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

Reproduction in Flowering Plants

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190	3	80
questions	sets	pages

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Multiple choice questions — 105 questions

1 Which of the following is NOT a characteristic of angiosperms?

(A) They reproduce sexually and asexually

(B) Their seeds develop inside a floral envelope

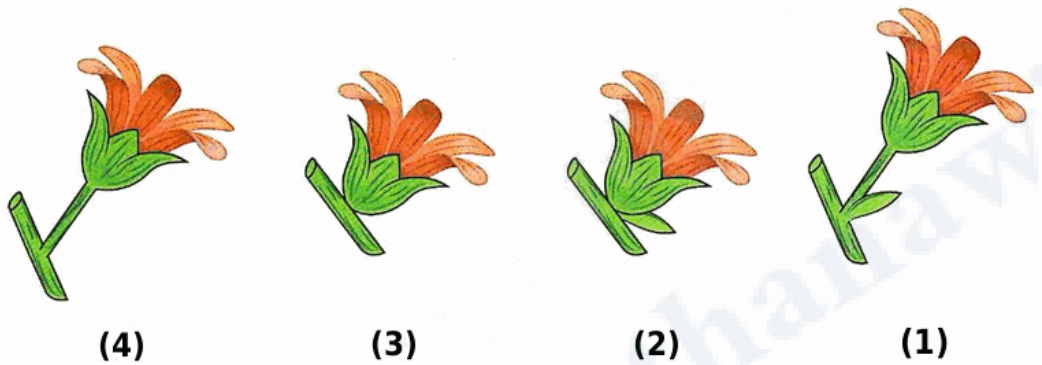
(C) They are called seed plants

(D) They are called flowering plants

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2 Study the following figures, then answer:

Which figure can represent a pedicellate flower with a bract?

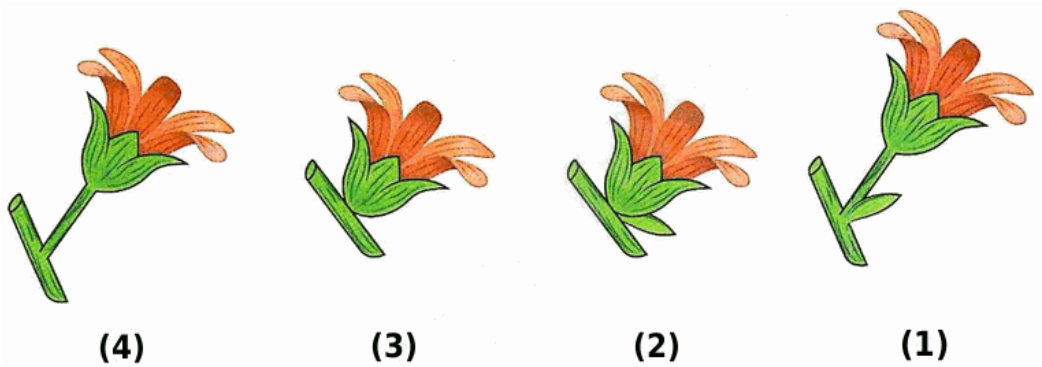


(A) (1) only (B) (2) only (C) (2) , (3) (D) (1) , (4)

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3 Study the following figures, then answer:

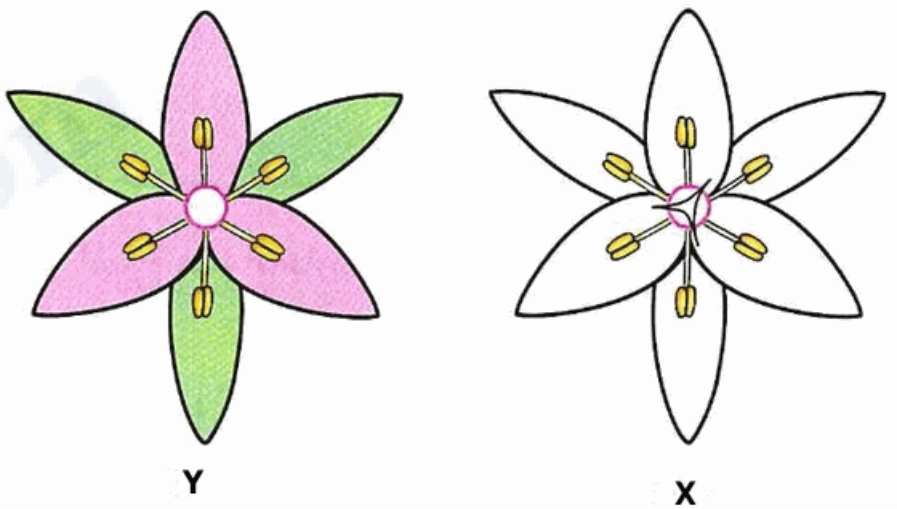
Which figures can represent a sessile flower?



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

---

4 In the two opposite figures, flower (X) differs from flower (Y) in that it is .....



(A) female with a floral envelope
(B) hermaphrodite with a floral envelope
(C) male with a floral envelope
(D) male with one cotyledon

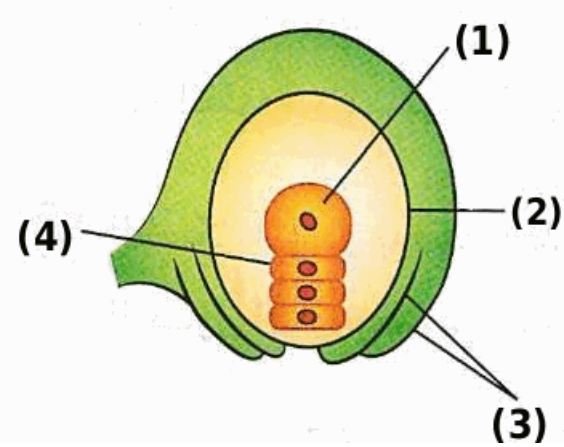
5 Which of the following is NOT a function of the flower?

(A) Producing pollen grains
(B) Asexual reproduction
(C) Producing ovules
(D) Sexual reproduction

6 Which of the following is the function of the style in the carpel?

(A) Guiding the entry of the pollen tube
(B) Recognizing the suitable pollen grains
(C) Producing nectar
(D) Stimulating the division of the generative cell

7 What is the number of the part from which the embryo sac forms in the opposite figure?



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

---

8 Which of the following is NOT one of the components of pollen grains as soon as they leave the anther?

(A) The tube nucleus
(B) The generative nucleus
(C) The thick wall
(D) The two male nuclei

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9 Which of the following results from meiotic division in one of the cells of the plant's gonads?

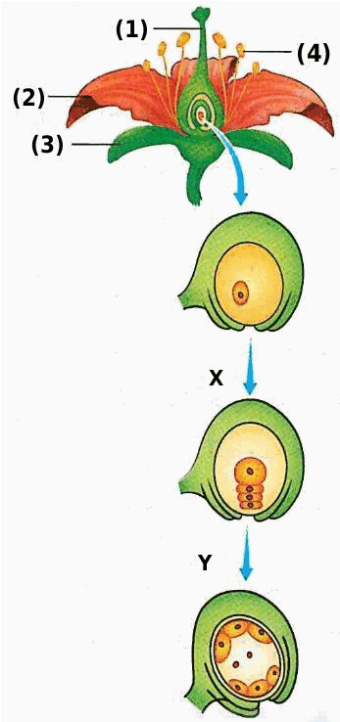
(A) 4 pollen grains
(B) 4 ovules
(C) 4 microspores
(D) One ovule or 4 pollen grains

---

10 The opposite figure shows the steps of forming the female gamete in a flowering plant.

Answer:

Where do the two processes (X) , (Y) take place, respectively?



(A) The ovule / the ovary

(B) The ovule / the embryo sac

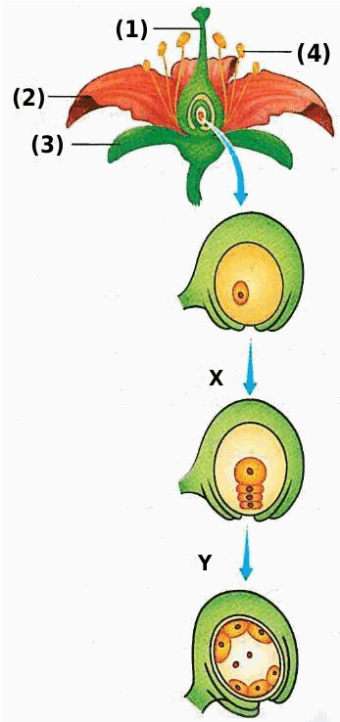
(C) The embryo sac / the ovary

(D) The embryo sac / the ovule

11 The opposite figure shows the steps of forming the female gamete in a flowering plant.

Answer:

Which of the following parts of the flower does NOT take part in pollination or fertilization?



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

---

12 Which of the following results from meiotic division followed by mitotic division of the spore mother cells in the gonads?

(A) The gametes in Plasmodium (malaria parasite)

(B) The ovules in plants

(C) The sperms in honeybees

(D) The eggs in Fern

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13 How are pollen grains formed in flowering plants?

(A) By meiotic division only

(B) By mitotic division only

(C) By mitotic division followed by meiotic division

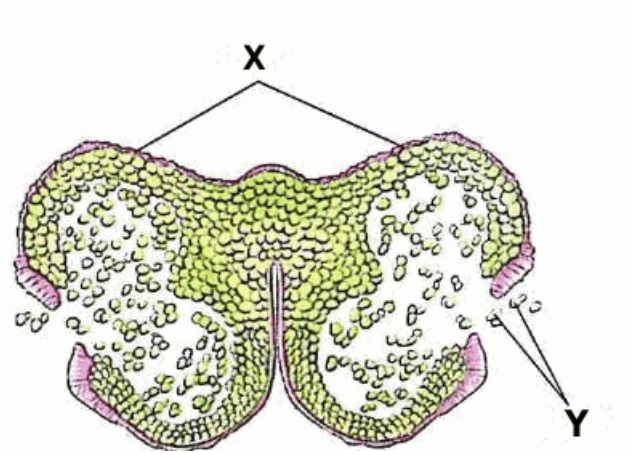
(D) By meiotic division followed by mitotic division

---

14 In what does the pollen grain resemble the zygospore?

(A) The number of nuclei
(B) Having a thick wall
(C) The conditions that cause its formation
(D) The number of chromosome sets

15 The opposite figure shows a section in the anther of a flower. Which of the choices in the following table expresses the chromosome sets of cells (X) , (Y)?

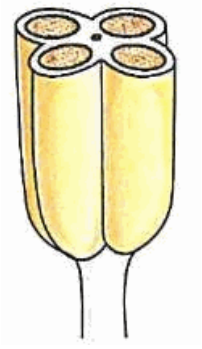


(A) X: n , Y: n
(B) X: 2n , Y: 2n
(C) X: n , Y: 2n
(D) X: 2n , Y: n

16 If you know that the number of pollen grains in each pollen sac of a plant is about 40 pollen grains, what is the number of spore mother cells in the flower of this plant, which has 5 stamens?

(A) 80
(B) 200
(C) 400
(D) 800

17 Which of the following is functionally similar to the opposite figure?



(A) The egg sac of Plasmodium
(B) The archegonia of Adiantum
(C) The antheridia of Fern
(D) The sporangium of bread mould

18 Which of the following happens in the ovule of angiosperms?

(A) Microspores form from the spore mother cell

(B) The spore mother cell divides by reduction division

(C) The egg nucleus results from the meiotic division of the embryo sac nucleus

(D) The endosperm surrounds the spore mother cell

---

19 If a flower produces 1600 pollen grains, and the number of spore mother cells in each pollen sac is 10 cells, how many stamens are there in this flower?

(A) 10 (B) 5 (C) 4 (D) 1

---

20 If each sac of the anther of a flower contains 120 spore mother cells, what is the maximum number of tube nuclei in the pollen grains produced from this anther?

(A) 480 (B) 960 (C) 1920 (D) 3840

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21 Which of the following is NOT found in the mature ovary of the flower?

(A) The spore mother cell (B) The egg cell

(C) The two polar nuclei (D) The nucellus

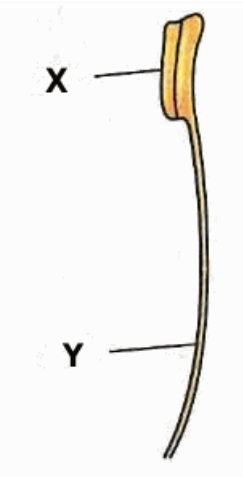
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22 If you know that the nucleus of a cell from a potato leaf contains 48 chromosomes, which of the following represents the number of chromosomes in one of the nuclei of the embryo sac?

(A) 21 (B) 24 (C) 48 (D) 72

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23 The opposite figure shows the structure of part of one of the floral whorls. Which of the following is correct?



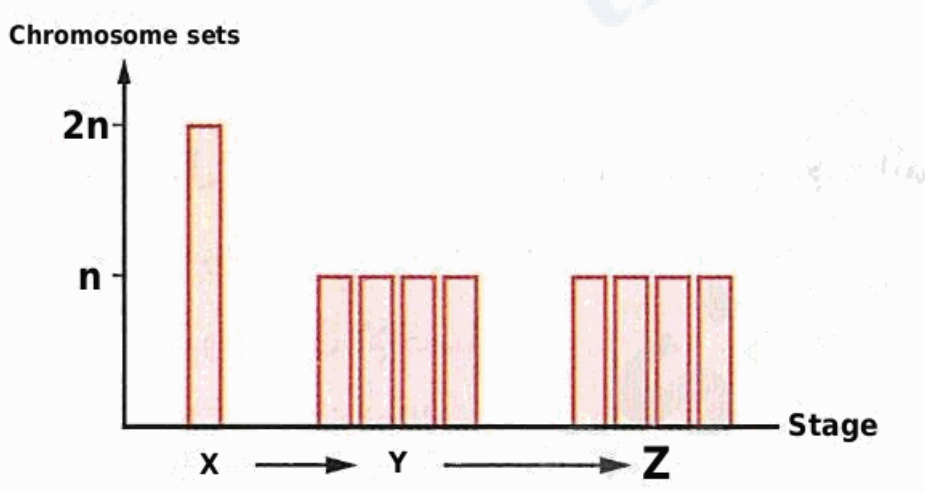
(A) The first and second meiotic divisions take place in part (Y)

(B) The first meiotic division takes place in part (X) and the second in part (Y)

(C) The first meiotic division takes place in part (Y) and the second in part (X)

(D) The first and second meiotic divisions take place in part (X)

24 Which of the following can represent the stages shown in the opposite graph?



(A) Germination of the pollen grain

(B) Formation of pollen grains

(C) Formation of ovules in plants

(D) Double fertilization

25 How many spore mother cells will produce 1000 generative nuclei?

(A) 125 (B) 200 (C) 250 (D) 500

26 What is the maximum number of antipodal cells that result from the division of 10 spore mother cells in the ovary of a flowering plant?

(A) 10 (B) 20 (C) 30 (D) 40

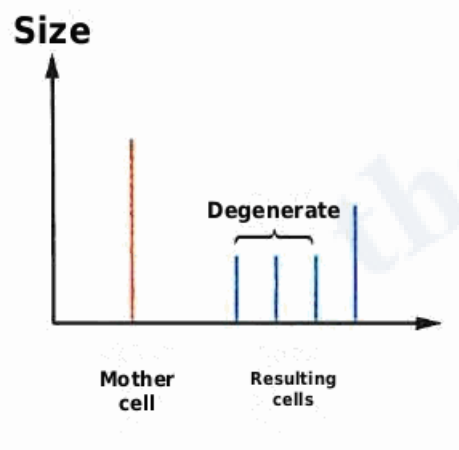
27 The ovary of a pea flower contains 6 mature ovules. What is the number of synergid cells and antipodal cells, respectively?

(A) 6 / 12 (B) 12 / 18 (C) 12 / 24 (D) 18 / 24

28 What is the maximum number of microspores that result from the division of 100 spore mother cells in the anther of a flowering plant?

(A) 100 (B) 400 (C) 800 (D) 1600

29 The opposite graph represents one of the stages of .....



(A) ovule formation in plants

(B) the formation of ciliated swimmers (antherozoids) in Fern

(C) sexual reproduction in Spirogyra

(D) pollen grain formation in plants

30 How many mitotic divisions are needed for 5 ovules to mature inside the ovary of a flower?

(A) 5 (B) 10 (C) 15 (D) 20

31 How many meiotic divisions are needed to form 100 pollen grains?

(A) 25 (B) 50 (C) 75 (D) 100

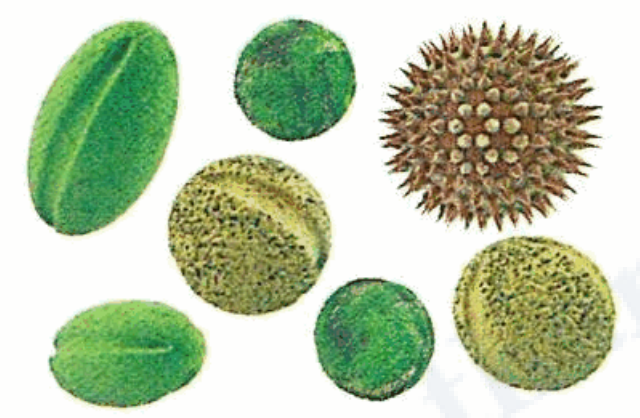
32 If you know that half the number of chromosomes of a cell in the stigma of a bean flower = 2X, what is the number of chromosomes of the male nucleus of the same plant?

