Which of the following females carry all the genetic traits of the mother?

(A) Honey bee queens
(B) Honey bee workers
(C) Aphid females produced by parthenogenesis
(D) Aphid females produced by sexual reproduction

53 Which of the following statements is NOT correct for the honey bee?

(A) All individuals produced by parthenogenesis reproduce sexually only
(B) All produced individuals reproduce asexually by parthenogenesis
(C) All individuals produced by parthenogenesis reproduce to give females only
(D) Parthenogenesis and sexual reproduction can take place in the same generation

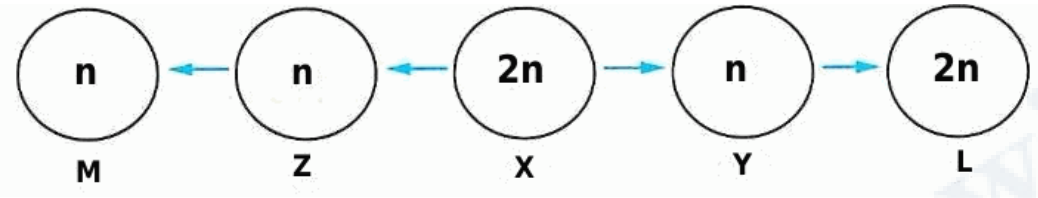
54 Which of the following forms of asexual reproduction depends on meiotic division?

(A) Binary fission in paramecium
(B) Tissue culture of the carrot plant
(C) Parthenogenesis in the honey bee
(D) Parthenogenesis in aphids

55 Which of the following represents the ratio between the number of chromosomes in the body cells of aphid males and in the body cells of aphid females?

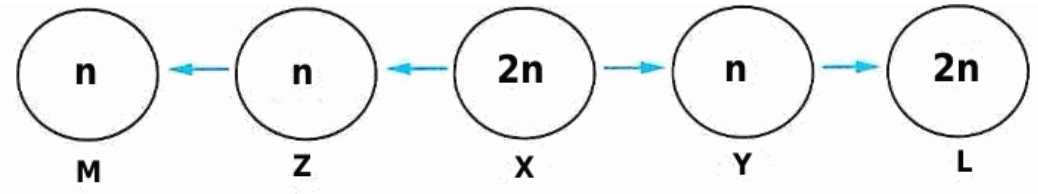
(A) 4 : 1
(B) 2 : 1
(C) 1 : 1
(D) 1 : 2

56 In the opposite chart, if you know that (X) represents the honey bee, answer:
What does organism (X) represent?



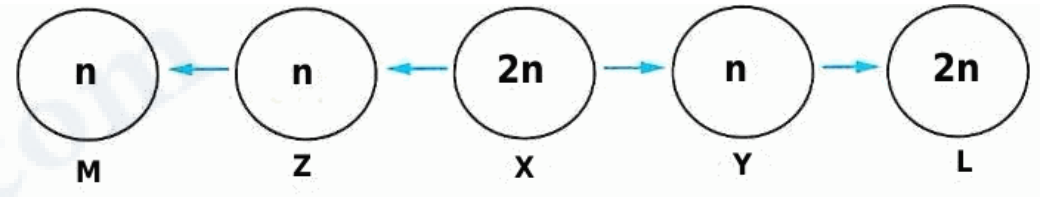
(A) A queen only
(B) A male only
(C) A worker or a queen
(D) A worker or a male

57 In the opposite chart, if you know that (X) represents the honey bee, answer:
What does each of (Y) and (Z) represent?



(A) Sperms only
(B) Ova only
(C) Sperms and ova respectively
(D) Ova and sperms respectively

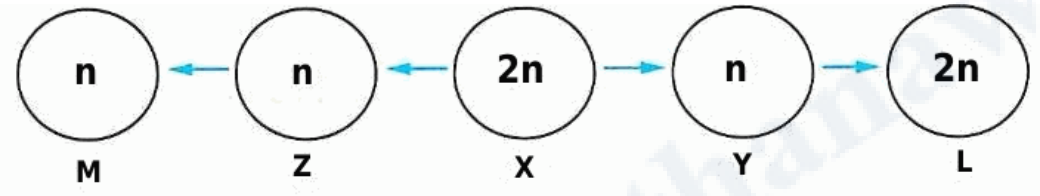
58 In the opposite chart, if you know that (X) represents the honey bee, answer:
What type of reproduction produces each of (L) and (M) respectively?



(A) Asexual by regeneration / sexual by gametes
(B) Asexual by parthenogenesis / sexual by gametes
(C) Sexual by gametes / asexual by parthenogenesis
(D) Sexual by gametes / asexual by regeneration

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59 In the opposite chart, if you know that (X) represents the honey bee, answer:
What is the sex of individuals (L) and (M)?



(A) Males only
(B) Females only
(C) Males and females
(D) Females and males respectively

---

60 Which of the following happens when an enucleated tobacco plant cell is placed in coconut milk?

(A) The cell is activated and divides mitotically
(B) The cell is activated and divides meiotically
(C) The cell dies within a short period
(D) The cell stays alive and does not divide

---

61 Why does the aphid female resort to parthenogenesis although it can reproduce sexually?

(A) To increase the number of females
(B) To increase the number of males
(C) To increase the number of both sexes
(D) To keep the number of chromosomes constant

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62 What factor determines sex in the honey bee?

(A) The type of food given to the larvae

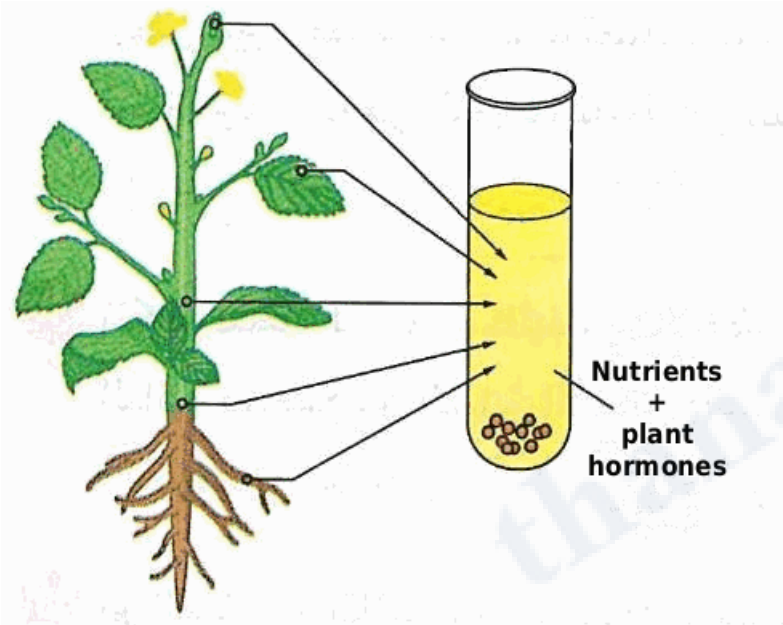
(B) The mating season

(C) The number of chromosomes in the produced individuals

(D) The number of ova laid by the queen

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63 What is the scientific basis used in the technique shown in the opposite figure?



(A) Asexual reproduction causes desired genetic variation in the produced plants

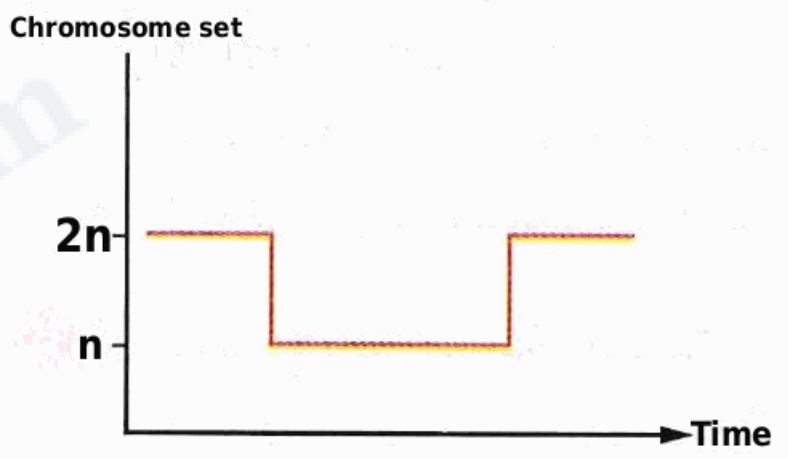
(B) A complete organ can be separated from a plant and cultured to get a plant of the same species

(C) An adult cell can divide and differentiate again after its genetic material is reduced

(D) Cells with complete genetic information can produce a complete plant by mitotic division

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64 Which of the following forms of asexual reproduction can the opposite graph represent?