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

33 If the maximum number of male nuclei produced in pollen grains is 320 nuclei, what is the number of spore mother cells in the anther of the flower?

(A) 10 (B) 40 (C) 80 (D) 160

34 The opposite figure shows different shapes of pollen grains. What is the importance of having many of them?

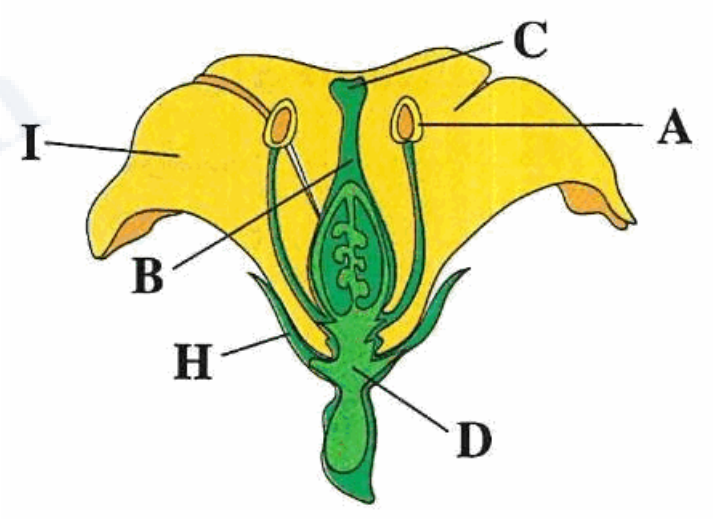


(A) Variety of fertilization methods
(B) Different types of seeds
(C) Variety of pollination means
(D) Different types of fruits

35 A pollen grain of a pea plant moved from the anther of a flower to the stigma of another flower on the same plant. What does this process represent?

(A) Self-pollination for the plant
(B) Self-pollination for the flower
(C) Self-pollination for both the plant and the flower
(D) Cross-pollination for both the plant and the flower

36 From the opposite figure, which of the following plays a role in pollination?



(A) I , A , C (B) D , H , I (C) B , A , H (D) B , D , I

37 Which of the following statements is NOT correct?

(A) All typical flowers contain an androecium and a gynoecium

(B) Pollination in complete flowers is always self-pollination

(C) Fertilization does not necessarily happen after the flower is pollinated

(D) Fruit production is linked to pollination

38 If the number of chromosomes in the nucleus of a cell from a tissue in the ovary wall of a flower of a plant = 12 chromosomes, what is the number of chromosomes in the generative nucleus, the male nucleus and the endosperm nucleus, respectively?

(A) 12 / 12 / 18 (B) 12 / 6 / 18 (C) 6 / 6 / 18 (D) 12 / 12 / 36

39 Which of the following is correct about pollination in flowering plants?

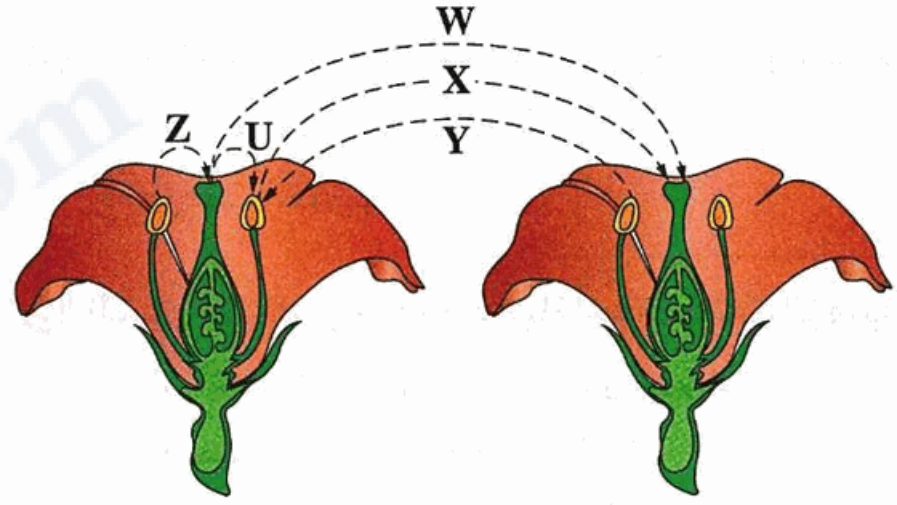
(A) Cross-pollination followed by fertilization produces seeds that give individuals carrying the traits of one parent

(B) Self-pollination is biologically costly

(C) Cross-pollination followed by fertilization produces seeds that give individuals more adapted to environmental changes

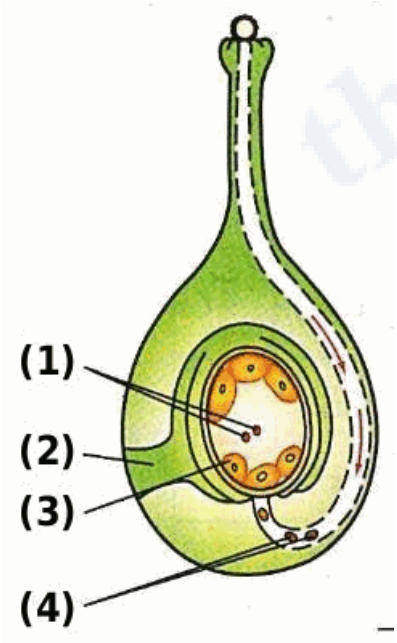
(D) Self-pollination without fertilization uses more energy than cross-pollination

40 From the opposite figure, which of the following symbols shows cross-pollination?



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

41 The opposite figure represents a mature ovary during fertilization. Which of the following is correct about the figure?



(A) Nuclei (1) are haploid and resulted directly from meiotic division

(B) The cells of tissue (2) are haploid and resulted directly from mitotic division

(C) Cell (3) is haploid and resulted directly from meiotic division

(D) Nuclei (4) are haploid and resulted directly from mitotic division

42 Pollination and fertilization in most dicotyledons pass through the following stages: (1) triple fusion. (2) formation of the pollen tube. (3) formation of the zygote. (4) division of the generative nucleus. (5) disappearance of the endosperm. (6) formation of the embryo. Which of the following represents the correct order of these stages?

(A) (2) → (4) → (5) → (1) → (6) → (3)
(B) (2) → (4) → (3) → (1) → (6) → (5)
(C) (2) → (4) → (1) → (3) → (5) → (6)
(D) (2) → (1) → (3) → (4) → (6) → (5)

43 Which of the following represents the correct sequence of gamete formation, fertilization and embryo formation in flowering plants?

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

44 If the ovary of a flower contains five mature ovules, how many pollen grains are needed to fertilize these ovules?

(A) 2
(B) 5
(C) 7
(D) 10

45 In which of the following cases does reproduction in flowering plants achieve its goals?

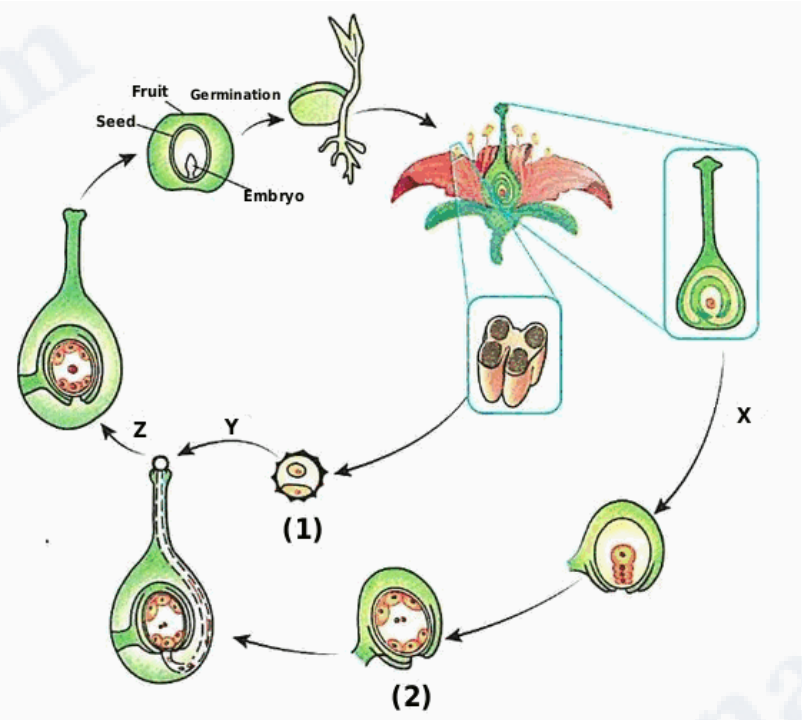
(A) Pollination without fertilization
(B) Fusion of a male nucleus with the egg cell nucleus inside the embryo sac only
(C) Triple fusion
(D) Double fertilization

46 Which of the following is a similarity between the nucellus and the endosperm?

(A) The number of chromosome sets
(B) The place where they are found
(C) The time of formation
(D) The function

47 The opposite figure shows the life cycle of a flowering plant:

Which of the following choices expresses processes (X) , (Y) , (Z)?



A X: mitotic division / Y: germination of the pollen grain / Z: triple fusion

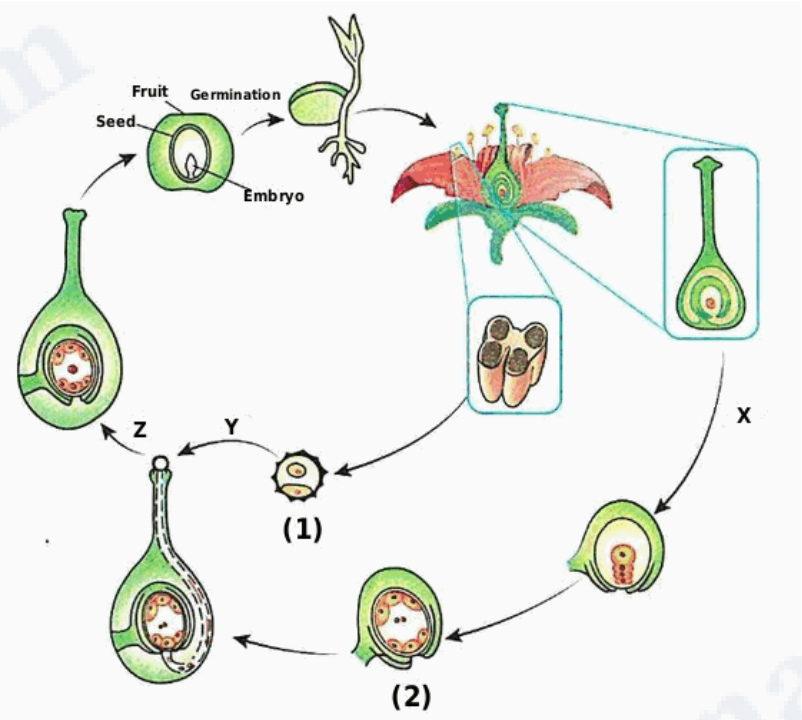
B X: meiotic division / Y: pollination / Z: triple fusion

C X: mitotic division / Y: germination of the pollen grain / Z: double fertilization

D X: meiotic division / Y: pollination / Z: double fertilization

48 The opposite figure shows the life cycle of a flowering plant:

What is the similarity between structures (1) and (2)?



(A) The number of meiotic divisions forming each structure

(B) The number of mitotic divisions forming each structure

(C) The total number of chromosomes of each structure

(D) The number of cells resulting from mitotic division

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49 Which of the following structures in a flowering plant corresponds to the structure found in the archegonia of Fern to complete sexual reproduction?

(A) The ovule

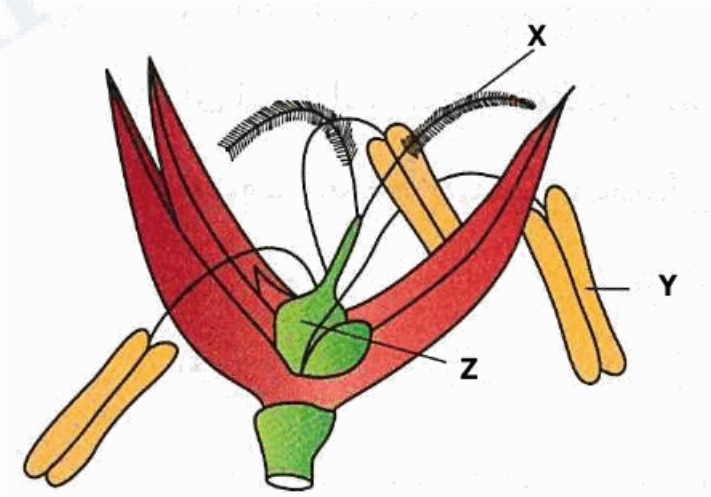
(B) The egg cell

(C) The two nuclei of the embryo sac

(D) The embryo sac

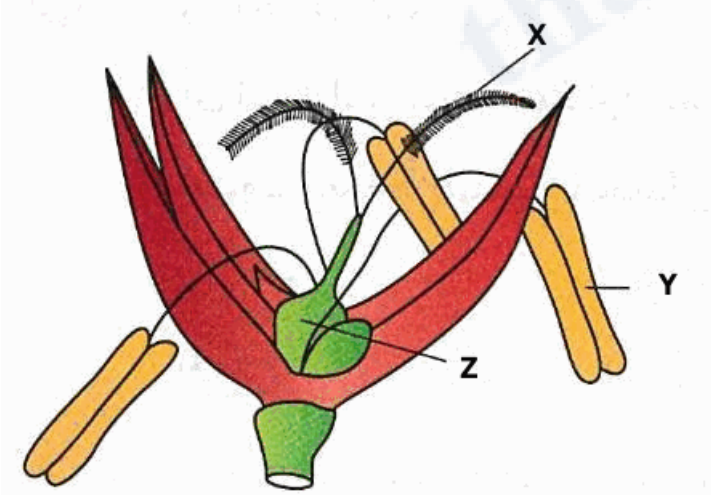
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50 From the opposite figure, which represents the flower of a plant:
Which of the following represents the place where the structures responsible for transferring the genetic material to the offspring are formed?



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

51 From the opposite figure, which represents the flower of a plant:
What type of pollination naturally happens in this flower?



(A) Always self-pollination
(B) Cross-pollination by wind
(C) Cross-pollination by insects
(D) Cross-pollination by humans

52 If the number of chromosomes in a petal cell of the pea plant is 7 pairs of chromosomes, what is the number of chromosomes in one of the cells of the embryo of a pea seed?

(A) 7 chromosomes
(B) 14 chromosomes
(C) 21 chromosomes
(D) 14 pairs of chromosomes

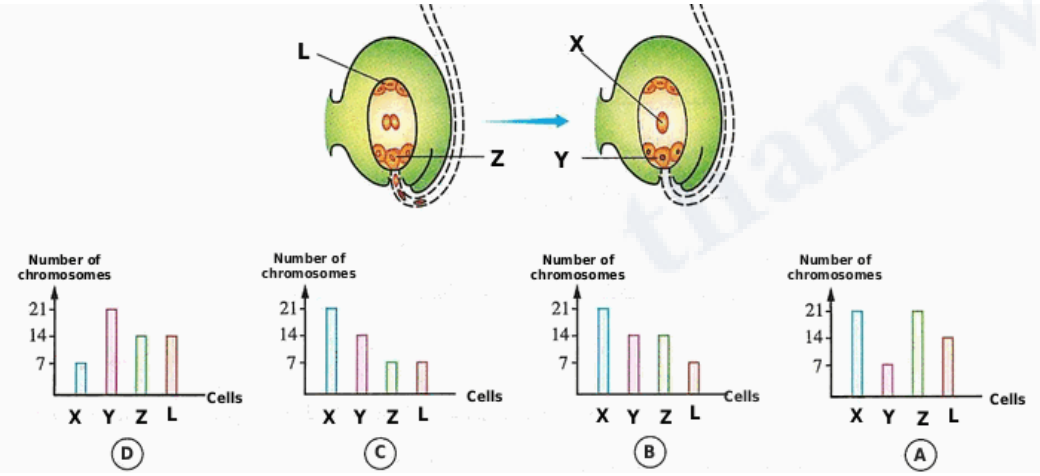
53 A researcher found a wild plant that carries hermaphrodite flowers without petals but with many stamens. What do you expect the method of pollination in this plant to be?

(A) Self or cross-pollination by insects
(B) Self or cross-pollination by wind
(C) Cross-pollination only by insects
(D) Cross-pollination only by wind

54 If the number of chromosomes in the endosperm nucleus of a maize grain is 33 chromosomes, what is the number of chromosomes in one of the cells of the embryo of this grain?

(A) 11 chromosomes
(B) 11 pairs of chromosomes
(C) 33 chromosomes
(D) 33 pairs of chromosomes

55 The two opposite figures show double fertilization in a plant. If you know that the number of chromosomes in the nucleus of a parenchyma cell in the leaf of this plant is 14 chromosomes, which graph represents cells (X) , (Y) , (Z) , (L) correctly?



56 Study the opposite table, then answer:
Which of the following plants depends most on bees for cross-pollination?

L	Z	Y	X	Plant type	
130	80	120	100	With bees	Number of fruits
10	80	80	20	Without bees	

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

57 Study the opposite table, then answer:

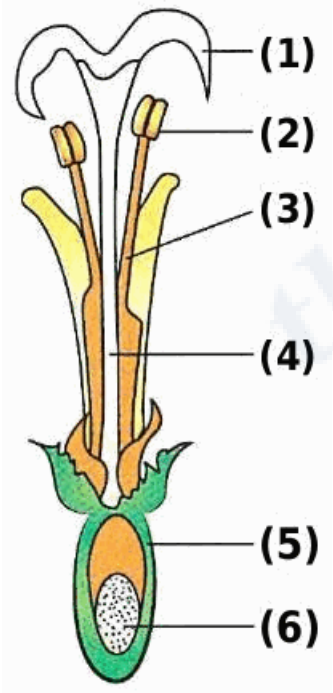
For which of the following plants can air be the main means of pollination?

L	Z	Y	X	Plant type	
130	80	120	100	With bees	Number of fruits
10	80	80	20	Without bees	

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

58 From the opposite figure, answer:

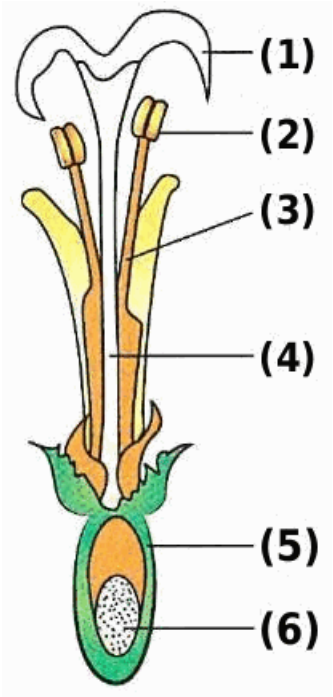
Which of the following may happen if the two structures (1) , (4) are absent?



(A) A true fruit forms with seeds inside it
(B) A false fruit forms with seeds inside it
(C) No fruit forms but seeds form
(D) The flower withers and dies

59 From the opposite figure, answer:

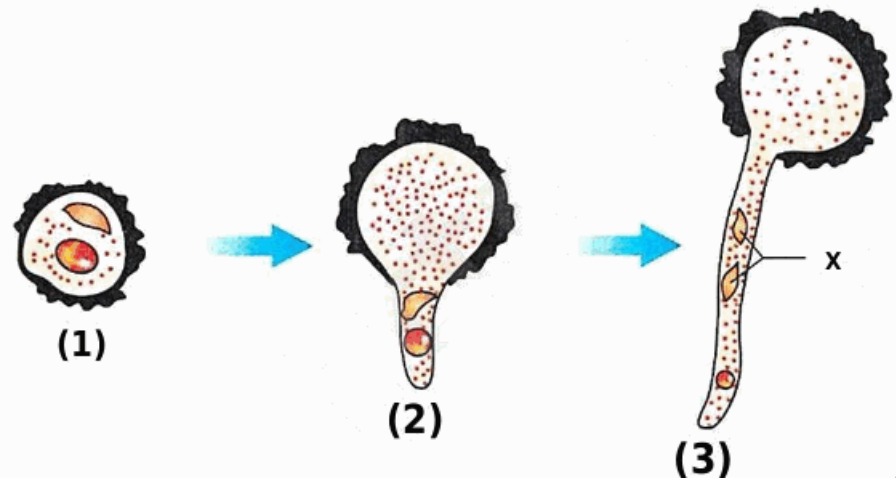
Which of the following parts determine the type of pollination in the flower?



(A) (3) , (4) (B) (2) , (5) (C) (1) , (5) (D) (4) , (6)

60 Study the opposite figure, then answer:

Which of the following is correct about the place where stage (2) shown in the figure takes place?



(A) Always the stigma of a flower of the same plant

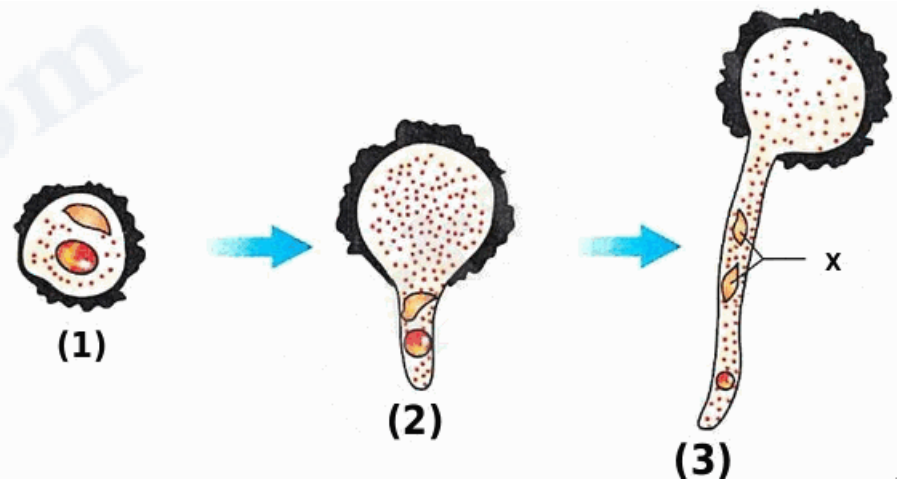
(B) The anther of a mature flower

(C) The funicle of an ovule of the same plant

(D) Sometimes the stigma of a flower of another plant of the same species

61 Study the opposite figure, then answer:

Which of the following is correct about the formation of structure (X)?



(A) It forms when it reaches the micropyle

(B) It forms during pollination

(C) It forms after its fusion with the two polar nuclei

(D) It forms before it reaches the micropyle

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62 What is the source of nourishment of the embryo of the bean seed directly after it forms?

(A) The nucellus

(B) The endosperm

(C) The food stored in the cotyledons

(D) The ovary

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63 Which of the following structures are responsible for forming the grain?

(A) The ovule and the calyx

(B) The ovary and the corolla

(C) The ovary and the ovule

(D) The receptacle and the testa

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64 Which of the following statements is NOT correct?

(A) The ovary wall fuses with the ovule coats in maize

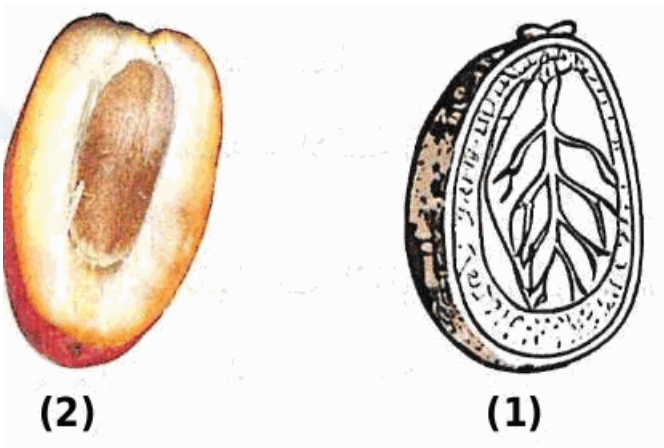
(B) The ovary wall does not fuse with the ovule coats in dates

(C) The endosperm disappears and other food is stored in the two cotyledons in castor oil

(D) Other food is stored in the two cotyledons in pea

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65 From the two opposite figures, which of the following statements is correct?



(A) Forming both requires double fertilization

(B) (1) represents an endospermic seed and (2) represents a non-endospermic seed

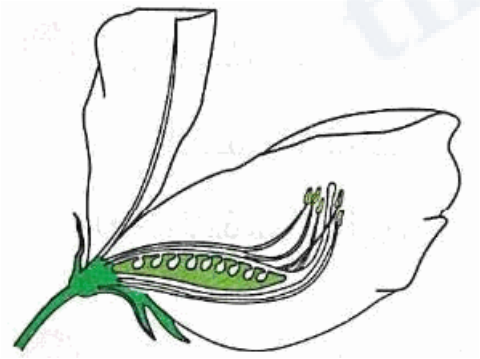
(C) In (2) the fruit coat fuses with the seed coat

(D) (1) , (2) represent monocotyledonous seeds

---

66 The opposite figure represents a flower of the pea plant:

Which of the following can be used as evidence that fertilization has been completed?



(A) Formation of seeds

(B) Formation of the fruit

(C) Withering of the corolla

(D) Withering of the calyx

---

67 The opposite figure represents a flower of the pea plant:

What will form inside the ovary after all the ovules are fertilized?



(A) 9 grains

(B) 9 fruits

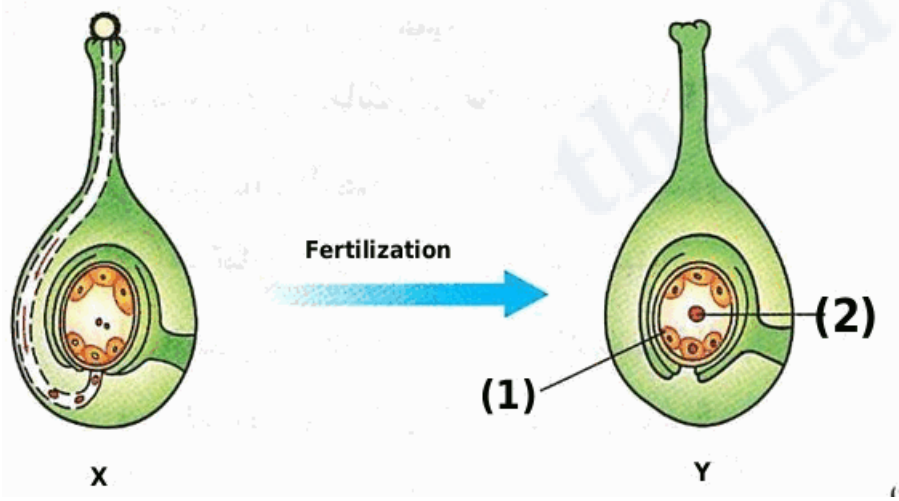
(C) 9 endospermic seeds

(D) 9 non-endospermic seeds

---

68 Study the two opposite figures (X) , (Y), then answer:

What is the fate of cell number (1) after fertilization?



(A) It divides mitotically to form a seed

(B) It divides mitotically to form a fruit

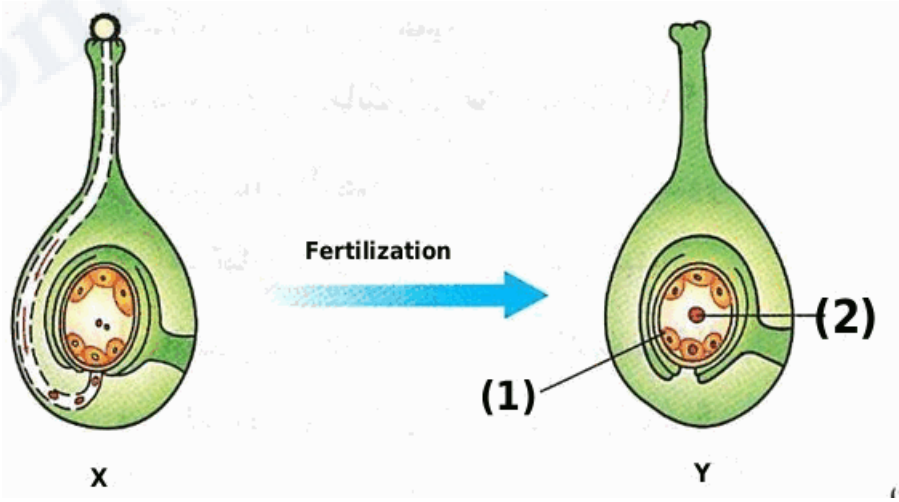
(C) It hardens and takes part in forming the testa

(D) It degenerates and disappears

---

69 Study the two opposite figures (X) , (Y), then answer:

Directly after fertilization, if this ovule is in a flower of the bean plant, what happens to structure number (2)?



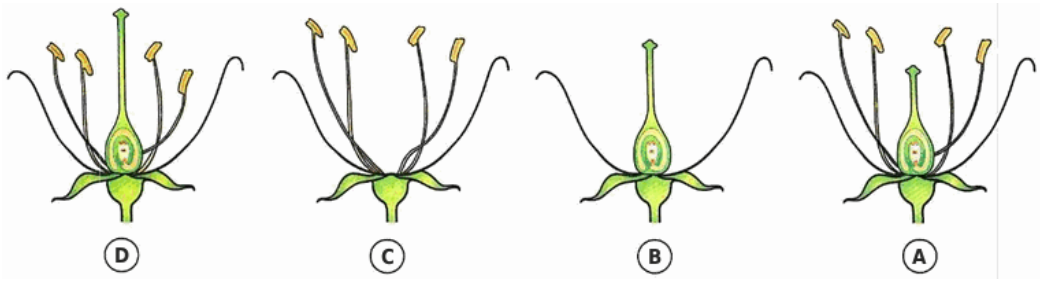
(A) It divides meiotically to form the endosperm tissue

(B) It divides mitotically to form the endosperm tissue

(C) It divides meiotically to form two cotyledons

(D) It divides mitotically to form two cotyledons

70 Which of the following flowers cannot form seeds?



71 What are the chromosome sets of the cells found inside the embryo sac directly after double fertilization?

(A) Haploid only

(B) Diploid only

(C) Diploid and triploid only

(D) Haploid, diploid and triploid

72 In which of the following plants can the fruit coat NOT be separated from the seed coat?

(A) Pea and castor oil

(B) Pea and bean

(C) Wheat and maize

(D) Dates and bean

73 Which of the following vital processes takes place in the seed in the first stage of germination?

(A) Cellular respiration

(B) Photosynthesis

(C) Meiotic division followed by mitotic division

(D) Cellular respiration and photosynthesis

---

74 The banana fruit is similar to the peach fruit in that each of them results from .....

(A) pollination and fertilization

(B) pollination only

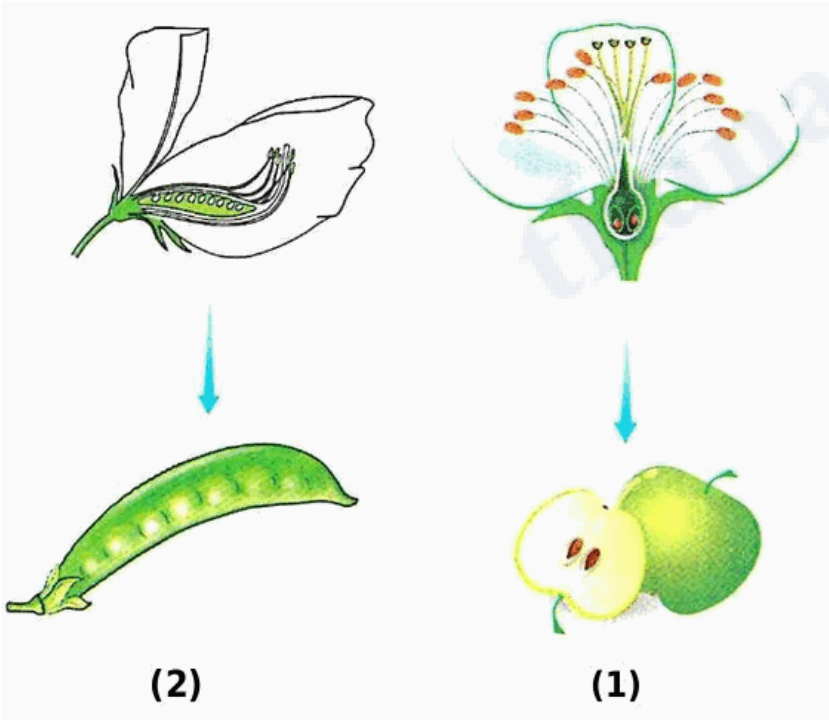
(C) the ovary

(D) the ovule

---

75 From the two opposite figures, answer:

In what does plant (1) differ from plant (2)?



(A) The components of the flower

(B) The origin of the seeds

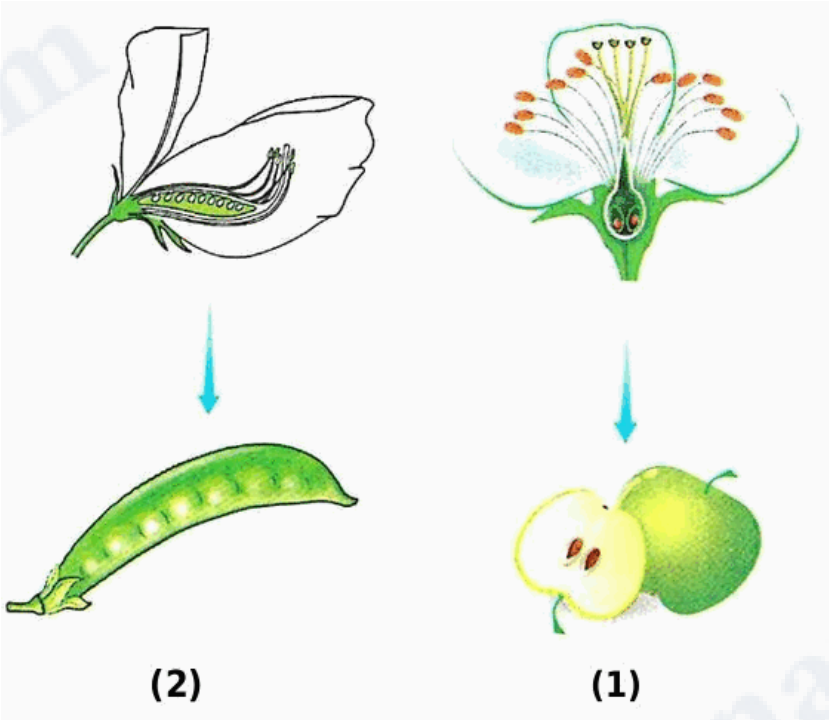
(C) The origin of the fruits

(D) The type of seed

---

76 From the two opposite figures, answer:

Which of the following statements is correct for fruit (1) and fruit (2), respectively?