(A) Natural parthenogenesis
(B) Artificial parthenogenesis
(C) Tissue culture
(D) Budding

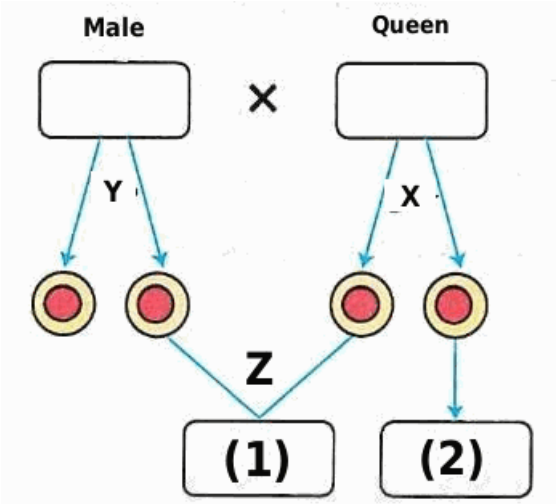
65 If you know that the number of chromosomes in a cell from a honey bee male's wing = 2X, how many chromosomes are in the ovum of the bee queen?

(A) X (B) 2X (C) 3X (D) 4X

66 If you know that the number of chromosomes in a cell from the wing of a honey bee worker equals 32 chromosomes, what is the number of chromosomes in a cell from the queen's wing?

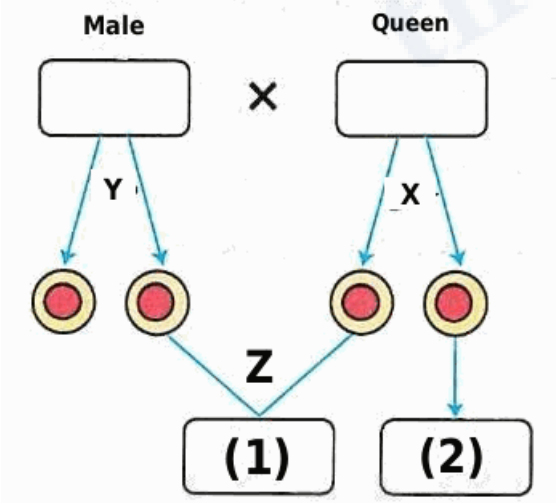
(A) 8 (B) 16 (C) 32 (D) 64

67 The opposite figure shows the reproduction process in the honey bee. Answer:
What do the letters (X) and (Y) represent respectively?



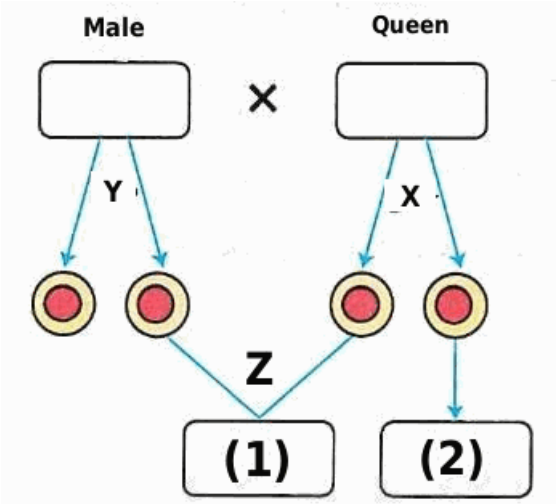
(A) Meiotic division / meiotic division
(B) Mitotic division / meiotic division
(C) Meiotic division / mitotic division
(D) Mitotic division / mitotic division

68 The opposite figure shows the reproduction process in the honey bee. Answer:
What is the chromosome set of individual number (2)?



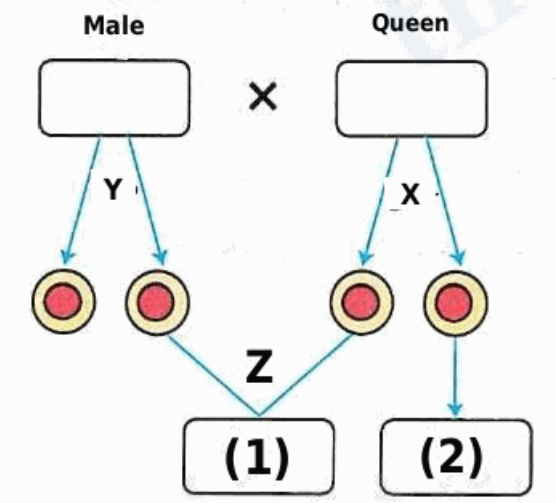
(A) n
(B) 2n
(C) 3n
(D) 4n

69 The opposite figure shows the reproduction process in the honey bee. Answer:
What type of reproduction produces individual number (1)?



(A) Sexual by gametes
(B) Sexual by conjugation
(C) Asexual by regeneration
(D) Asexual by parthenogenesis

70 The opposite figure shows the reproduction process in the honey bee. Answer:
What is the sex of the individuals produced by process (Z)?



(A) Males only
(B) Females only
(C) Males and females
(D) Males or females

71 There are types of lizards called "rainbow lizards" because of their distinctive colours. They reproduce by parthenogenesis, coming from unfertilized eggs in which chromosome doubling took place after meiotic division. What do you expect the number of chromosome sets to be in a body cell of the individuals produced from these eggs?

(A) n
(B) 2n
(C) 4n
(D) 2n + n

72 Some plants like potatoes reproduce vegetatively, where the stem is cut into parts and each part grows into a complete plant. Which of the following choices is correct about the original plant and the new plants regarding the type of reproduction and the genetic content respectively?

(A) Sexual / identical
(B) Sexual / different
(C) Asexual / identical
(D) Asexual / different

73 Which of the following statements is NOT correct for aphids?

(A) The number of females is greater than the number of males
(B) All individuals produced by parthenogenesis reproduce to give females only
(C) Some individuals produced by sexual reproduction reproduce by parthenogenesis
(D) Both types of reproduction cannot take place when producing gametes by the same type of division

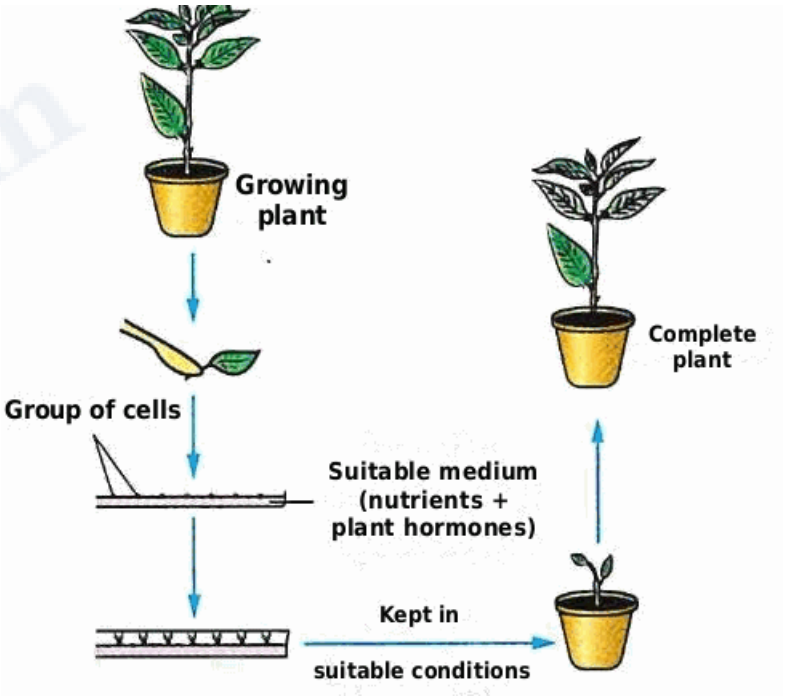
74 Which of the following is NOT correct for two cells, one from the root of a carrot plant and the other from its stem?

(A) They are equal in the number of chromosomes
(B) They are similar in the type of division
(C) They are identical in the number of chromosome sets
(D) They differ in the type of genes

75 In tissue culture, the new seedlings get from the original plant .....

(A) all the genetic traits
(B) half the genetic traits
(C) most of the genetic traits
(D) the good genetic traits

76 The opposite figure shows one of the forms of reproduction that can be used in .....



(A) producing the most common plant strains

(B) producing plants different from the original plant

(C) propagating rare plants

(D) improving the production of herbaceous plants

---

77 Honey bee females are produced from .....

(A) unfertilized worker ova

(B) unfertilized queen ova

(C) fertilized worker ova

(D) fertilized queen ova

---

78 Which of the following is correct about asexual reproduction?

(A) It takes place by the fusion of gametes

(B) It does not take place in higher plants

(C) It is accompanied by genetic variation

(D) It takes place naturally or artificially

---

79 Which of the following is one of the advantages of the tissue culture technique?

(A) Producing plants that do not form flowers

(B) Protecting some plants from extinction

(C) Producing plants whose flowers all have different colours

(D) Genetic variation of the produced plants

---

80 In sexual reproduction of the honey bee, workers are produced from the fusion of gametes that contain .....

(A) half the chromosomes of both the male and the queen

(B) all the chromosomes of the male and half the chromosomes of the queen

(C) all the chromosomes of both the male and the queen

(D) all the chromosomes of the queen and half the chromosomes of the male

---

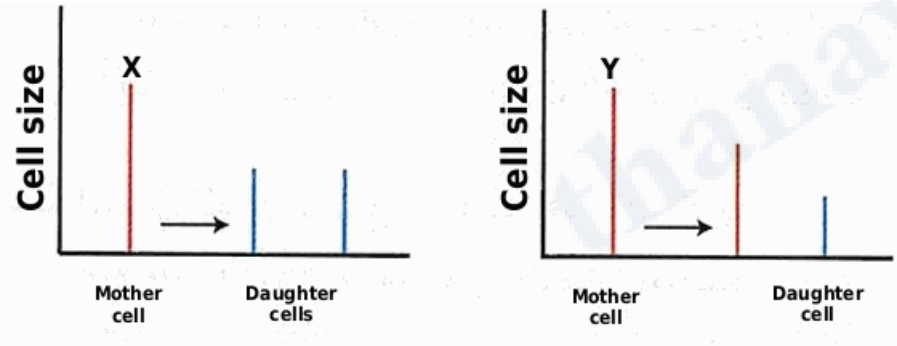
81 Which of the following is a similarity between the honey bee worker and the queen?