A true, monocotyledonous / true, dicotyledonous

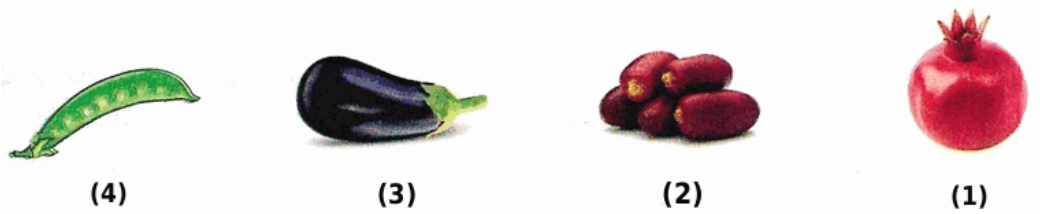
B true, dicotyledonous / true, monocotyledonous

C false, monocotyledonous / false, dicotyledonous

D false, dicotyledonous / true, dicotyledonous

77 In front of you is a group of fruits. Study them, then answer:

Which of the following is a similarity between fruits (1) : (4)?



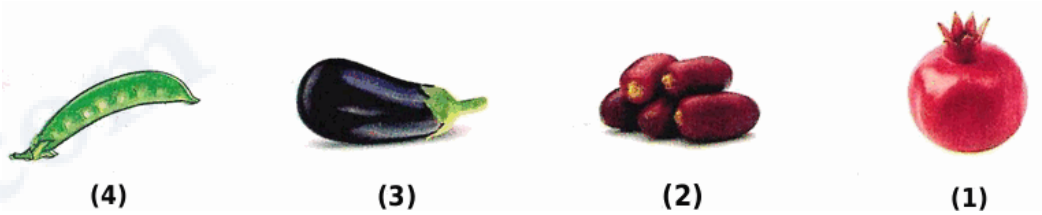
A The number of pollen grains needed to form the seeds

B The number of egg cells needed to form the embryo

C Keeping the sepals

D Keeping the petals

78 In front of you is a group of fruits. Study them, then answer:
In what does fruit (1) differ from fruit (3)?



(A) The number of nuclei that share in forming the seed
(B) The number of chromosomes of the seed
(C) The chromosome set of the endosperm tissue
(D) The part that becomes fleshy with food

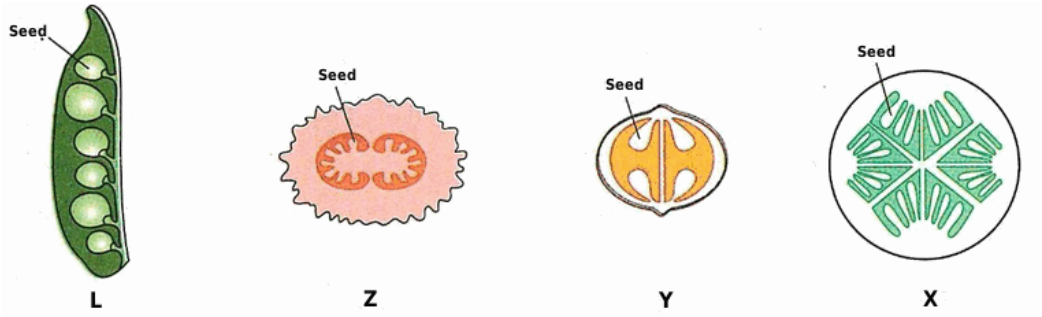
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79 How does the bean embryo get the food needed for its growth under the soil surface during germination?

(A) By photosynthesis
(B) By hydrolysis of starch in the endosperm
(C) By hydrolysis of protein in the two cotyledons
(D) From the mineral salts in the soil

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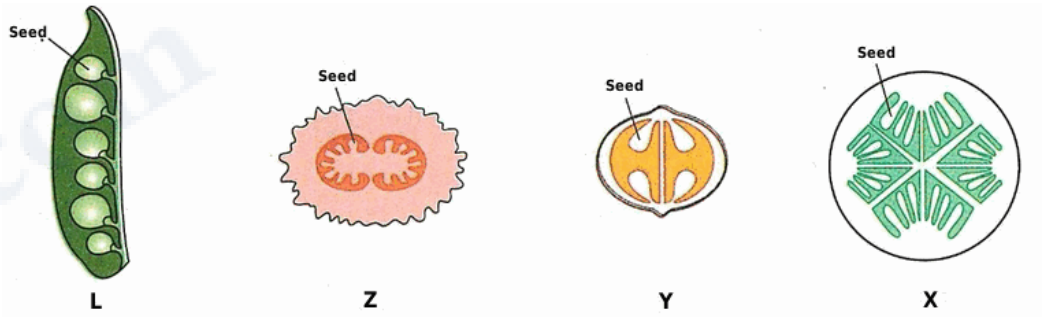
80 The following figures represent sections of several different fruits. Study them, then answer:
How many pollen grains share in forming the seeds of (X)?



(A) 4 (B) 8 (C) 16 (D) 24

---

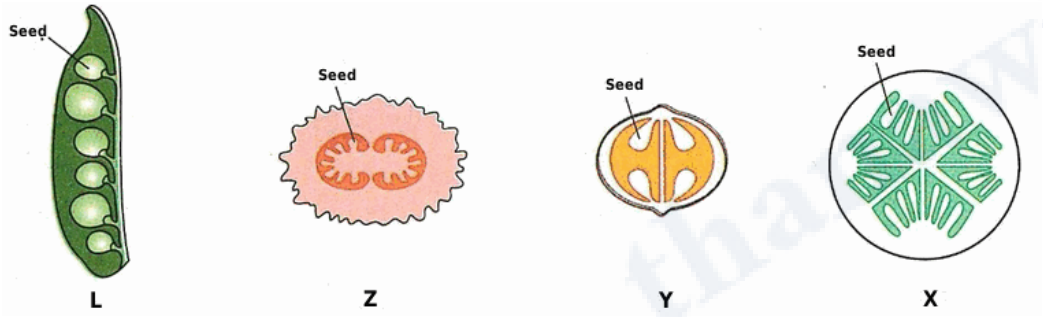
81 The following figures represent sections of several different fruits. Study them, then answer:
How many nuclei share in forming the seeds of (Y)?



(A) 4 (B) 5 (C) 10 (D) 20

---

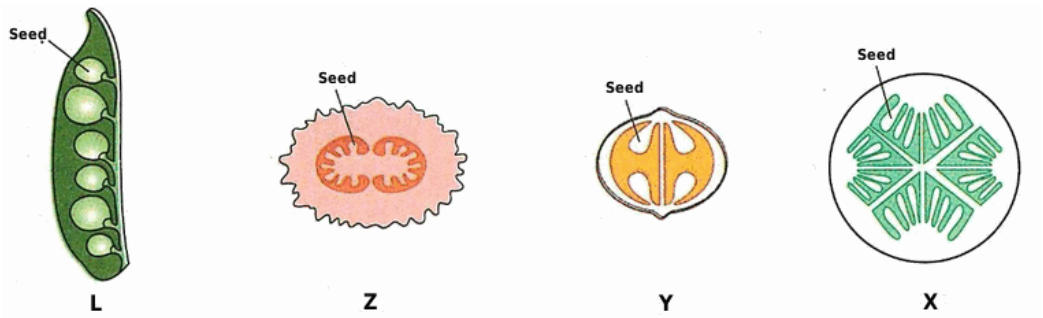
82 The following figures represent sections of several different fruits. Study them, then answer:
How many ovules share in forming the seeds of (Z)?



(A) 1 (B) 2 (C) 7 (D) 14

---

83 The following figures represent sections of several different fruits. Study them, then answer:
Why does the size of the seeds in (L) differ?



(A) Because of the different amount of food stored in the two cotyledons of each
(B) Because of the different number of chromosomes in each
(C) Because of the different amount of food stored in the endosperm tissue of each
(D) Because of the different number of nuclei sharing in forming each

---

84 In the mature ovary of a flower that contains one ovule, how many cells degenerate after double fertilization?

(A) 5 (B) 6 (C) 7 (D) 8

85 Which of the following expresses the origin of the testa?

(A) The ovary wall only
(B) The ovule coats only
(C) The egg coat only
(D) The ovary wall and the ovule coats together

86 Which of the following happens after double fertilization in the plant?

(A) The ovary turns into a fruit and the fertilized ovules turn into seeds
(B) The ovary turns into a seed and each ovule turns into a fruit
(C) The ovule turns into a fruit and each fertilized ovary turns into a seed
(D) The flower withers and falls

87 Which of the following represents the number of cells found in the ovule of a mature flower before and after double fertilization, respectively?

(A) 7 / 6 (B) 7 / 4 (C) 7 / 2 (D) 6 / 2

88 Which of the following plant structures corresponds to the spore in the life cycle of bread mould?

(A) The pollen grain (B) The egg (C) The seed (D) The zygote

89 In which of the following plants does the embryo use up all the endosperm while it forms?

(A) Wheat (B) Maize (C) Lupine (D) Castor oil

90 Which of the following pairs of terms is correct in flowering plants?

(A) Ovary → false fruit
(B) Embryo sac → female gamete
(C) Ovary → true fruit
(D) Zygote → seeds

91 How many pollen grains are needed to fertilize the mango flower?

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

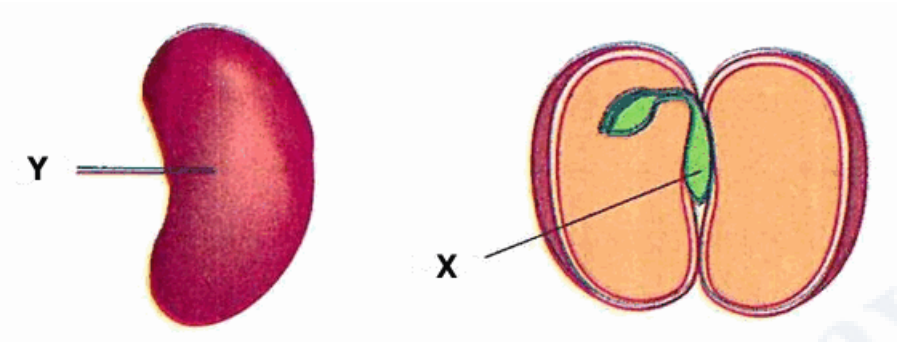
92 How many nuclei share in forming the bean seed?

(A) 2 (B) 3 (C) 4 (D) 5

93 How many nuclei share in forming the wheat grain?

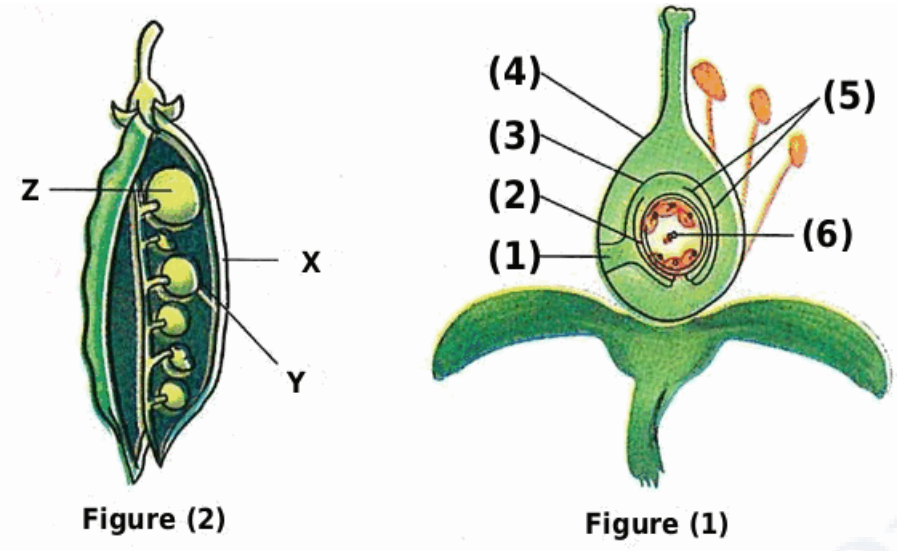
(A) 2 (B) 3 (C) 4 (D) 5

94 From the following figure, which represents the seed of a dicotyledonous plant, what is the number of chromosome sets of the two structures (X) , (Y)?



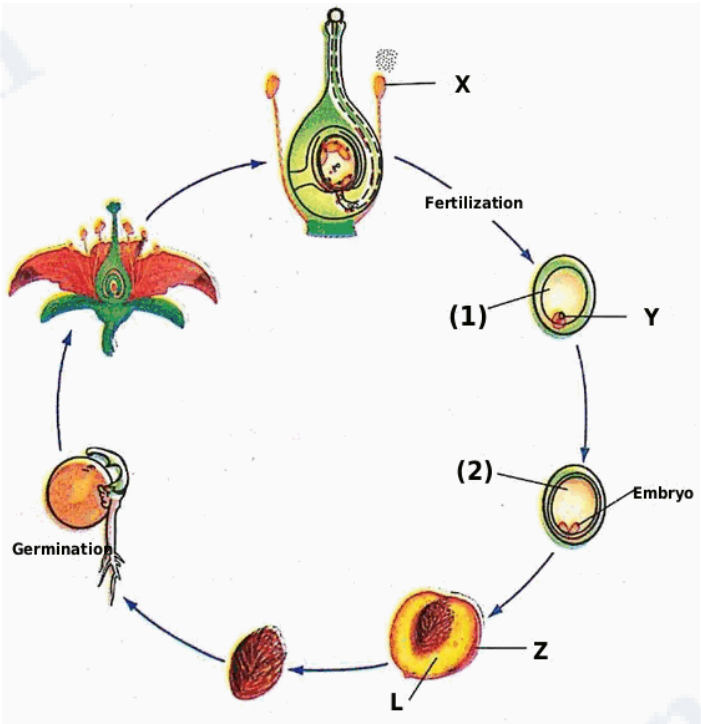
(A) Haploid and diploid, respectively
(B) Diploid and haploid, respectively
(C) Both are haploid
(D) Both are diploid

95 From the two opposite figures, which of the following choices corresponds to parts (X) , (Y) , (Z), respectively, after the fruit forms?



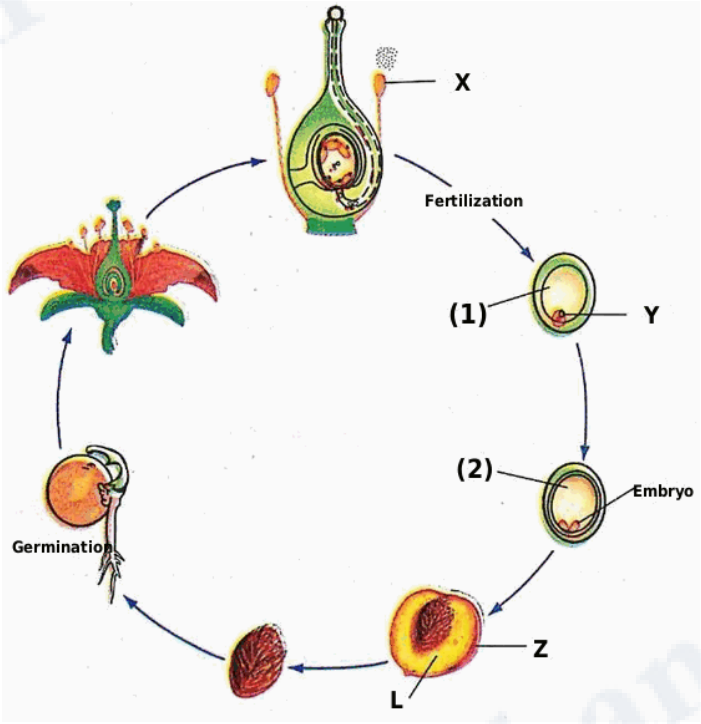
(A) (2) / (4) / (5) (B) (4) / (5) / (2) (C) (5) / (6) / (3) (D) (3) / (5) / (6)

96 The opposite figure represents the life cycle of a flowering plant. Study it, then answer:
From what does structure (Z) develop?



(A) The ovule (B) The ovary (C) The ovule coat (D) The ovary wall

97 The opposite figure represents the life cycle of a flowering plant. Study it, then answer: Which of the following expresses structure number (1) and structure number (2), respectively?