(A) Shape (B) Size

(C) Number of chromosomes (D) Fertility

---

82 The two opposite graphs represent two forms of asexual reproduction of two unicellular organisms (X), (Y). How do organism (X) and organism (Y) reproduce respectively?

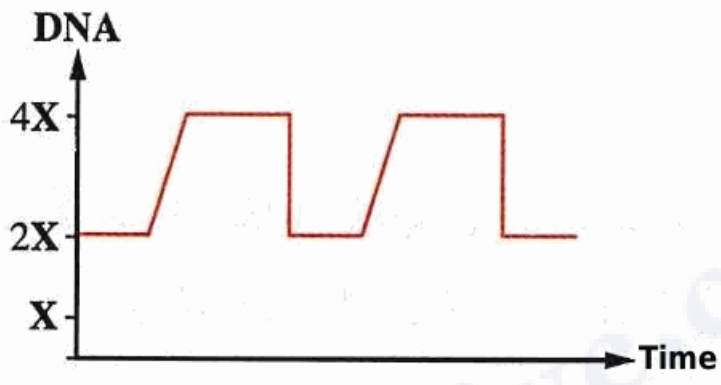


(A) By spores / by budding (B) By binary fission / by budding

(C) By budding / by binary fission (D) By budding / by spores

---

83 The opposite graph shows the change in the amount of DNA of amoeba during cell division. How many amoebae are produced by this division?



(A) One amoeba (B) Two amoebae (C) Four amoebae (D) Eight amoebae

84 Which of the following forms of asexual reproduction leads to genetic variation in the individuals produced by it?

(A) Reproduction by regeneration in hydra
(B) Binary fission in amoeba
(C) Tissue culture in carrot
(D) Parthenogenesis in the honey bee

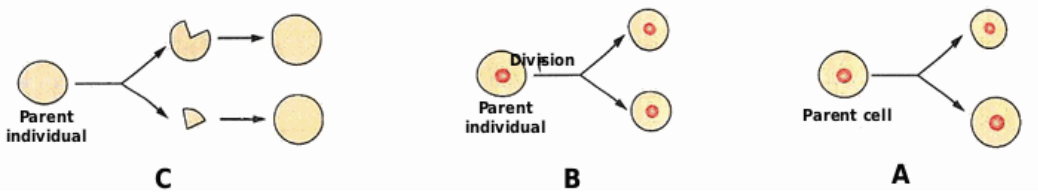
Essay questions — 7 questions

1 From the following figures:

Identify:

(1) the form of reproduction that each figure represents, with an example, explaining your answer.

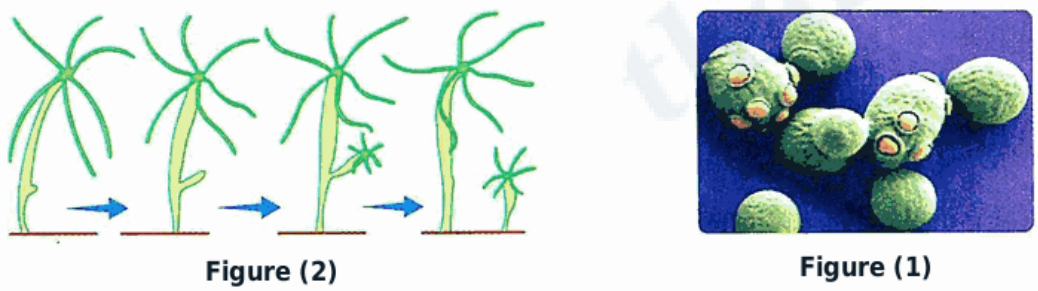
(2) a similarity and a difference between cases (A) and (B).



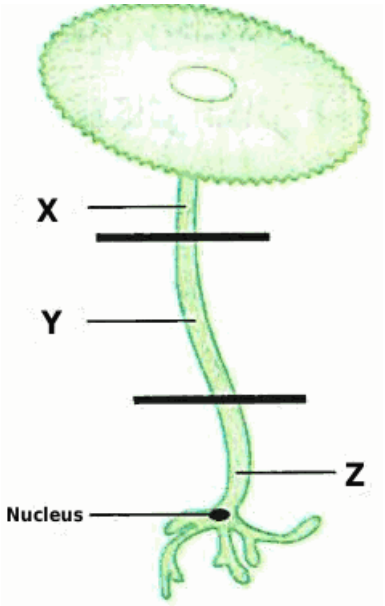
2 The following two figures represent one of the forms of asexual reproduction of two different organisms. Study them, then answer:

(1) Identify the form of asexual reproduction in both figures (1) and (2).

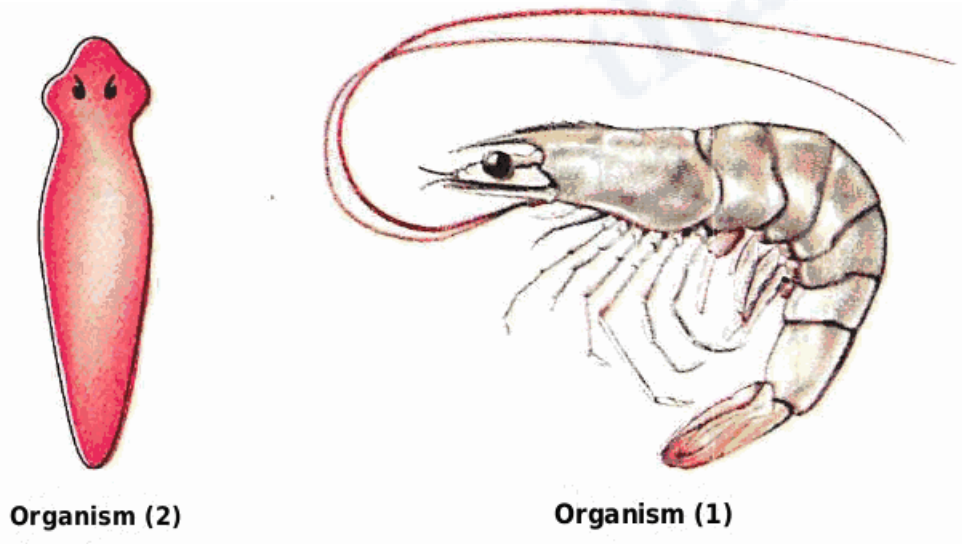
(2) What is the difference between the form of asexual reproduction in the two organisms?



3 The opposite figure shows the alga Acetabularia, a unicellular alga, cut into three parts. Which part grows to form the new individual? Explain your answer.



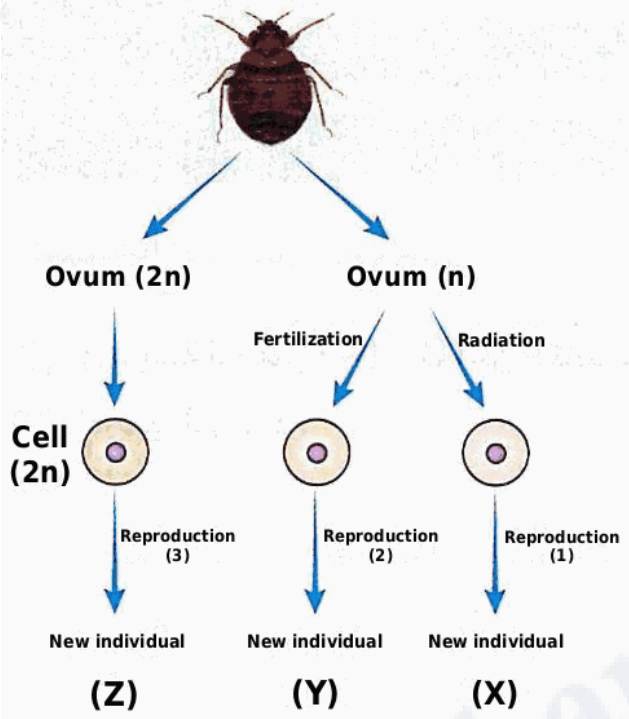
4 From the two opposite figures, what is the aim of regeneration in each of organism (1) and organism (2)?



5 The opposite figure shows the methods of reproduction of the female of one of the insects:

(1) Which of these methods are the lowest in biological cost? Explain your answer.

(2) What is the sex of insects (X), (Y), (Z)?



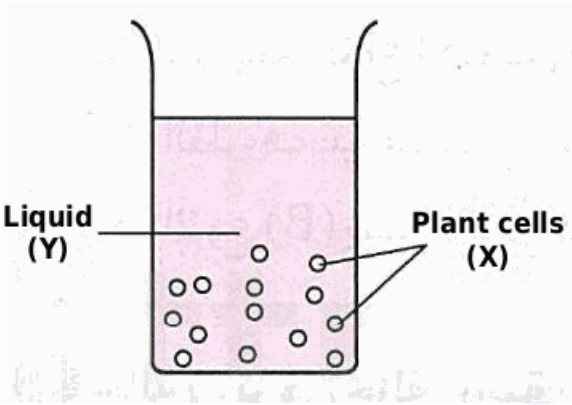
6 If activating the ova of a female mouse by radiation succeeds, will it give males, females or both? Explain your answer.

7 The opposite figure shows one of the modern techniques for facing the food problem:

(1) What is the name of this technique?

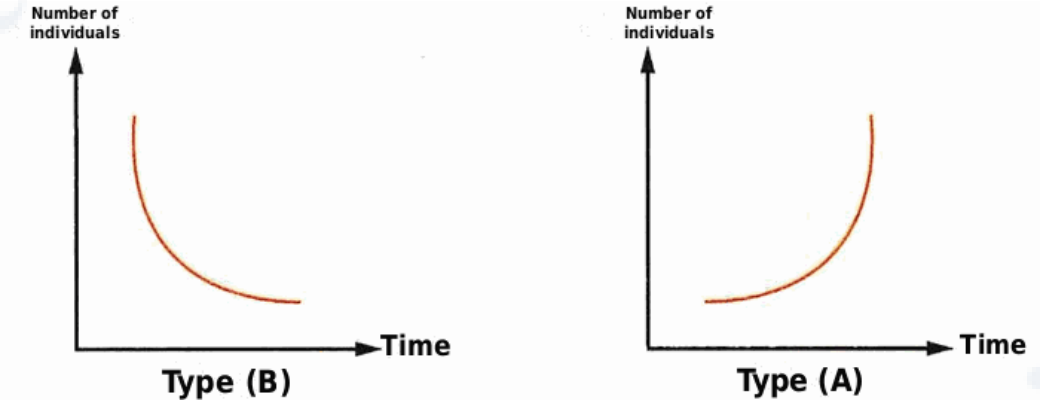
(2) Does this technique represent sexual or asexual reproduction? Why?

(3) What is the importance of liquid (Y) for the cells of plant (X)?



Past exam questions — 31 questions

1 In a study of two types (A) and (B) of living organisms in a forest, the results were obtained and represented graphically as follows. Study them, then identify: (Trial exam / June 2021)
What distinguishes type (A) from type (B)?



(A) The conditions are unsuitable for the survival of type (A)
(B) Type (B) seeks to secure the survival of the individuals of its species
(C) Type (B) produces more offspring than type (A)
(D) The conditions are suitable for the survival of type (A)

---

2 Turner's syndrome is a genetic condition that arises in the human female due to the absence of a sex chromosome (X), which leads to incomplete reproductive organs. What is the result of this condition? (1st session 2022)

(A) She dies because her reproductive organs are incomplete
(B) This condition is inherited by the next generations
(C) The Turner female continues to live
(D) She gives birth to normal children

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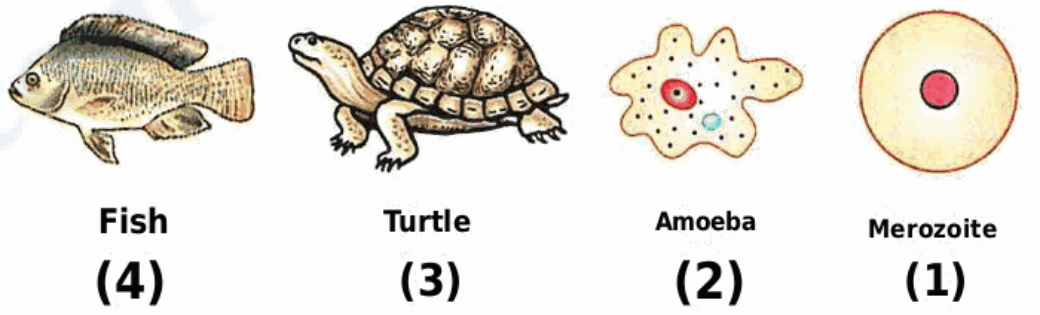
3 Why does the female water turtle lay about 200 eggs, while the female desert turtle lays 30 eggs? (Trial exam / June 2021)

(A) The method of feeding
(B) The type of reproduction
(C) The size of the risks
(D) The type of movement

---

4 Arrange the following organisms from the most able to reproduce to the least able: (1st session 2022)

(1) merozoite, (2) amoeba, (3) turtle, (4) fish.



(A) (2) , (1) , (3) , (4)
(B) (1) , (4) , (3) , (2)
(C) (2) , (1) , (4) , (3)
(D) (1) , (2) , (4) , (3)

---

5 Why does the number of offspring of the Fasciola worm, which infects the human liver, differ from the number of offspring of the earthworm found in the tunnels of agricultural soil? (Trial exam 2023, Sample exam 2025)

(A) The nature of life
(B) Parental care
(C) Life span
(D) The method of movement

---

6 What characterizes living organisms that take care of their young? (1st session 2023, Sample exam 2025)

(A) Primitive (B) Small in size (C) Short-lived (D) Advanced

---

7 Humans have a lower reproductive ability than other living organisms. Which of the following is NOT a reason for the weak reproductive ability of humans? (2nd session 2023)

(A) Advanced and large in size
(B) Reproduces sexually and is a mammal
(C) Free-living and long-lived
(D) Provides its young with protection and parental care

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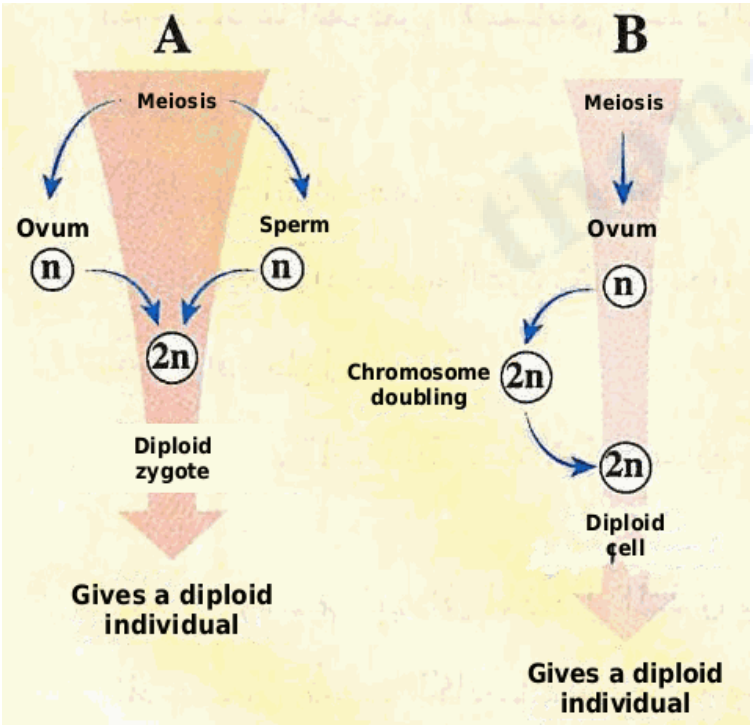
8 Aquatic organisms produce more individuals than terrestrial organisms. Why do the reproductive abilities of aquatic organisms differ from those of terrestrial organisms? (1st session 2024)

(A) Age
(B) Body size
(C) The surrounding difficulties
(D) Body complexity

9 Which of the following is NOT a reason for the ability of Bilharzia worms to reproduce more than humans? (2nd session 2024)

(A) Because they are parasites
(B) Because they are short-lived
(C) Because they are primitive
(D) Because they are not autotrophic

10 Study the opposite chart of two forms of reproduction, then deduce what distinguishes reproduction in form (A) from reproduction in form (B)? (2nd session 2024)



(A) The method of producing gametes
(B) The ability to face environmental changes
(C) The chromosome number of the cells taking part in reproduction
(D) The constancy of the genetic traits

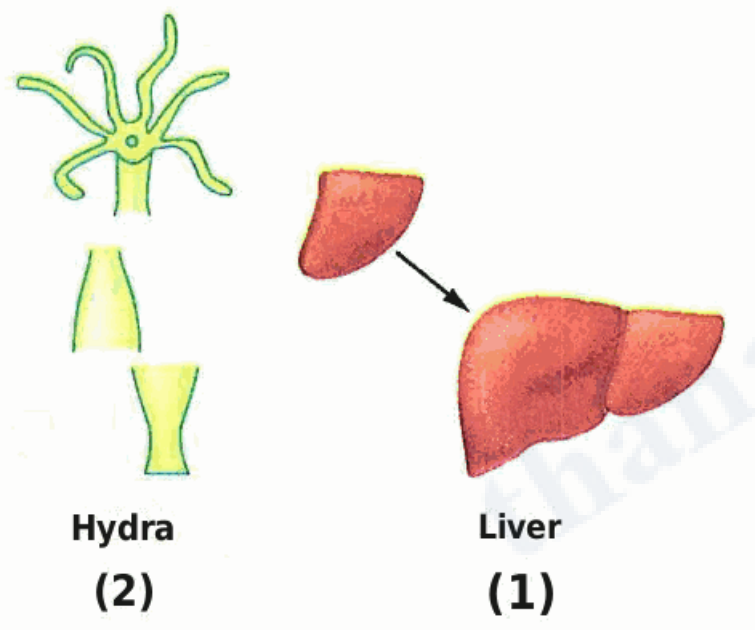
11 The following table shows the average number of offspring produced by each successful fertilization: (Sample exam 2025)

Lice: 450 eggs, lion: 2 : 5 cubs, blue whale: 1 whale, fish: 100 : 1000 fish.