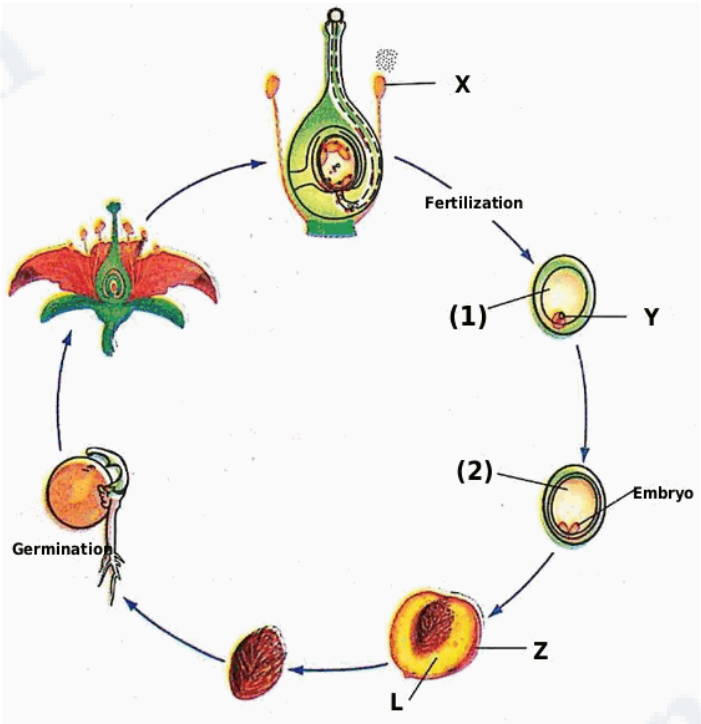
(A) Endosperm tissue / nucellus tissue

(B) Nucellus tissue / endosperm tissue

(C) Endosperm tissue / food stored in the two cotyledons

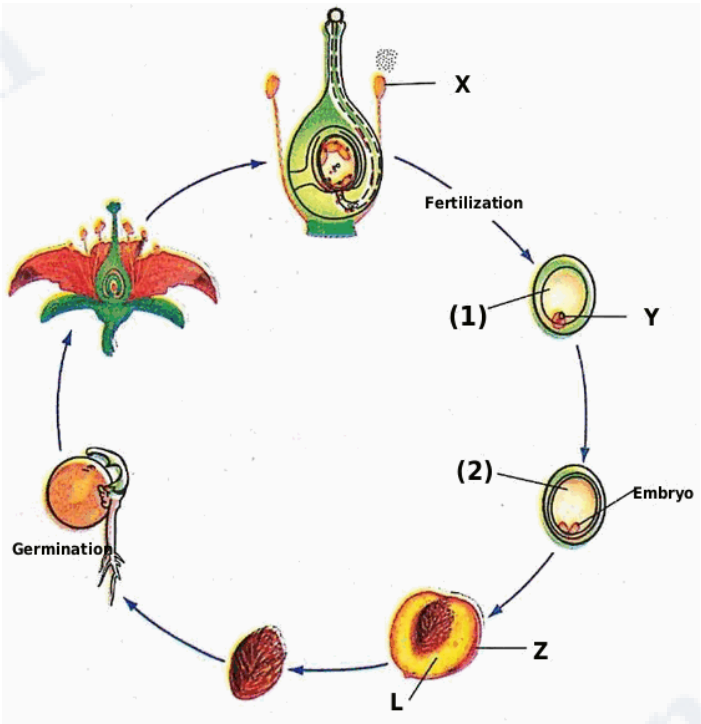
(D) Food stored in the two cotyledons / endosperm tissue

98 The opposite figure represents the life cycle of a flowering plant. Study it, then answer:
What type of cell division takes place in structure (Y)?



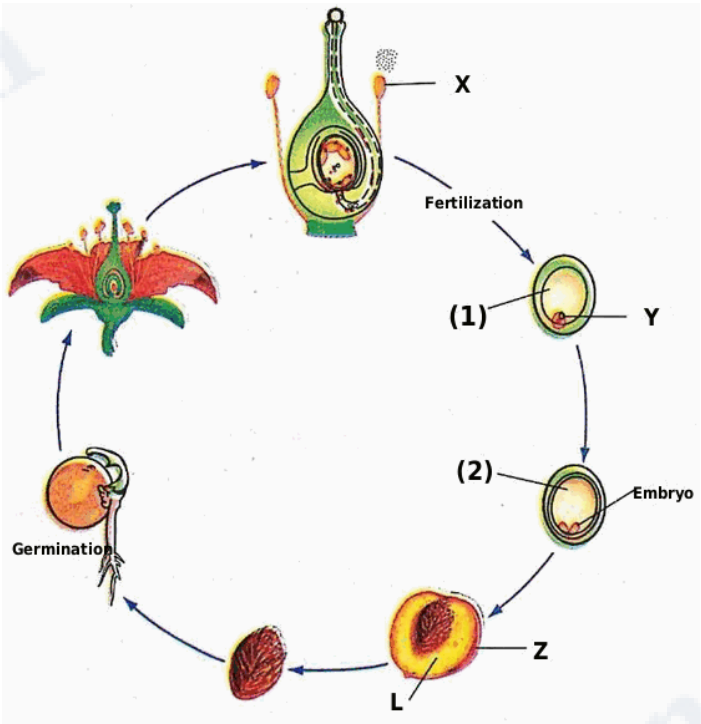
(A) Meiotic
(B) Mitotic
(C) Meiotic then mitotic
(D) Mitotic then meiotic

99 The opposite figure represents the life cycle of a flowering plant. Study it, then answer:
What type of cell division takes place inside structure (X)?



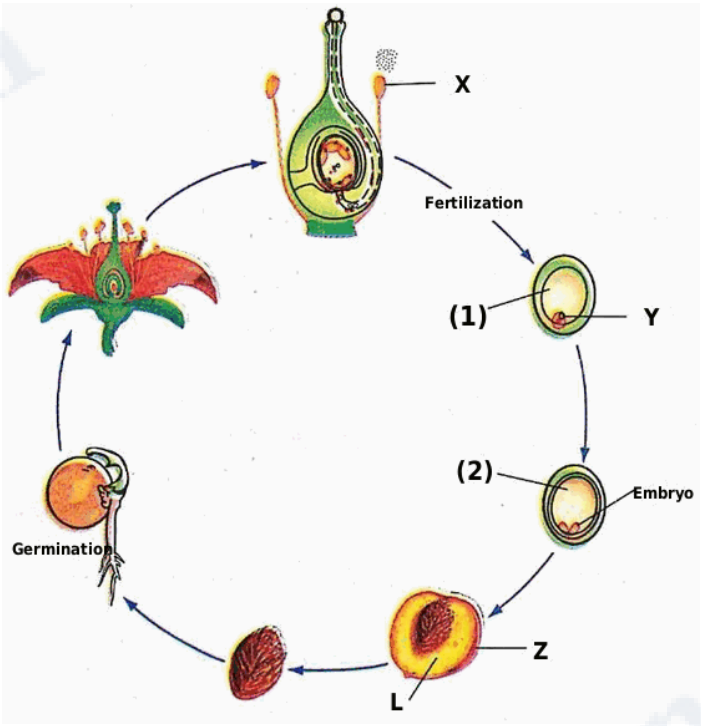
(A) Meiotic
(B) Mitotic
(C) Meiotic then mitotic
(D) Mitotic then meiotic

100 The opposite figure represents the life cycle of a flowering plant. Study it, then answer:
What is the type of pollination in this plant?



(A) Always self-pollination
(B) Cross-pollination, mostly by insects
(C) Cross-pollination by water
(D) Always cross-pollination by humans

101 The opposite figure represents the life cycle of a flowering plant. Study it, then answer:
From what does structure (L) develop?



(A) The receptacle of the flower
(B) The ovary
(C) The ovule
(D) The pedicel of the flower

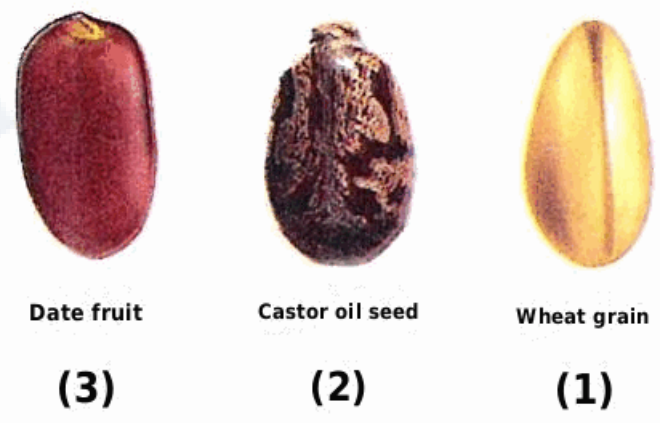
102 If the total number of chromosomes that share in forming a plant grain equals 75, what is the number of chromosomes in the endosperm nucleus?

(A) 15 (B) 20 (C) 30 (D) 45

103 Which of the following is NOT one of the natural effects of plant hormones?

(A) Ripening of fruits and increase in their size
(B) Withering of annual plants before reproduction is completed
(C) Growth of the root system
(D) Coiling of the tendril around the support

104 Study the opposite pictures. Which of the following statements is NOT correct?



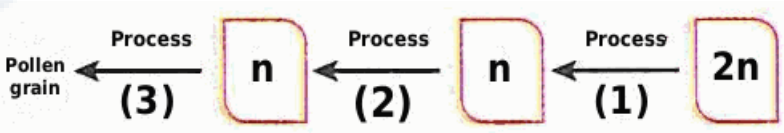
(A) (1) is an endospermic monocotyledonous seed
(B) (3) is an endospermic monocotyledonous seed
(C) (2) is an endospermic dicotyledonous seed
(D) (2) is a non-endospermic dicotyledonous seed

105 A tree produces seedless oranges, and when a small branch is cut from this tree and planted in the soil, it produces a new plant. Which of the following characterizes the ripe fruits?

(A) Most of them have seeds
(B) Most of them are seedless
(C) All of them have seeds
(D) All of them are seedless

Essay questions — 18 questions

1 Study the opposite chart, which shows the stages of forming the male gametes in the plant. What are processes (1) , (2) , (3)? And what is the purpose of each of them?



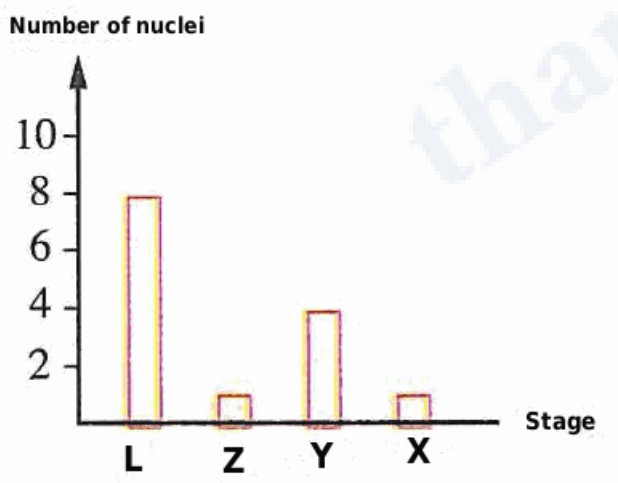
2 The opposite graph shows the stages of division of a cell inside the ovary of a flower, showing the number of nuclei produced at each stage:

(1) What types of division does cell (X) pass through until it reaches cell (L) inside the ovary of the flower? Explain your answer.

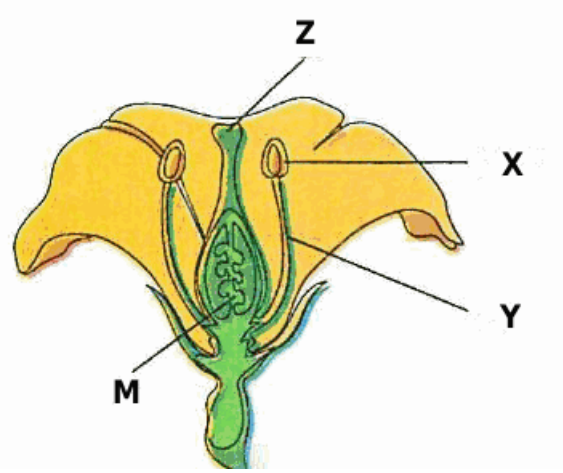
(2) What is the number of chromosome sets of the nuclei in stages (X) : (L)?

(3) What is the number of cells in each of the two stages (Y) , (L)? Explain your answer.

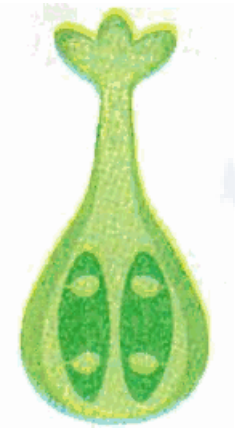
(4) What is the difference between cell (X) and cell (Z)?



3 From the opposite figure, identify the letters and names of the structures in which meiotic division takes place.



4 Study the opposite figure, which shows a section in one of the carpels of a flower. What is the expected number of antipodal cells formed in the figure?

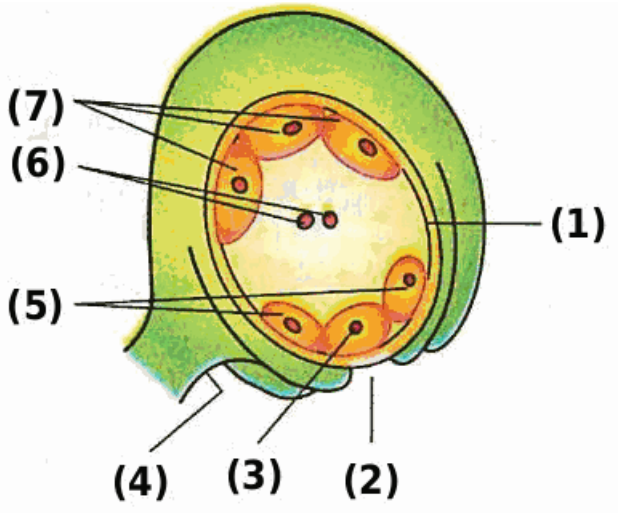


5 The opposite figure shows an ovule directly before fertilization. Identify the number and name of the structure that:

(1) results from the meiotic division of the spore mother cell.

(2) fuses with the nucleus of the pollen grain to form the zygote.

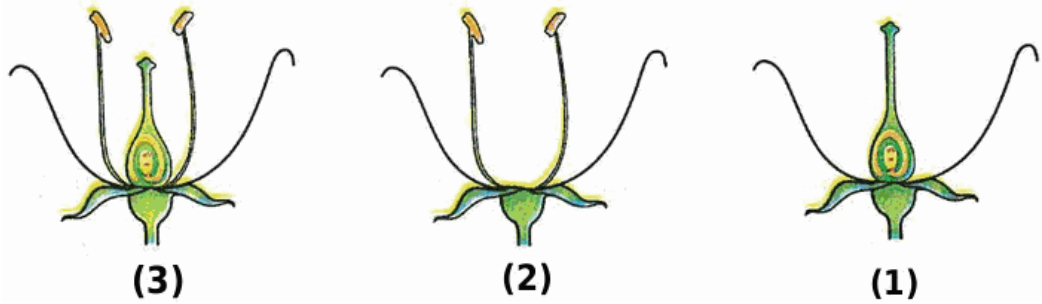
(3) the pollen tube reaches.



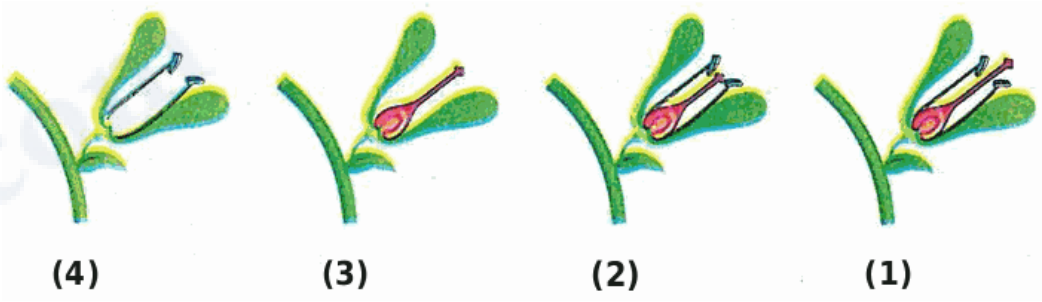
6 Why do some farmers remove the anthers from hermaphrodite flowers?

7 What happens if pollination does not take place in flowering plants?

8 From the opposite figures, which of them can represent a flower that produces a false fruit? Explain your answer.



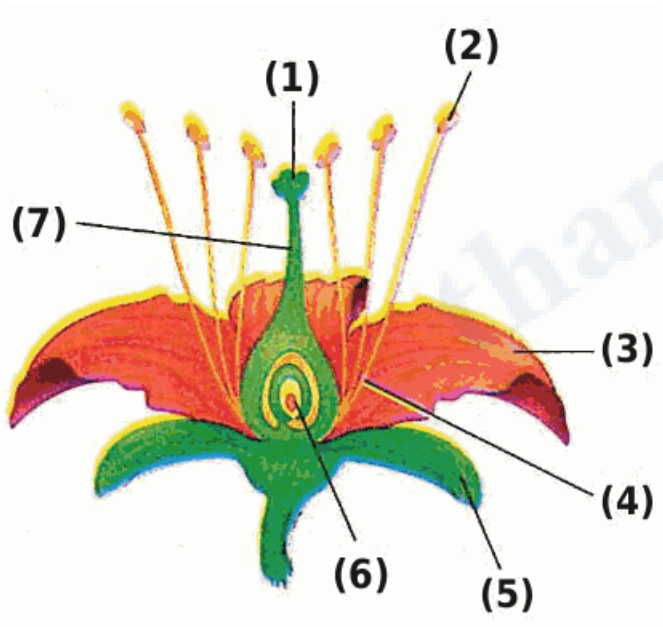
9 From the opposite figures, which flowers give individuals with high genetic variation? Explain your answer.



10 From the opposite figure:

(1) What are the main parts responsible for determining the type of pollination?