Which organism do you expect to spend the longest time in parental care?

(A) Lice (B) Lion (C) Blue whale (D) Fish

12 Study the two opposite figures. What is the difference in division between figures (1) and (2)? (Trial exam / May 2021)



(A) The number of cells produced by each division

(B) The number of chromosomes in the produced cells compared to the original cell

(C) The purpose of the division

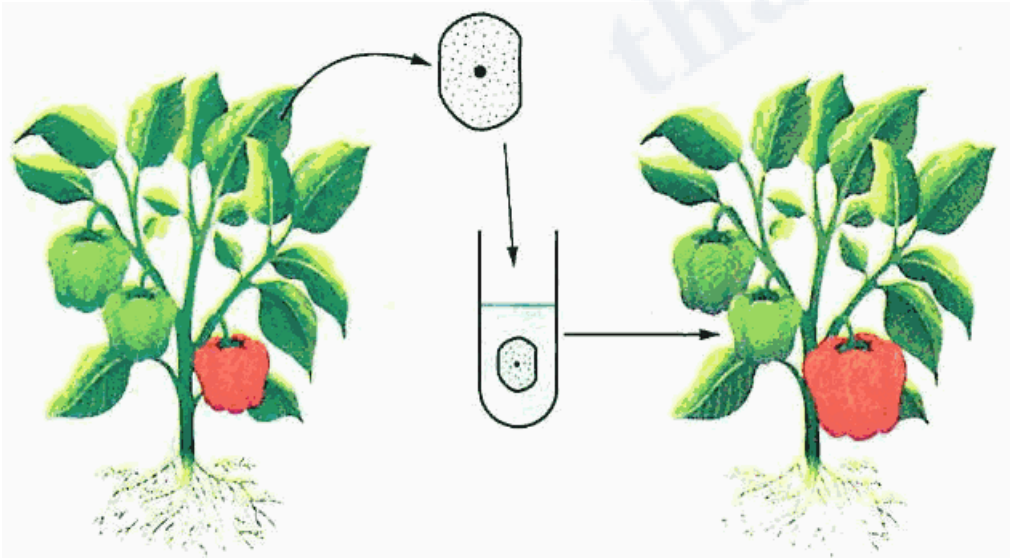
(D) The type of division

13 The opposite figure shows a planaria worm cut into 8 pieces and then placed in salty water. How many planaria worms are expected to be produced by regeneration? (Trial exam / May 2021)



(A) Zero (B) 2 (C) 4 (D) 8

14 Study the opposite figure, which shows one of the modern techniques of artificial reproduction in plants, then identify the main purpose of this technique as shown in the figure. (Trial exam / June 2021)



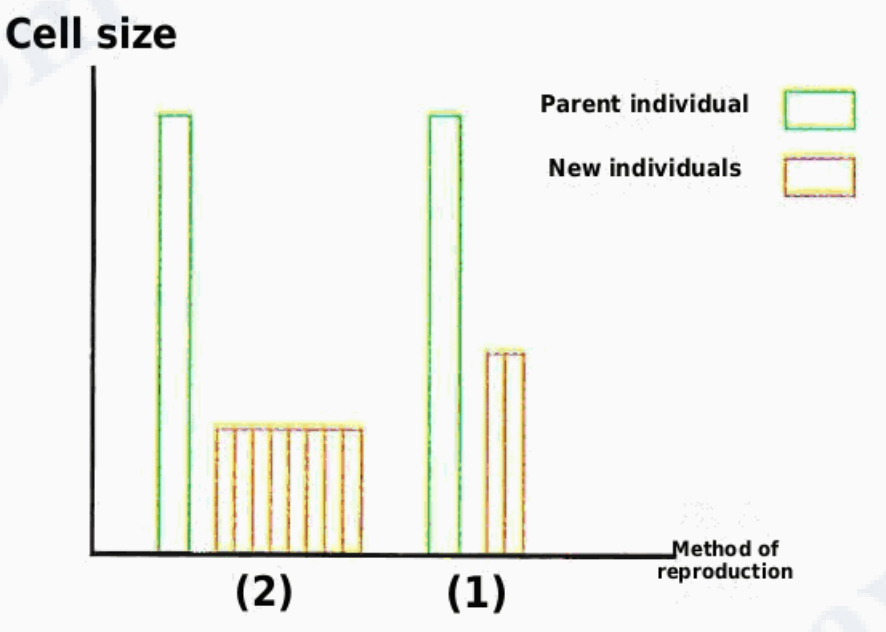
(A) Producing individuals that carry new traits

(B) Producing individuals exactly like the parent individual

(C) Increasing the length of the plant

(D) Propagating plants of excellent strains

15 Study the opposite graph, which shows asexual reproduction of a unicellular organism, and deduce the similarity between the two methods of reproduction (1) and (2) of this organism. (1st session 2021)



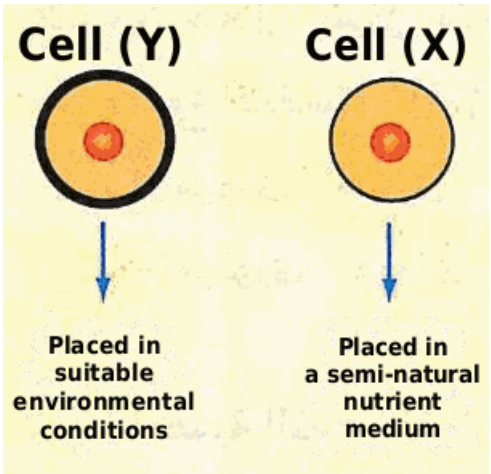
(A) Their environmental conditions

(B) The size of the produced cells

(C) The number of produced cells

(D) The number of chromosomes in the produced cells

16 The two opposite figures are of two cells, each reproducing asexually in a different way. What distinguishes cell (X) from cell (Y)? (2nd session 2021)



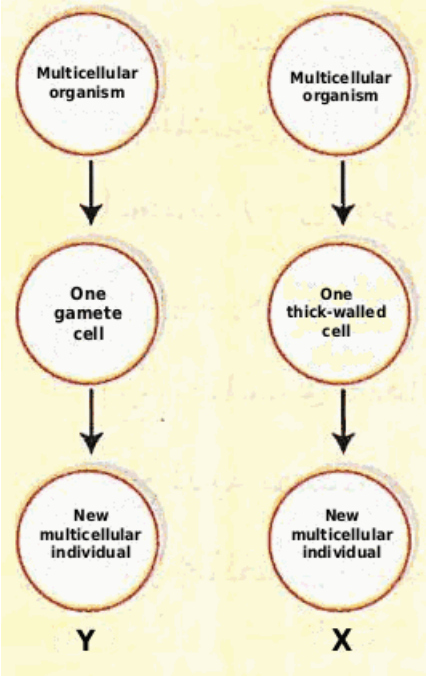
(A) It reproduces naturally

(B) It is formed inside a sporangium

(C) It is a modified cell

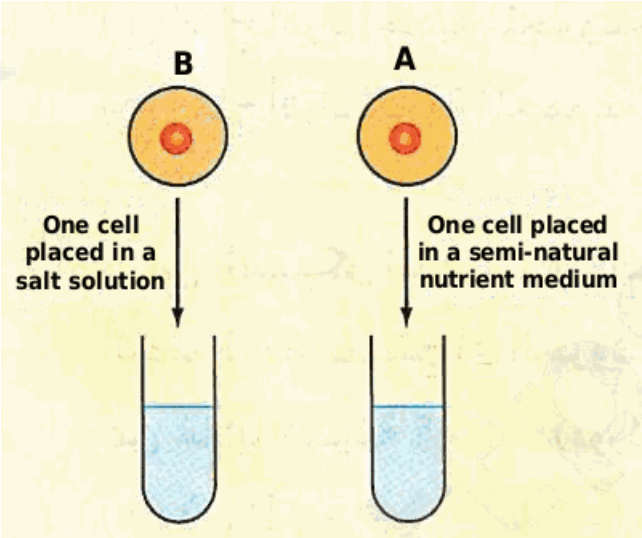
(D) It reproduces artificially

17 Study the opposite diagram, which represents natural reproduction in two different types of living organisms, then deduce the form of reproduction in each of (X) and (Y) respectively. (1st session 2022)



(A) Budding / parthenogenesis
(B) Parthenogenesis / spore formation
(C) Spore formation / parthenogenesis
(D) Parthenogenesis / budding

18 In the two opposite figures, cells (A) and (B) undergo asexual reproduction. What is the form of reproduction in cells (A) and (B) respectively? (2nd session 2022)