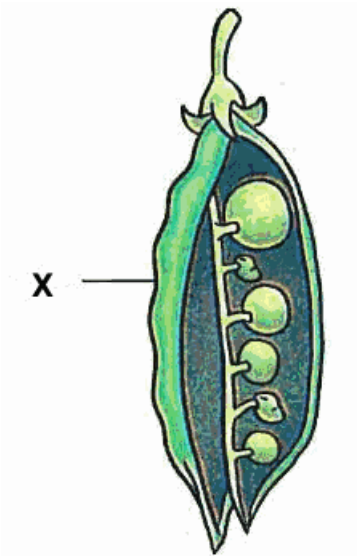
(2) What are the parts responsible for determining the means of pollination?



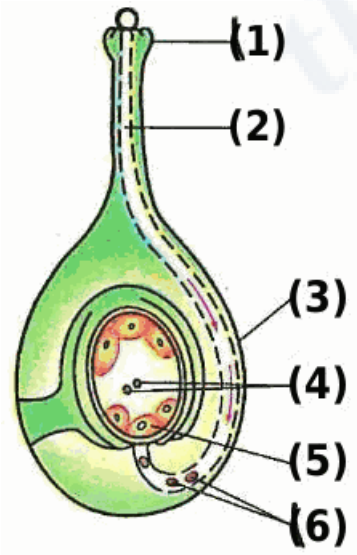
11 The opposite figure shows the fruit of the pea plant after it opens. Study it, then answer:

(1) What means does this plant use to keep its stem upright although it is weak?

(2) Write what structure (X) indicates, and what its origin is.

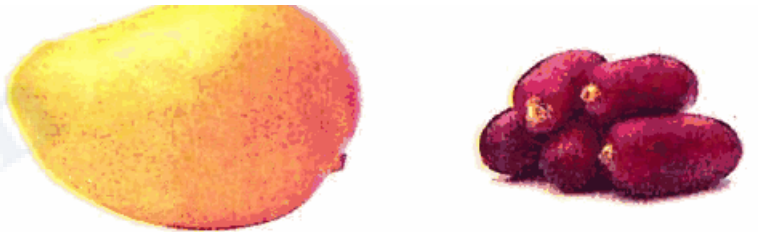


12 From the opposite figure, identify the numbers and names of the structures responsible for completing double fertilization.



13 Castor oil seeds combine the characteristics of monocotyledonous and dicotyledonous seeds. Explain that.

14 What is the similarity between the origin of the two fruits shown in front of you?



15 A watermelon fruit contains 240 seeds. How many pollen grains are needed for fertilization? And how many spore mother cells are needed in this ovary to form these seeds?

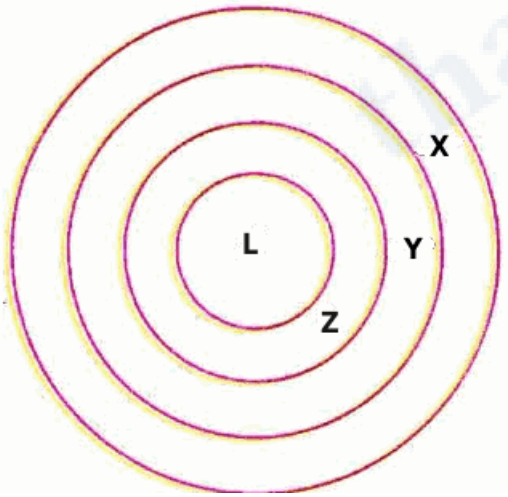
16 The opposite diagram shows the whorls of a typical flower arranged from the outside inwards. Which floral whorls remain present after the fruit forms in the following plants:

(1) Eggplant.

(2) Pomegranate.

(3) Pumpkin.

(4) Dates.



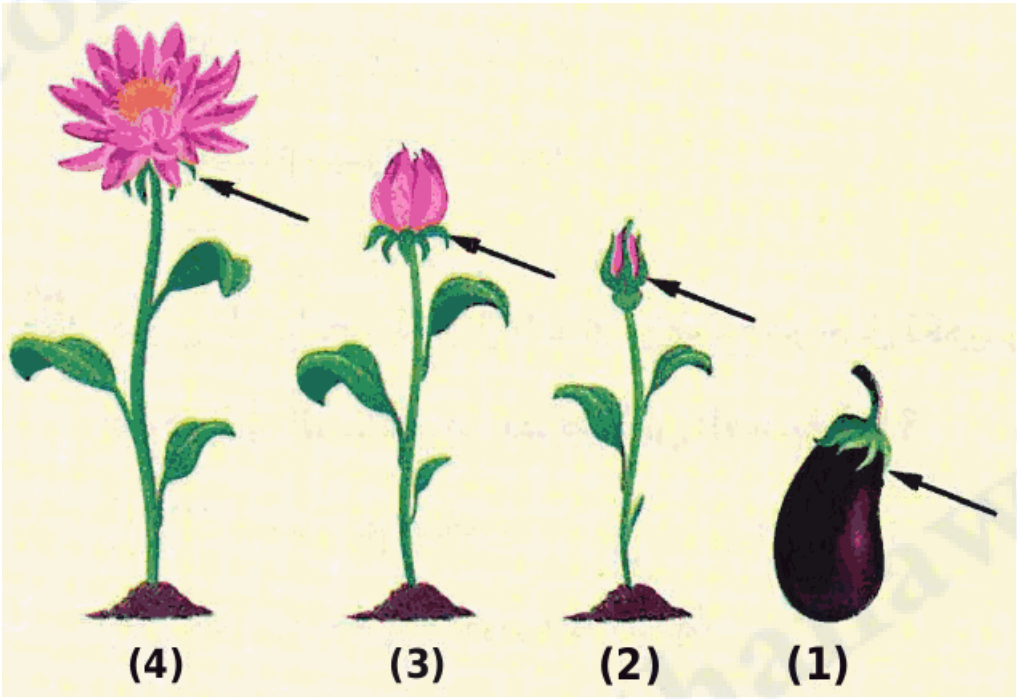
17 Study the opposite table, then deduce: what do the letters (X) , (Y) , (Z) refer to?

Bean: method of reproduction (X) , plant (Y): spores , carrot: method of reproduction (Z).

18 Parthenocarpy is not considered reproduction, while parthenogenesis is considered reproduction. Explain that.

Past exam questions — 67 questions

1 Which of the opposite figures shows the main role of the structure pointed to by the arrow? (Trial exam / June 2021)



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

2 Which floral whorl(s) carry out the function of protection in the flower? (1st session 2024)

(A) The calyx only
(B) The corolla only
(C) The calyx and the receptacle
(D) The calyx and the corolla

3 How many floral whorls are there in a male flower whose corolla consists of 4 rows of petals? (Sample exam 2025)

(A) Two whorls (B) 3 whorls (C) 4 whorls (D) 6 whorls

4 The swollen end of the flower pedicel, which carries all the parts of the flower, is called ..... (Sample exam 2025)

(A) the bract (B) the receptacle (C) the calyx (D) the corolla

5 Which of the following floral whorls of the tulip flower attract insects to pollinate the flower? (Sample exam 2025)

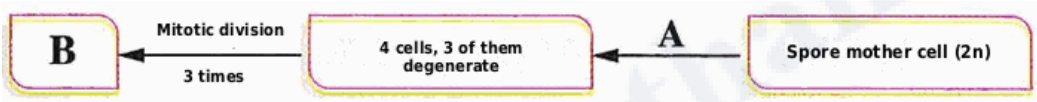
(A) The calyx only
(B) The corolla only
(C) Both the calyx and the corolla
(D) Both the corolla and the androecium

6 Which of the following represents the difference between the steps of forming pollen grains and ovules in flowering plants? (Trial exam / May 2021)

(A) The order of meiotic and mitotic division
(B) The number of times of mitotic division
(C) The number of times of meiotic division
(D) The number of cells resulting from meiotic division

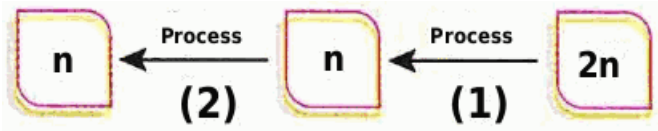
7 Study the following chart, which expresses the stages of forming an ovule of the bean plant: (Trial exam / June 2021)

What do (A) , (B) express, respectively?



(A) Mitotic division / 4 cells
(B) Meiotic division / 4 nuclei
(C) Mitotic division / 8 cells
(D) Meiotic division / 8 nuclei

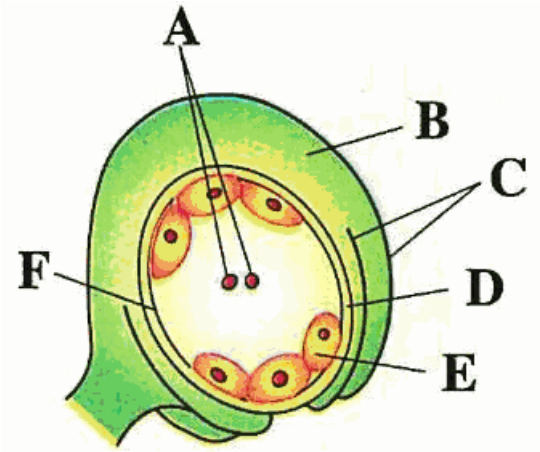
8 Study the opposite chart, which shows the stages of forming the male gametes in the plant. What is the purpose of process (2)? (1st session 2021, 2022)



(A) Producing microspores
(B) Producing the nuclei of the pollen grain
(C) Forming the spore mother cells
(D) Reducing the number of chromosomes

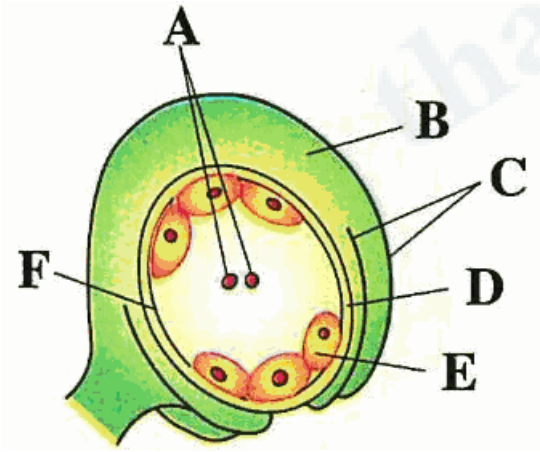
9 The opposite figure shows part of a mature ovary:

(1) Which letter expresses the food of the contents of the embryo sac? (2nd session 2021, 2022)



10 The opposite figure shows part of a mature ovary:

(2) Which letter expresses one of the products of meiotic division? (Trial exam 2023, Sample exam 2025)



11 Study the opposite figure, which shows a section in one of the carpels of a flower. What is the expected number of synergid cells formed in the figure? (2nd session 2022)



(A) 20 (B) 15 (C) 5 (D) 8

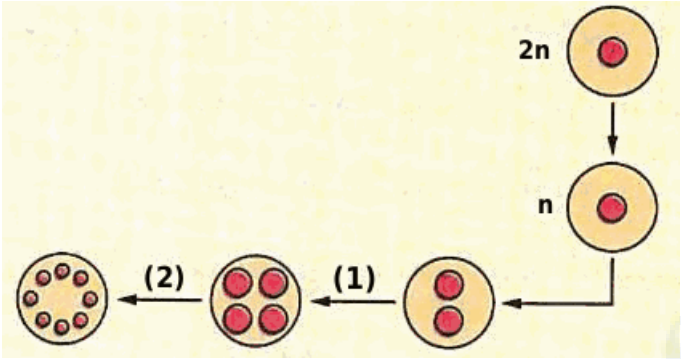
12 What is the source of the nutrients needed to nourish the ovule in flowering plants? (1st session 2023, Sample exam 2025)

(A) The nucellus and the micropyle
(B) The funicle
(C) The endosperm
(D) The ovary wall and the nucellus

13 When are the pollen sacs full of spore mother cells? (2nd session 2023)

(A) During the production of pollen grains
(B) Before the production of pollen grains
(C) Before and after the production of pollen grains
(D) Before and during the production of pollen grains

14 In front of you is a diagram showing one of the stages of sexual reproduction in flowering plants. Identify the type of division in (1) , (2), respectively. (2nd session 2023)



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

15 What is the importance of the degeneration of three of the four cells produced by the meiotic division of the spore mother cell in the ovary of a flower while the ovule matures? (1st session 2024)

(A) Reducing the number of chromosomes and providing food for the ovule

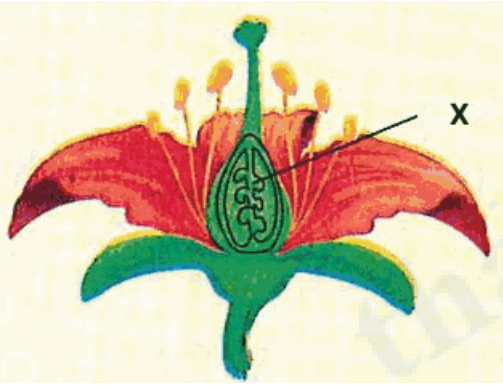
(B) Forming the embryo sac and forming the funicle

(C) Reducing the number of chromosomes and forming the micropyle

(D) Providing food for the ovule and forming the ovule coats

---

16 The opposite figure shows the structure of the flower in angiosperms. How many meiotic divisions lead to producing the gametes found in the structure pointed to by the letter (X) in the figure? (1st session 2025)



(A) 1 (B) 3 (C) 6 (D) 18

---

17 How many swellings (spore mother cells) are attached to the wall of the flower ovary at the beginning of ovule formation? (2nd session 2025)

(A) One (B) Four (C) One or two (D) One or many

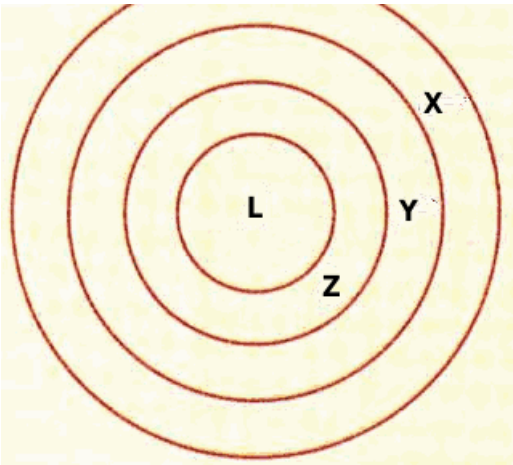
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18 The mature pollen grain contains ..... (Sample exam 2026)

(A) one nucleus (B) two nuclei (C) three nuclei (D) four nuclei

---

19 Study the opposite diagram, which shows the whorls of a fully mature flower arranged from the outside inwards, then deduce: what is the reason that confirms self-pollination happens in this flower? (Trial exam / May 2021)



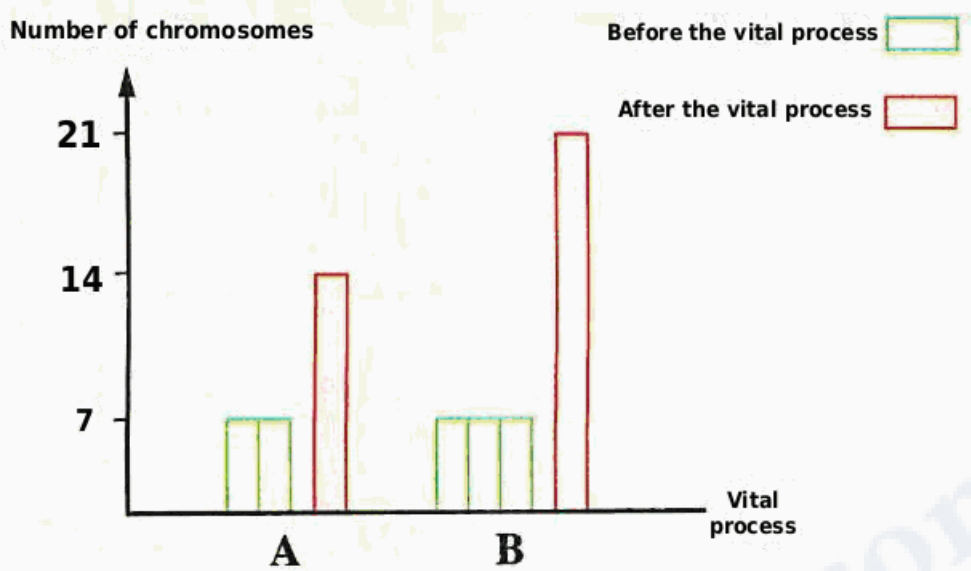
(A) (Y) attracting insects

(B) Both (Z) , (L) maturing at the same time

(C) (L) maturing before (Z)

(D) (X) protecting the inner components

20 Study the opposite graph, which shows one of the vital processes inside the ovules of the pea plant (its body cells contain 14 chromosomes), then deduce: what vital process do (A) , (B) together express? (Trial exam / May 2021)



(A) Double fertilization

(B) Triple fusion

(C) Formation of the embryo sac

(D) Formation of the fruit

21 Which of the following must be found in flowers that are cross-pollinated by wind? (1st session 2021)

(A) Pollen grains that are numerous and light in weight

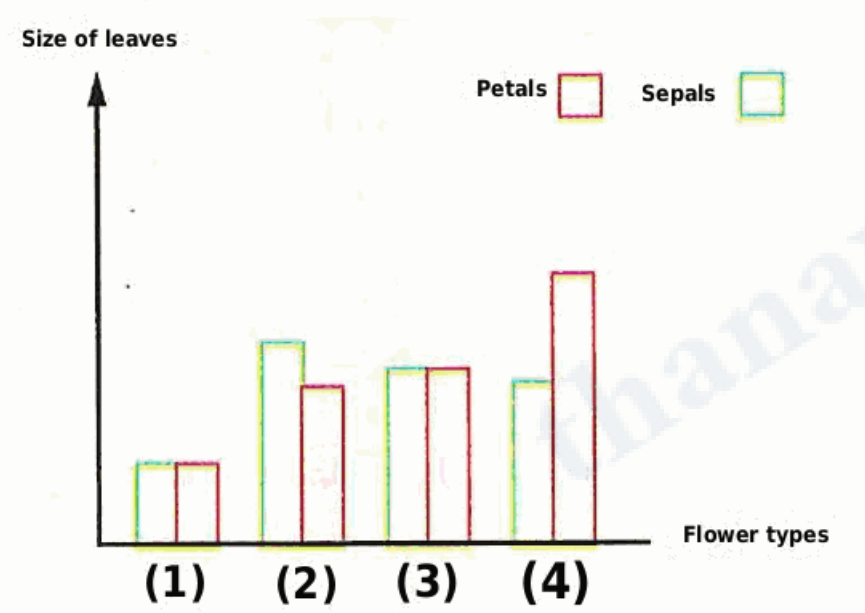
(B) Stigmas completely covered by petals

(C) Brightly coloured petals

(D) The level of the stigmas lower than the level of the anthers

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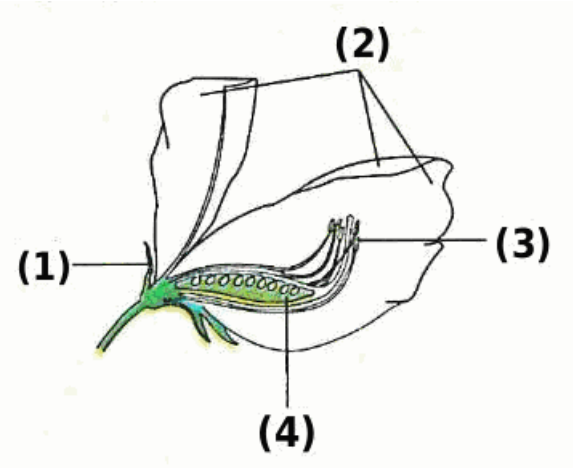
22 The opposite graph shows the size of the leaves of two floral whorls of four flowers of different species. Which number refers to the flower pollinated by insects? (2nd session 2021)



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

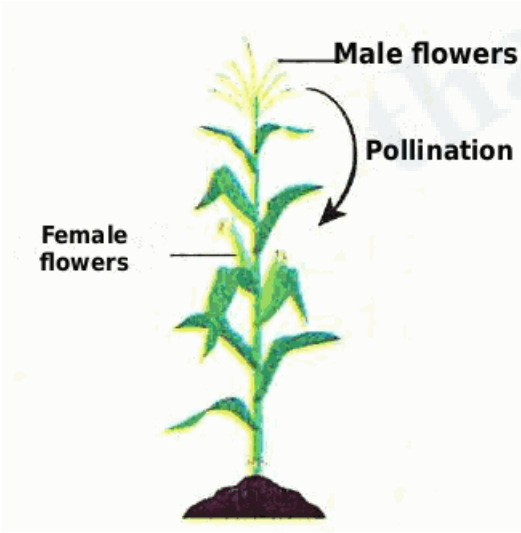
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23 Which of the following is determined by structure number (2) in the opposite figure? (1st session 2022)



(A) Fertilization (B) The fruit (C) Pollination (D) The seed

24 Study the opposite figure, then answer: what characterizes pollination as it appears in the figure? (2nd session 2022)



(A) Cross-pollination for the plant
(B) Self-pollination for the plant
(C) Self-pollination for the plant and for the flower
(D) Cross-pollination for the plant and for the flower

25 What role does the filament play in the stamens of flowers? (2nd session 2022)

(A) It determines the type of pollination in unisexual flowers

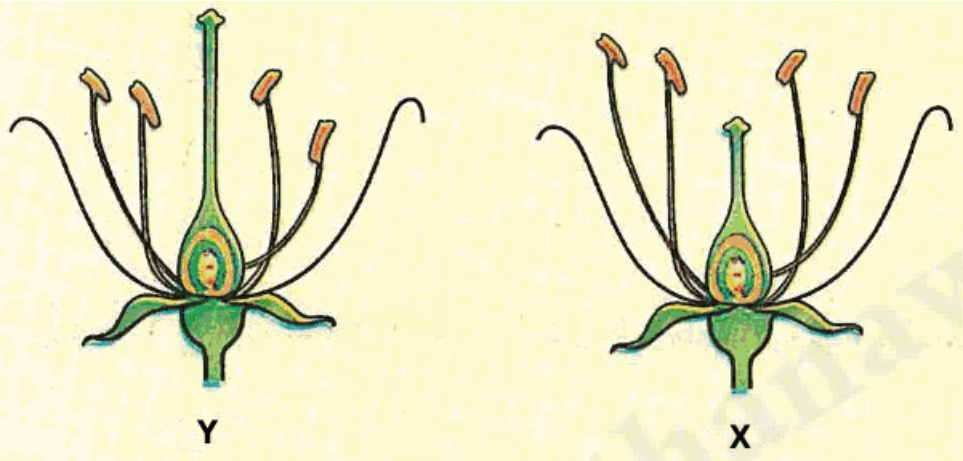
(B) It determines the type of pollination in hermaphrodite flowers

(C) It protects the carpels in hermaphrodite flowers

(D) It shares in forming pollen grains

---

26 What is the difference between the two flowers (X) , (Y)? (Trial exam 2023, Sample exam 2025)



(A) The type of pollination

(B) The sex of the flower

(C) The number of pollen sacs

(D) The number of ovules

---

27 Study the following table, which shows the structures that appear when examining the pollen sacs and the ovary of three flowers of different plants, then deduce: (2nd session 2023)

Flower (1): anther: microspores , ovary: egg cell.

Flower (2): anther: generative nucleus and tube nucleus , ovary: spore mother cells.

Flower (3): anther: generative nucleus and tube nucleus , ovary: antipodal cells.

What is the reason that self-pollination happens in flower (3) and does not happen in flowers (1) , (2)?

(A) The flower has a floral envelope

(B) The absence of cross-pollination means

(C) The anthers are at a higher level than the stigmas

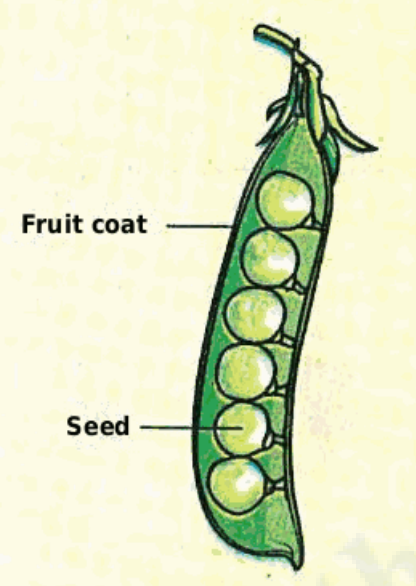
(D) The two sexual parts mature together

---

28 What is the product of double fertilization in flowering plants? (2nd session 2023)

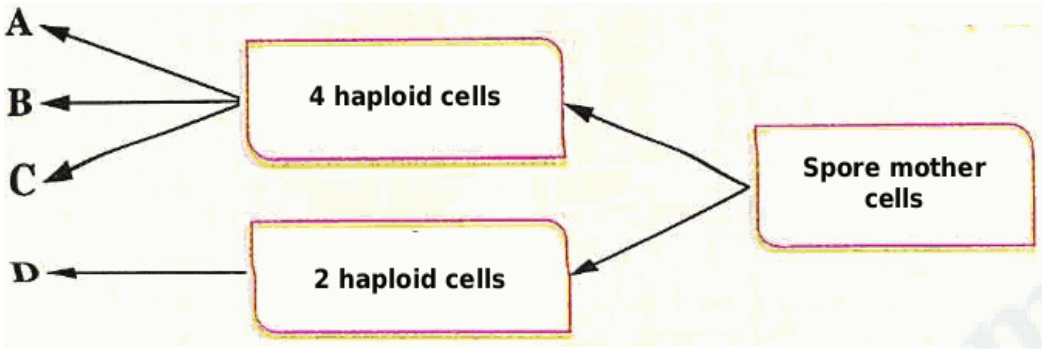
(A) A zygote and an endosperm nucleus
(B) An embryo and endosperm tissue
(C) A zygote and nucellus
(D) An embryo and a fruit

29 Study the figure in front of you, then deduce: how many pollen tubes and male nuclei shared in producing the seeds of this fruit, respectively? (2nd session 2024)



(A) 6 / 12
(B) 6 / 6
(C) 12 / 12
(D) 12 / 6

30 Study the following chart, which shows the division of spore mother cells and the final product of these divisions. If (A) , (B) are produced in flowering plants, while (C) is produced in a non-flowering plant and (D) is produced in a primitive organism, which letters express the production of new individuals? (2nd session 2024)



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

31 What is the product of triple fusion in the fertilization of the pea plant? (2nd session 2025)

(A) The zygote
(B) The zygote and the endosperm nucleus
(C) The endosperm nucleus
(D) The tissue needed for seed germination

32 The pollen tube in flowering plants plays a main role in ..... (Sample exam 2026)

(A) carrying the male nuclei to the ovule
(B) stimulating the ovary to form seeds
(C) carrying the tube nucleus and the generative nucleus to the embryo sac
(D) delivering the pollen grain to the ovule to complete fertilization

33 How many nuclei are found in the pollen tube while it passes through the ovary wall? (Sample exam 2026)

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

34 Which of the following describes the eggplant fruit? (Trial exam / May 2021)

(A) True (B) False (C) Single-seeded (D) Seedless

35 Which fruit differs in its type from the other fruits? (Trial exam / June 2021)



36 What are the pea pods resulting from treating the flowers with pollen grain powder in ether solution like? (1st session 2021)

(A) Empty of seeds (B) Longer (C) Larger in size (D) With few seeds

37 What is the similarity between bean seeds and maize grains? (1st session 2021)

(A) Both contain a micropyle through which water passes during germination
(B) The embryo feeds on the endosperm during germination
(C) The embryo feeds on the food stored in the cotyledons during germination
(D) Both are endospermic seeds

38 Look at the figure in front of you, then explain how this fruit formed. (2nd session 2021)



(A) Pollination then fertilization
(B) Removing the stamens of the flower
(C) Pollination without fertilization
(D) Treating the plant with nitrous acid

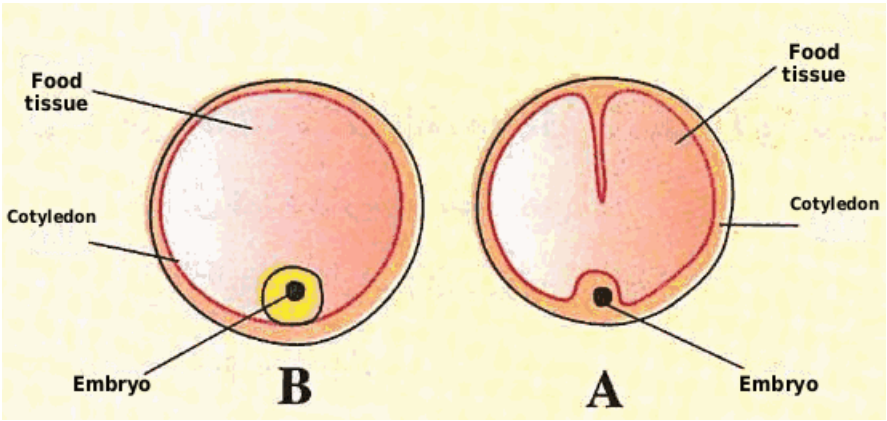
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39 The wheat plant shows only vegetative growth in February and March. What means can stimulate this plant to form flowers and fruits when it is grown in these two months? (2nd session 2021)

(A) Spraying the plant with mustard gas
(B) Watering the plant at close intervals
(C) Using organic fertilizers
(D) Spraying the plant with indole acetic acid solution

---

40 In front of you are two different types of seeds (A) , (B) in flowering plants. Identify them, then determine the most important thing that distinguishes seed (A) from seed (B). (2nd session 2021)



(A) Presence of the nucellus
(B) Disappearance of the nucellus
(C) Disappearance of the endosperm
(D) Presence of the endosperm

---

41 What is the similarity between the pineapple and apple fruits? (1st session 2022)

(A) Their formation is linked to pollination and fertilization

(B) Both contain seeds

(C) They result from pollination without fertilization

(D) They result from hormonal activity

---

42 Study the opposite chart, which shows a human carrying out a process on the plant. What is the role of substance (X) in forming (Y)? (1st session 2022)



(A) Increasing the size of the seeds

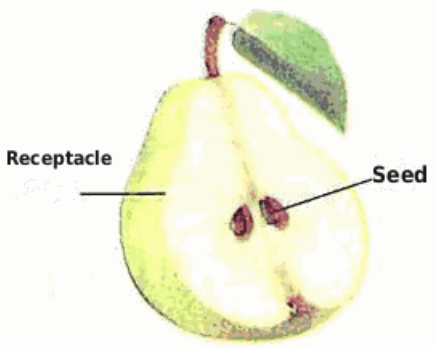
(B) Increasing the number of seeds

(C) Inducing the plant to resist diseases

(D) Stimulating the reproductive organs to form fruits

---

43 Study the opposite figure, then answer: what is the correct description of this fruit? (2nd session 2022)



(A) It formed from the ovary becoming fleshy

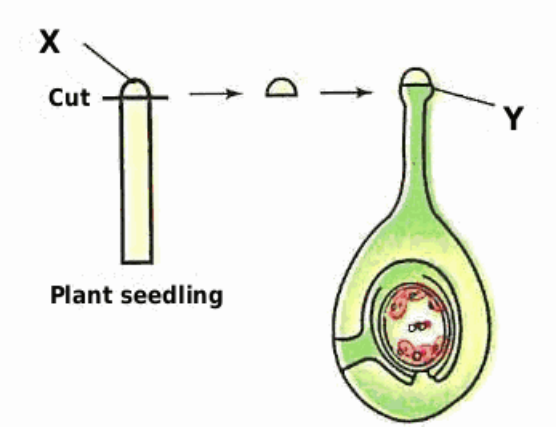
(B) It resulted from fertilization

(C) It resulted from hormonal stimulation

(D) It formed without fertilization

---

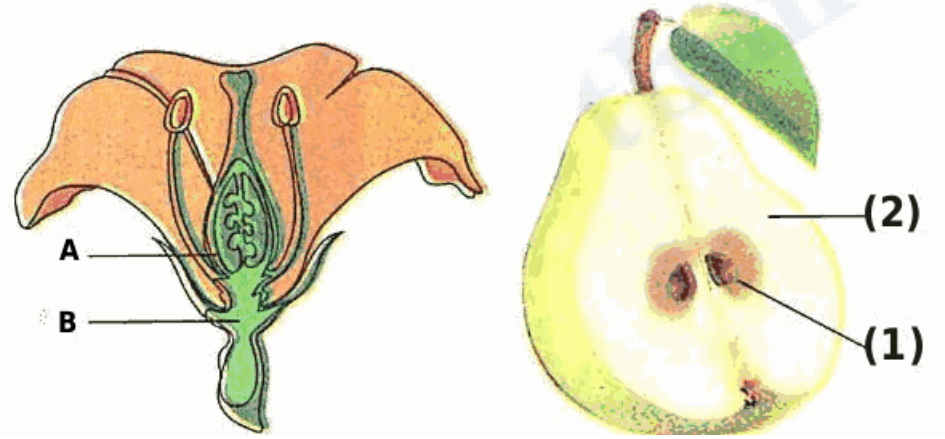
44 What are the results of putting part (X) on part (Y)? (2nd session 2022)



(A) Hardening of the flower coats
(B) The ovary cells becoming fleshy
(C) Formation of a false fruit
(D) Withering of the flower

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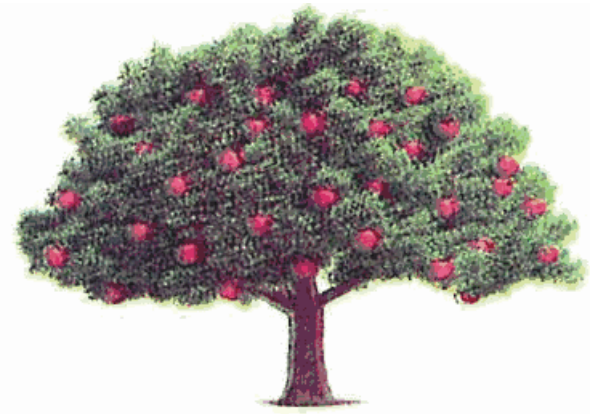
45 Study the opposite figure, which shows the formation of a fruit. If you know that (1) results from (A), and (2) results from (B), which of the following describes the resulting fruit? (Trial exam 2023, Sample exam 2025)



(A) True, resulting from no fertilization
(B) False, resulting from fertilization
(C) True, resulting from fertilization
(D) False, resulting from no fertilization

---

46 From the opposite picture, what is the effect of inhibiting auxins on this plant during this stage of its growth? (Trial exam 2023)