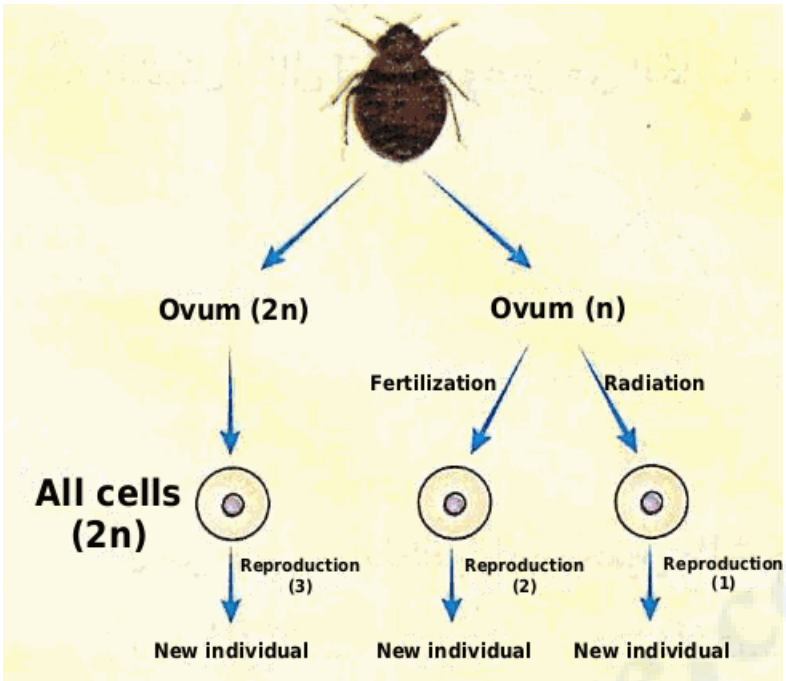
(A) Natural parthenogenesis / tissue culture

(B) Tissue culture / artificial parthenogenesis

(C) Artificial parthenogenesis / tissue culture

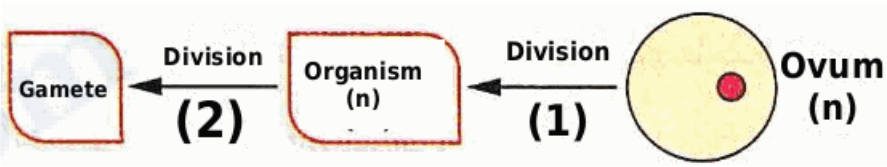
(D) Tissue culture / natural parthenogenesis

19 The opposite figure shows the methods of reproduction of one of the insects. Which of these methods is the highest in biological cost? (2nd session 2022)



(A) (2) only (B) (1) only (C) (2) , (3) (D) (1) , (3)

20 From the opposite diagram, what is the type of divisions (1) and (2) respectively? (2nd session 2022)



(A) Meiotic / meiotic (B) Meiotic / mitotic (C) Mitotic / meiotic (D) Mitotic / mitotic

---

21 What is the importance of budding for yeast fungus? (Trial exam 2023, Sample exam 2025)

(A) Producing new individuals of different sizes

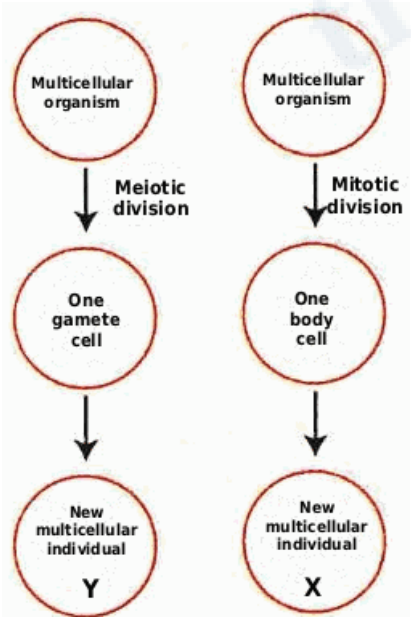
(B) Producing individuals that carry new traits

(C) Producing large numbers of individuals of the same species

(D) Producing individuals more suited to the environmental conditions

---

22 Study the opposite diagram of asexual reproduction in two different types of living organisms, then deduce what distinguishes the new individual (X) from the new individual (Y). (Trial exam 2023, Sample exam 2025)



(A) It is exactly like the parent individual

(B) It differs in its traits from the parent individual

(C) It has half the number of chromosomes of the parent individual

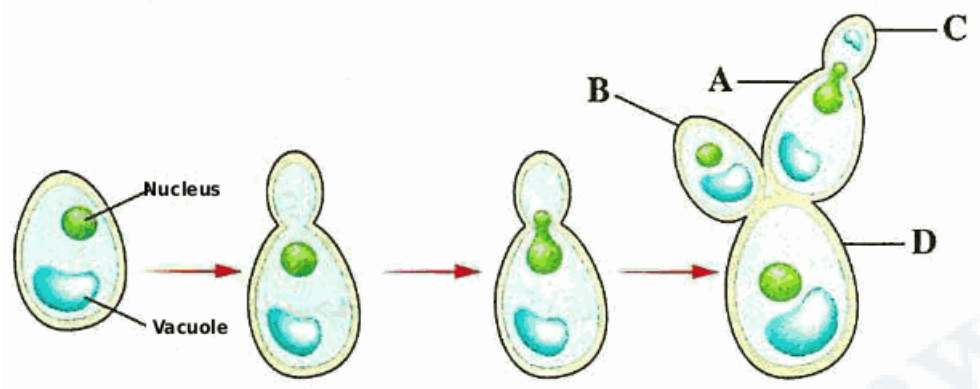
(D) It differs in sex from the parent individual

---

23 Which of the following distinguishes sexual reproduction in aphids from sexual reproduction in honey bees? (1st session 2023, Sample exam 2025)

(A) Producing haploid individuals
(B) The possibility of producing females
(C) Producing diploid individuals
(D) The possibility of producing males

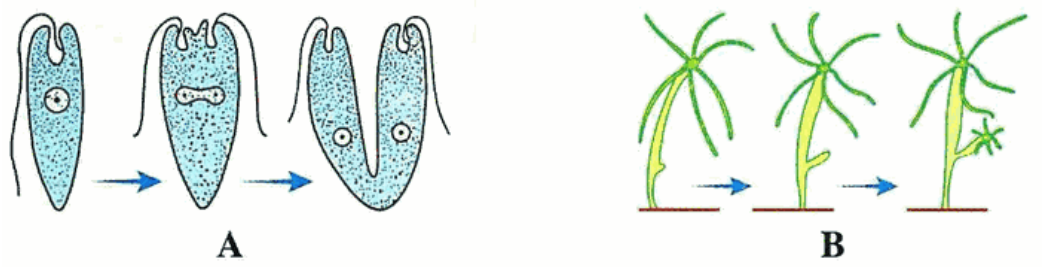
24 Study the opposite figure of reproduction in yeast, then deduce which letters express sister cells. (2nd session 2023)



(A) A , B
(B) A , C
(C) A , B , C
(D) A , B , D

25 The following figure is of reproduction of two types of living organisms. Study it, then deduce: (1st session 2024)

Which of the two forms of reproduction shown in the figure allows the organism to stay alive in unfavourable environmental conditions?



(A) (A) only
(B) (B) only
(C) Both
(D) Neither of them

26 What is the aim of forming aphid ova by mitotic division? (2nd session 2024)

(A) Forming females or males by sexual reproduction
(B) Forming females only by asexual reproduction
(C) Increasing the number of female gametes
(D) Keeping the chromosome number of the individuals produced by asexual reproduction

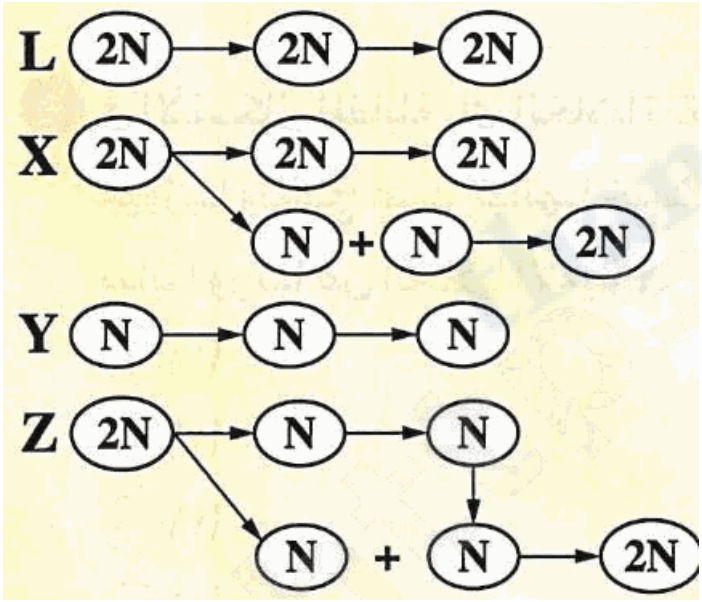
27 From your study of tissue culture, which plants were successfully grown from their tissues in coconut milk as a suitable nutrient medium? (Sample exam 2025)

(A) All plants
(B) Carrot and tobacco plants
(C) Rare plants
(D) The most disease-resistant plants

28 If a sporangium of bread mould contains 200 spore cells, how many spores are produced directly from the division of these cells in this sporangium? (Sample exam, 1st session 2025)

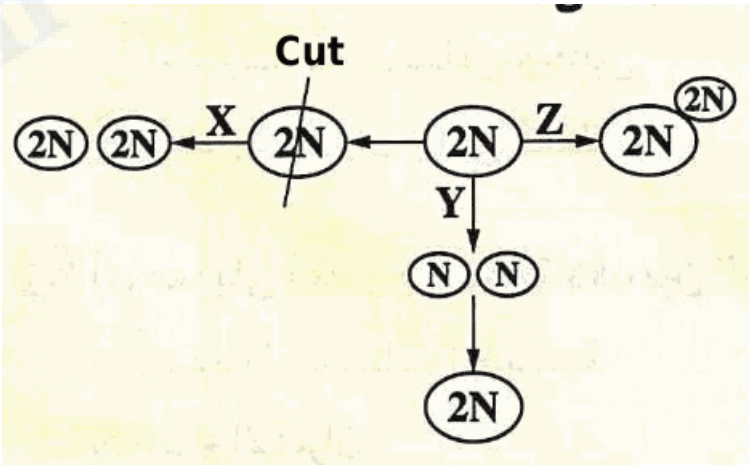
(A) 100 (B) 200 (C) 400 (D) 800

29 The opposite figure shows the methods and forms of reproduction of some living organisms. Which of the following expresses the methods and forms of reproduction of organisms (L), (X), (Y), (Z)? (Sample exam 2026)



(A) (L) binary division / (X) asexual and sexual reproduction in aphids / (Y) sporulation / (Z) budding
(B) (L) tissue culture / (X) asexual and sexual reproduction in aphids / (Y) sporulation / (Z) asexual and sexual reproduction in bees
(C) (L) sporulation / (X) asexual and sexual reproduction in bees / (Y) budding / (Z) asexual and sexual reproduction in aphids
(D) (L) binary division / (X) asexual and sexual reproduction in aphids / (Y) regeneration / (Z) asexual and sexual reproduction in bees

30 The opposite figure shows the methods of reproduction of one of the living organisms. Which of the following represents this organism, and what are processes (X), (Y) and (Z) respectively? (Sample exam 2026)



(A) Yeast, regeneration / meiotic division / budding

(B) Hydra, regeneration / meiotic division / budding

(C) Carrot, tissue culture / fertilization / artificial parthenocarpy

(D) Plasmodium, fragmentation / fertilization / sporulation

31 Which organism / organisms can reproduce by binary fission without the nucleus dividing mitotically? Explain your answer. (Sample exam 2025)

Answer key and solutions

Multiple choice questions

1 D	2 B	3 B	4 A	5 D	6 C	7 B	8 D	9 D	10 A
11 C	12 B	13 D	14 A	15 B	16 B	17 D	18 D	19 D	20 C
21 B	22 A	23 A	24 B	25 D	26 C	27 C	28 A	29 D	30 A
31 A	32 D	33 C	34 C	35 B	36 C	37 B	38 C	39 B	40 A
41 A	42 D	43 D	44 C	45 C	46 C	47 C	48 C	49 C	50 A
51 B	52 C	53 B	54 C	55 C	56 A	57 B	58 C	59 D	60 C
61 A	62 C	63 D	64 B	65 B	66 C	67 C	68 A	69 A	70 B
71 B	72 C	73 B	74 D	75 A	76 C	77 D	78 D	79 B	80 B
81 C	82 B	83 C	84 D						

1 **Answer (D)**

Reproduction ensures the survival of the species, while the other vital functions secure the life of the individual.

2 **Answer (B)**

In Klinefelter's syndrome (XXY) the person lives but is sterile.

3 **Answer (B)**

Type (Y) is the one that became extinct after the environmental change.

4 **Answer (A)**

Type (X) kept a relatively large number after the change.

5 **Answer (D)**

Parasitic worms produce very large numbers of ova to ensure the survival of the species.

6 **Answer (C)**

(X) is a part cut from a starfish that grows into a new individual (regeneration), and (Y) is a lizard that replaced its amputated tail.

7 **Answer (B)**

The more advanced the organism, the fewer new individuals it produces.

8 **Answer (D)**

The ability to reproduce decreases with advancement: amoeba, then fish, then lizard, then gorilla, so the order from the least is: gorilla, then lizard, then fish, then amoeba.

9 **Answer (D)**

Asexual reproduction increases numbers quickly in a short time.

10 **Answer (A)**

Mitotic division keeps the number of chromosomes constant.

11 **Answer (C)**

Amoeba forms a thick cyst in unsuitable conditions.

12 **Answer (B)**

Both the genetic material and the cytoplasm divide equally.

13 **Answer (D)**

The cyst bursts and the small amoebae are released when water is available.

14 **Answer (A)**

All the amoebae produced by binary fission have the same chromosome number.

15 **Answer (B)**

Amoeba reproduces by binary fission, which does not take place in unsuitable conditions (it encysts).

16 **Answer (B)**

In binary fission the parent individual divides into two individuals, so it disappears.

17 **Answer (D)**

Amoeba reproduces by binary fission and yeast by budding.

18 **Answer (D)**

Shrimp replaces lost parts by regeneration but does not reproduce by it.

19 **Answer (D)**

The male produces its gametes by mitosis (n), and the queen produces the ova by meiosis.

20 **Answer (C)**

The individuals produced by binary fission receive a complete copy of the genetic information.

21 **Answer (B)**

In budding the parent individual remains and the bud comes out of it.

22 **Answer (A)**

Binary fission gives two new cells, and budding gives one bud.

23 **Answer (A)**

Budding in hydra arises from the division of interstitial cells.

24 **Answer (B)**

The individuals produced by both types are all diploid.

25 **Answer (D)**

Bee males are haploid (n), and aphid males are diploid (2n).

26 **Answer (C)**

Some amphibian cells divide mitotically and differentiate to replace the amputated organ.

27 **Answer (C)**

Planaria and hydra regenerate if they are cut transversely or longitudinally.

28 **Answer (A)**

(X) is an amputated part whose wound heals, and (Y) is the part that decomposes.

29 **Answer (D)**

Sponge reproduces by regeneration.

30 **Answer (A)**

In aphids the individuals produced by parthenogenesis are all (2n).

31 **Answer (A)**

Each part grows into a complete individual, and the two individuals are genetically identical (mitotic division).

32 **Answer (D)**

Shrimp is the least able of these organisms to regenerate.

33 **Answer (C)**

Hydra and planaria are the most able to regenerate.

34 **Answer (C)**

The picture has 7 arms, and each arm with a part of the disc grows into a starfish.

35 **Answer (B)**

The first is regeneration (starfish) and the second is binary fission (amoeba), so the form of reproduction differs.

36 **Answer (C)**

Regeneration in birds and higher vertebrates is limited to healing wounds.

37 **Answer (B)**

38 **Answer (C)**

(X) is meiosis to form the ovum (n), (Y) is parthenogenesis, and (Z) is mitotic division.

39 **Answer (B)**

Regeneration in planaria depends on mitotic division only.

40 **Answer (A)**

Some fungi, like yeast, reproduce by budding; not all of them reproduce by spores.

41 **Answer (A)**

Bread mould is haploid (n), so structures (X) and (Y) are identical.

42 **Answer (D)**

Spores germinate only in moist conditions; on dry bread they stay alive and do not germinate.

43 **Answer (D)**

The individuals produced by parthenogenesis (n) differ genetically from the queen (2n).

44 **Answer (C)**

Sexual reproduction produces males and females in the ratio 1 : 1, and asexual reproduction produces females only, so the total is 1 : 3.

45 **Answer (C)**

The worker is sterile, so it does not reproduce sexually.

46 **Answer (C)**

Aphid females produce their gametes by mitosis (parthenogenesis) and by meiosis (sexual reproduction).

47 **Answer (C)**

The queen produces the ovum by meiosis, then it divides mitotically to form the male.

48 **Answer (C)**

Males and ova are haploid (n).

49 **Answer (C)**

Normal growth does not double the chromosomes, while shock, fertilization and pricking change (n) into (2n).

50 **Answer (A)**

Females in both the bee and the aphid are diploid.

51 **Answer (B)**

In parthenogenesis the female gamete develops without fertilization.

52 **Answer (C)**

Parthenogenesis produces individuals genetically identical to the mother.

53 **Answer (B)**

The males produced by parthenogenesis reproduce sexually only, so not all individuals reproduce by parthenogenesis.

54 **Answer (C)**

The queen's ovum is formed by meiosis and then develops without fertilization.

55 **Answer (C)**

Aphid males and females are all diploid (2n), so the ratio is 1 : 1.

56 **Answer (A)**

(X) is diploid and produces ova by meiosis, then they develop by parthenogenesis, so it is a queen.

57 **Answer (B)**

Y and Z are female gametes (n), that is, ova.

58 **Answer (C)**

(L) is produced by gametes (fertilization), and (M) is produced by parthenogenesis.

59 **Answer (D)**

(L) are females from a fertilized ovum, and (M) is a male from an unfertilized ovum.

60 **Answer (C)**

An enucleated cell cannot divide and dies after a short period.

61 **Answer (A)**

Parthenogenesis increases the number of females quickly.

62 **Answer (C)**

Sex in bees is determined by the number of chromosomes: (n) male and (2n) female.

63 **Answer (D)**

The technique is tissue culture: plant cells with complete genetic information produce a complete plant by mitotic division.

64 **Answer (B)**

The ovum (n) has its chromosomes doubled to (2n), which is artificial parthenogenesis.

65 **Answer (B)**

The bee male (n) = 2X, and the ovum is also (n) = 2X.

66 **Answer (C)**

The worker and the queen are both 2n, so the number is 32.

67 **Answer (C)**

(X) is the formation of the queen's ova by meiosis, and (Y) is the formation of the male's sperms by mitosis.

68 **Answer (A)**

Individual (2) came from an ovum without fertilization, so it is a male (n).

69 **Answer (A)**

Individual (1) came from the fusion of gametes.

70 **Answer (B)**

The fusion of gametes produces females (workers and queens).

71 **Answer (B)**

Chromosome doubling makes the body cells of the produced individuals (2n).

72 **Answer (C)**

Vegetative reproduction is asexual, so the new plants are genetically identical to the original.

73 **Answer (B)**

The individuals produced by parthenogenesis may reproduce sexually, giving males and females.

74 **Answer (D)**

Root and stem cells of the same plant have the same genes.

75 **Answer (A)**

Tissue culture depends on mitotic division, so the seedlings carry all the genetic traits.

76 **Answer (C)**

The figure is tissue culture, which is used to propagate rare plants.

77 **Answer (D)**

Females are produced from fertilized queen ova.

78 **Answer (D)**

Asexual reproduction takes place naturally, like budding, or artificially, like tissue culture.

79 **Answer (B)**

Tissue culture protects some plants from extinction.

80 **Answer (B)**

The worker carries all the chromosomes of the male (n) and half the chromosomes of the queen (2n), that is, a complete set from the male and a set from the queen.

81 **Answer (C)**

The worker and the queen are both produced by fertilization, so both are diploid; they differ in shape, size and fertility.

82 **Answer (B)**

(X) gives two equal daughter cells, binary fission, and (Y) gives two unequal cells, budding.

83 **Answer (C)**

DNA doubled twice before division, so the cell divides twice and produces 4 amoebae.

84 **Answer (D)**

Parthenogenesis in bees produces genetically different males because of meiosis in the queen.

Essay questions

1 **Model answer**

(1) (A) Budding, example: yeast. Explanation: the cells produced by division are unequal in size.
(B) Binary fission, example: bacteria - amoeba - paramecium. Explanation: the parent individual divides to give two cells equal in size, each of which grows into a new individual.
(C) Regeneration, example: starfish. Explanation: a part of the body (containing a piece of the central disc) is cut and grows into a complete individual, and this part is also replaced in the body by regeneration.
(2) Similarity: both depend on mitotic division.
Difference: the parent individual remains when budding takes place in case (A), while the parent individual vanishes when binary fission takes place in case (B).

2 **Model answer**

(1) Figure (1): budding in yeast fungus. Figure (2): budding in hydra.
(2) Budding in yeast fungus (unicellular): the growing bud may separate from the mother cell or stay attached to it, forming cell colonies, and the bud arises from the division of the nucleus and cytoplasm of the mother cell.
Budding in hydra (multicellular): the growing bud separates completely from the mother to start an independent life, and the bud arises from the division and differentiation of the mother's interstitial cells.

3 **Model answer**

Part (Z), because it contains the nucleus, which contains the complete genetic information of this organism needed for its cell to divide and replace what was lost, forming a new individual by mitotic division.

4 **Model answer**

The aim of regeneration in organism (1), the shrimp, is replacing amputated parts, while the aim of regeneration in organism (2), the planaria, is asexual reproduction to produce new individuals.

5 **Model answer**

(1) (1) and (3), because reproduction (1) represents artificial parthenogenesis as a result of activating the ovum (n) by radiation, so the chromosomes double without fertilization, forming a new individual exactly like the mother. Reproduction (3) represents natural parthenogenesis, where the ovum (2n) develops directly without fertilization to form females. Both are asexual reproduction, which is lower in biological cost.

(2) (X) female, (Y) male or female, (Z) female.

6 **Model answer**

It gives females only, because after the ova are activated the chromosomes double without fertilization (artificial parthenogenesis), so they develop into individuals exactly like the mother, that is, females (2n).

7 **Model answer**

(1) Tissue culture.

(2) Asexual reproduction, because it depends on the mitotic division of cells, so a new individual exactly like the original individual in all its traits is produced.

(3) Liquid (Y) is a suitable (semi-natural) nutrient medium containing all the plant hormones and nutrients in certain ratios, needed for the growth of the cells of plant (X) and their differentiation into a complete plant.

Past exam questions

1	2	3	4	5	6	7	8	9	10
D	C	C	D	A	D	B	C	D	B
11	12	13	14	15	16	17	18	19	20
C	C	A	D	D	D	C	B	A	D
21	22	23	24	25	26	27	28	29	30
C	A	D	A	D	B	B	C	B	B

31

1 **Answer (D)**

The number of individuals of type (A) increases with time, so the conditions are suitable for its survival, while the number of type (B) decreases.

2 **Answer (C)**

The Turner female lives a normal life but is sterile, so the condition is not inherited.

3 **Answer (C)**

Water turtles face greater risks (predation and currents), so they lay a larger number of eggs to ensure the survival of the species.

4 **Answer (D)**

The simpler and smaller the organism, the greater its ability to reproduce: the merozoite, then the amoeba, then the fish, then the turtle.

5 **Answer (A)**

Fasciola is a parasite that faces great risks to reach the host, so it produces many offspring, unlike the free-living earthworm.

6 **Answer (D)**

Advanced organisms produce a small number of individuals and take care of them.

7 **Answer (B)**

Being advanced, large, free-living, long-lived and caring for the young are reasons for the weak reproductive ability of humans.

Reproducing sexually and being a mammal is not a reason.

8 **Answer (C)**

Aquatic organisms face greater difficulties and risks, so they produce larger numbers.

9 **Answer (D)**

Bilharzia is a primitive, short-lived parasite, and these are reasons for its greater ability to reproduce.

Being non-autotrophic is not a reason.

10 **Answer (B)**

Form (A) is sexual reproduction in which two gametes fuse, producing individuals with genetic variation that can face environmental changes.

Form (B) is parthenogenesis, in which no variation happens.

11 **Answer (C)**

The blue whale produces one individual, so it spends the longest time in parental care.

12 **Answer (C)**

Division in the liver is to replace the lost part, and in hydra it is to produce new individuals.

Both are mitotic divisions, so the difference is in the purpose of the division.

13 **Answer (A)**

Salty water is an unsuitable medium for planaria life, so no regeneration happens and no worms are produced.

14 **Answer (D)**

Tissue culture is used to propagate plants of excellent strains.

15 **Answer (D)**

(1) is binary fission and (2) is reproduction by spores; both are by mitotic division, so the produced cells have the same number of chromosomes as the parent cell.

16 **Answer (D)**

Cell (X) was placed in a semi-natural nutrient medium, so it reproduces artificially (tissue culture).

17 **Answer (C)**

(X) is a thick-walled cell that grows into a new individual: a spore.

(Y) is a gamete cell that develops without fertilization: parthenogenesis.

18 **Answer (B)**

Cell (A) is in a semi-natural nutrient medium: tissue culture.

Cell (B) is in a salt solution: artificial parthenogenesis.

19 **Answer (A)**

Method (2) takes place by fertilization (sexual reproduction), so it is the highest in biological cost.

20 **Answer (D)**

The ovum (n) divides mitotically to form an organism (n), like the honey bee male, then the organism (n) produces gametes by mitotic division.

21 **Answer (C)**

Budding in yeast gives large numbers of individuals of the same species.

22 **Answer (A)**

Individual (X) is produced from a body cell by mitotic division, so it is exactly like the parent individual.

23 **Answer (D)**

In sexual reproduction in aphids, males and females may be produced, while in bees the fertilized egg produces females only.

24 **Answer (A)**

Sister cells are those produced by the division of the same mother cell, and cells (A) and (B) were produced from cell (D).

25 **Answer (D)**

(A) is binary fission and (B) is budding; neither allows survival in unfavourable conditions, unlike spores.

26 **Answer (B)**

In asexual reproduction in aphids, the ova are formed by mitotic division and develop without fertilization into females only.

27 **Answer (B)**

The tissues of carrot and tobacco plants were successfully grown in coconut milk.

28 **Answer (C)**

Each spore cell divides mitotically into two spores, so the number of spores = $2 \times 200 = 400$

29 **Answer (B)**

(L) cells (2N) give cells (2N): tissue culture.

(X) individuals (2N) reproduce asexually and sexually: aphids, and (Y) cells (N) divide mitotically: sporulation in bread mould.

(Z) the female (2N) gives males (N): the honey bee.

30 **Answer (B)**

(X) a part cut from the organism grows into a complete individual: regeneration, (Y) forming gametes (N): meiotic division, and (Z) budding.

All of them take place in hydra.

31 **Model answer**

Bacteria, because bacteria are prokaryotes that do not contain a definite nucleus; the genetic material is in the cytoplasm, not surrounded by a nuclear membrane.