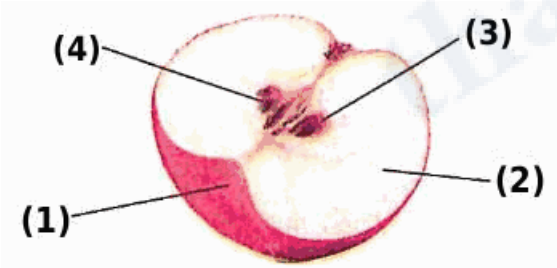


A tree carrying fully ripe fruits

(A) Formation of seedless fruits
(B) Withering of the fruits
(C) Stopping of vegetative growth
(D) Withering and death of the plant

---

47 From the picture in front of you, what structure(s) result from double fertilization? (1st session 2023)



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

---

48 Why does the embryo of some seeds keep the endosperm? (1st session 2023, Sample exam 2025, 2026)

(A) Because the endosperm is the only source of food for the germination of all types of seeds
(B) Because the ovule coats fuse with the ovary wall
(C) Because it does not use up all the endosperm while it forms
(D) Because it stores food in the two cotyledons

---

49 In which fruit does the ovary not store food other than the food stored in the seed? (1st session 2023)

(A) Orange
(B) Maize
(C) Eggplant
(D) Zucchini

50 Which of the following seeds get the energy needed for embryo formation from the endosperm? (2nd session 2023)

(A) Monocotyledonous only
(B) Endospermic only
(C) Non-endospermic only
(D) Endospermic and non-endospermic

51 Which of the following floral whorls / leaves can be found together in the same fruit? (2nd session 2023)

(A) The calyx and the corolla
(B) The sepals and the stamens
(C) The stamens and the petals
(D) The petals and the receptacle

52 What is the purpose of sexual reproduction in monocotyledonous plants? (1st session 2024)

(A) Producing seeds
(B) Producing grains
(C) Producing fruits
(D) Producing flowers

53 What is the fate of the ovary in the wheat flower after fertilization is completed? (1st session 2024)

(A) It turns into a monocotyledonous seed
(B) It turns into an endospermic seed
(C) It turns into a grain
(D) It turns into a seedless fruit

54 In which fruits is the ovary part of their structure? (1st session 2024)

(A) Fruits with a fleshy ovary only
(B) False fruits only
(C) Seedless fruits only
(D) All types of fruits

55 Which of the following is a characteristic of the onion flower? (2nd session 2024)

(A) It does not turn into a fruit after fertilization
(B) It is a unisexual flower
(C) It can turn into a seed after fertilization
(D) It has coloured sepals

56 The characteristic that distinguishes the apple fruit is that ..... (Sample exam 2025)

(A) it forms from one of the parts of the flower other than the ovary

(B) it results from pollination without fertilization

(C) it results from the fusion of the ovule coats with the ovary wall

(D) it forms from an ovary that increased in size and stored food

57 Which of the following parts of the wheat plant has nuclei containing a larger amount of DNA? (Sample exam 2025)

(A) The stem (B) The root (C) The grain (D) The leaf

58 After double fertilization the fertilized ovule turns into a seed. Which of the following seeds has all its cells diploid after it matures? (Sample exam 2025)

(A) Bean (B) Wheat (C) Castor oil (D) Maize

59 Which types of seeds contain the food needed for the growth of the embryo during germination? (Sample exam 2025)

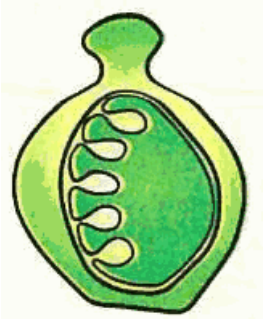
(A) Endospermic seeds

(B) Monocotyledonous seeds

(C) Non-endospermic seeds and grains

(D) Endospermic and non-endospermic seeds

60 The opposite figure shows a longitudinal section in the carpel of a flower. When two ovules in the carpel are fertilized, the number of fruits formed is ..... (1st session 2025)



(A) 1 (B) 2 (C) 5 (D) 10

61 Which of the following statements is NOT correct about the banana fruit? (1st session 2025)

(A) Auxins play a role in its formation

(B) Its ovules were not fertilized

(C) Pollination shared in its formation

(D) The ovary did not share in its formation

62 Which of the following is a characteristic of castor oil seeds? (1st session 2025)

(A) Non-endospermic seeds

(B) Endospermic seeds

(C) Monocotyledonous seeds

(D) They are considered grains

63 Which floral whorls do not wither and stay as part of the pomegranate fruit? (2nd session 2025)

(A) All whorls except the corolla

(B) The calyx and the androecium

(C) The gynoecium and the corolla

(D) The calyx and the corolla

64 All the following seeds contain a food tissue when they finish maturing, except the seeds of ..... (2nd session 2025)

(A) bean (B) wheat (C) castor oil (D) maize

65 The part that turns into the fruit coat in dates is ..... (Sample exam 2026)

(A) the ovary wall

(B) the ovule coats

(C) the ovary wall and the ovule coats

(D) the outer ovule coat and the ovary wall

66 How many fruits does a flower whose gynoecium consists of 10 separate carpels form? (Sample exam 2026)

(A) One fruit

(B) 5 fruits

(C) 10 fruits

(D) A number equal to the number of ovules inside the carpels

67 The pollen grain passes through mitotic division twice in two different places. Identify these two places, and the importance of this division in each of them. (Sample exam 2026)

Answer key and solutions

Multiple choice questions

1 B	2 A	3 C	4 B	5 B	6 A	7 A	8 D	9 C	10 B
11 C	12 B	13 D	14 B	15 D	16 B	17 C	18 B	19 A	20 C
21 A	22 B	23 D	24 B	25 C	26 C	27 B	28 B	29 A	30 C
31 A	32 B	33 B	34 C	35 A	36 A	37 B	38 C	39 C	40 A
41 D	42 B	43 C	44 B	45 D	46 D	47 D	48 A	49 B	50 D
51 B	52 B	53 B	54 B	55 C	56 D	57 C	58 D	59 A	60 D
61 D	62 B	63 C	64 C	65 A	66 A	67 D	68 D	69 B	70 C
71 D	72 C	73 A	74 C	75 C	76 D	77 C	78 B	79 C	80 D
81 D	82 D	83 A	84 A	85 B	86 A	87 C	88 C	89 C	90 C
91 A	92 D	93 D	94 D	95 B	96 D	97 C	98 B	99 C	100 B
101 B	102 D	103 B	104 D	105 D					

1 **Answer (B)**

Seeds develop inside the ovary, not inside the floral envelope.

2 **Answer (A)**

Figure (1) is the one that has both a pedicel and a bract.

3 **Answer (C)**

A sessile flower has no pedicel and is attached directly to the stem: (2) , (3).

4 **Answer (B)**

Flower (X) carries both stamens and carpels, so it is hermaphrodite.

5 **Answer (B)**

The flower is an organ of sexual reproduction only.

6 **Answer (A)**

The style is a passage through which the pollen tube grows towards the ovary.

7 **Answer (A)**

The embryo sac develops from one cell only, which is part (1).

8 **Answer (D)**

The two male nuclei form later from the division of the generative nucleus inside the pollen tube.

9 **Answer (C)**

Meiotic division of the spore mother cell produces four spores.

10 **Answer (B)**

(X) is meiosis in the ovule, and (Y) is mitotic divisions that form the embryo sac.

11 **Answer (C)**

Part (3) is the calyx, so it does not take part in pollination or fertilization.

12 **Answer (B)**

Meiosis then mitosis in the ovule produces the embryo sac that carries the egg.

13 **Answer (D)**

The spore mother cell divides meiotically to give spores, then each divides mitotically to form the pollen grain.

14 **Answer (B)**

Both the pollen grain and the zygospore have a thick wall that protects them from harsh conditions.

15 **Answer (D)**

(X) is a spore mother cell (2n), and (Y) is a pollen grain (n).

16 **Answer (B)**

$40 \div 4 = 10$ cells per sac, 10×4 sacs $\times$ 5 stamens = 200.

17 **Answer (C)**

The figure is an anther that produces the male pollen grains, so the antheridia correspond to it functionally.

18 **Answer (B)**

The spore mother cell divides by reduction (meiotic) division in the ovule.

19 **Answer (A)**

1600 ÷ (4 × 10 × 4 sacs) = 10 stamens.

20 **Answer (C)**

120 × 4 sacs × 4 = 1920 pollen grains, and each grain has one tube nucleus.

21 **Answer (A)**

The spore mother cell divides before the ovary matures, so it is not found in it.

22 **Answer (B)**

The nuclei of the embryo sac are haploid (n) = 48 ÷ 2 = 24.

23 **Answer (D)**

The first and second meiotic divisions take place in the anther (X).

24 **Answer (B)**

A (2n) cell divides meiotically then mitotically, so pollen grains form.

25 **Answer (C)**

1000 generative nuclei = 1000 pollen grains, and each mother cell gives 4: 1000 ÷ 4 = 250.

26 **Answer (C)**

Each spore mother cell gives 3 antipodal cells: 10 × 3 = 30.

27 **Answer (B)**

Each embryo sac has two synergids and 3 antipodal cells: 6 × 2 = 12 , 6 × 3 = 18.

28 **Answer (B)**

Each spore mother cell gives 4 spores: 100 × 4 = 400.

29 **Answer (A)**

A mother cell gives 4 cells, 3 of which degenerate and one remains; this happens when the ovule forms.

30 **Answer (C)**

Each embryo sac needs 3 mitotic divisions: $5 \times 3 = 15$.

31 **Answer (A)**

Each meiotic division produces 4 pollen grains: $100 \div 4 = 25$.

32 **Answer (B)**

The stigma cell (2n) = 4X, so the male nucleus (n) = 2X.

33 **Answer (B)**

$320 \div 2 = 160$ pollen grains, and $160 \div 4 = 40$ spore mother cells.

34 **Answer (C)**

The variety of pollen grain shapes is linked to the variety of pollination means.

35 **Answer (A)**

Moving between two flowers on the same plant is self-pollination for the plant and cross-pollination for the flower.

36 **Answer (A)**

The corolla (I , C) attracts insects, and the anther (A) carries the pollen grains.

37 **Answer (B)**

Complete flowers may be self-pollinated or cross-pollinated.

38 **Answer (C)**

The wall cell (2n) = 12, so the generative and male nuclei (n) = 6, and the endosperm (3n) = 18.

39 **Answer (C)**

Cross-pollination gives individuals that are more varied and more adapted to environmental changes.

40 **Answer (A)**

(X) carries pollen grains from one flower to the stigma of another flower, so it is cross-pollination.

41 **Answer (D)**

Nuclei (4) are male nuclei that resulted from mitotic division of the generative nucleus.

42 **Answer (B)**

(2) the pollen tube, then (4) division of the generative nucleus, then (3)(1) double fertilization, then (6) the embryo and finally (5) disappearance of the endosperm.

43 **Answer (C)**

Spore mother cell (2n) → meiosis (n) → fertilization (2n) → embryo (2n).

44 **Answer (B)**

Each ovule needs one pollen grain.

45 **Answer (D)**

Double fertilization forms the embryo and the stored food, so it achieves the goal of reproduction.

46 **Answer (D)**

Both the nucellus and the endosperm nourish the embryo.

47 **Answer (D)**

(X) is meiosis to form the spores, (Y) is pollination and (Z) is double fertilization.

48 **Answer (A)**

Both the pollen grain and the embryo sac result from one meiotic division.

49 **Answer (B)**

The archegonium carries the egg, and the egg cell corresponds to it.

50 **Answer (D)**

Pollen grains form in the anther (Y), and ovules in the ovary (Z).

51 **Answer (B)**

The stigma is feathery and the stamens stick out, so pollination is cross-pollination by wind.

52 **Answer (B)**

The embryo cell (2n) = 7 pairs = 14 chromosomes.

53 **Answer (B)**

A flower without petals and with many stamens is usually pollinated by wind, self or cross.

54 **Answer (B)**

The endosperm (3n) = 33, so the embryo (2n) = 22, i.e. 11 pairs.

55 **Answer (C)**

(2n) = 14, so the endosperm (X) 3n = 21, the zygote (Y) 2n = 14, and (Z) , (L) are haploid (7).

56 **Answer (D)**

The fruits of (L) dropped from 130 to 10 when bees were absent.

57 **Answer (C)**

The number of fruits of (Z) does not change when bees are absent, so it is pollinated by air.

58 **Answer (D)**

The absence of the stigma and the style prevents pollination and fertilization, so the flower withers and dies.

59 **Answer (A)**

Self-pollination needs the anther to be higher than the stigma, i.e. the filament (3) longer than the style (4).

60 **Answer (D)**

The pollen grain germinates on the stigma of a flower of the same plant or of a flower of another plant of the same species.

61 **Answer (D)**

The generative nucleus divides inside the pollen tube, forming two male nuclei (X) before it reaches the micropyle.

62 **Answer (B)**

The embryo feeds on the endosperm while it forms.

63 **Answer (C)**

The grain is a fruit in which the ovule coats fuse with the ovary wall.

64 **Answer (C)**

Castor oil is an endospermic seed, so its endosperm does not disappear.

65 **Answer (A)**

Every seed in flowering plants forms after double fertilization.

66 **Answer (A)**

Seeds form only after fertilization.

67 **Answer (D)**

Pea is non-endospermic and the ovary has 9 ovules, so 9 seeds form.

68 **Answer (D)**

The synergid and antipodal cells degenerate and disappear after fertilization.

69 **Answer (B)**

The endosperm nucleus (3n) divides mitotically to form the endosperm tissue.

70 **Answer (C)**

Flower (C) has no ovary, so it does not form seeds.

71 **Answer (D)**

After double fertilization: the zygote (2n), the endosperm (3n) and the other cells (n).

72 **Answer (C)**

In grains the ovary wall fuses with the ovule coats.

73 **Answer (A)**

The seed starts germination with cellular respiration before the leaves appear.

74 **Answer (C)**

A true fruit results from the ovary only.

75 **Answer (C)**

Other parts such as the receptacle share in the fruit of plant (1), while the fruit of plant (2) comes from the ovary only.

76 **Answer (D)**

Apple is a false fruit, and pea is a true fruit, and both are dicotyledons.

77 **Answer (C)**

All these fruits keep the sepals.

78 **Answer (B)**

79 **Answer (C)**

The bean seed is non-endospermic and there is no light under the soil, so the embryo feeds on the food of the two cotyledons.

80 **Answer (D)**

Each seed needs one pollen grain, so the number of pollen grains = the number of seeds.

81 **Answer (D)**

5 nuclei for each seed × 4 seeds = 20.

82 **Answer (D)**

Each seed develops from one ovule, so the number of ovules = the number of seeds.

83 **Answer (A)**

Pea seeds differ in the amount of food stored in the two cotyledons of each.

84 **Answer (A)**

3 antipodal cells + 2 synergids = 5.

85 **Answer (B)**

The testa develops from the ovule coats.

86 **Answer (A)**

The ovary becomes a fruit and the fertilized ovules become seeds.

87 **Answer (C)**

7 cells before fertilization, and after it two cells (the zygote and the endosperm cell).

88 **Answer (C)**

The spore spreads and germinates into a new individual, and so does the seed.

89 **Answer (C)**

Lupine is a non-endospermic seed whose embryo uses up the endosperm.

90 **Answer (C)**

The ovary produces the true fruit.

91 **Answer (A)**

Mango is a fruit with one seed, so it needs one pollen grain.

92 **Answer (D)**

5 nuclei: the egg + the two polar nuclei + the two male nuclei.

93 **Answer (D)**

5 nuclei, as in bean.

94 **Answer (D)**

The embryo (X) and the seed coat (Y) are made of diploid (2n) cells.

95 **Answer (B)**

The pod wall comes from the ovary wall (4), the seeds from the ovules (5), and the funicle from (2).

96 **Answer (D)**

The outer coat of the fruit develops from the ovary wall.

97 **Answer (C)**

(1) is the endosperm tissue, and (2) is the food stored in the two cotyledons after the embryo forms.

98 **Answer (B)**

The zygote divides mitotically to form the embryo.

99 **Answer (C)**

In the anther the spore mother cell divides meiotically, then the spores divide mitotically to form pollen grains.

100 **Answer (B)**

The flower is large and coloured, so it is mostly pollinated by insects.

101 **Answer (B)**

Structure (L) is part of the fruit, which develops from the ovary.

102 **Answer (D)**

5 nuclei share in forming the grain, each has $75 \div 5 = 15$ chromosomes, so the endosperm nucleus $= 15 + 30 = 45$.

103 **Answer (B)**

Annual plants wither after reproduction is completed, not before it.

104 **Answer (D)**

Castor oil is an endospermic seed, so statement (D) is wrong.

105 **Answer (D)**

The tree reproduces by cuttings, so all its fruits are seedless.

Essay questions

1 **Model answer**

Process (1): meiotic division / producing microspores.

Process (2): mitotic division of the microspore nucleus / forming the tube nucleus and the generative nucleus of the pollen grain.

Process (3): thickening of the pollen grain coat, forming a thick wall / protecting the pollen grain.

2 **Model answer**

(1) Meiotic then mitotic / the spore mother cell (X) divides meiotically so that the chromosome number is reduced, giving 4 cells (n). Three of them degenerate and one remains, which grows quickly forming the embryo sac, whose nucleus divides mitotically 3 times to give 8 nuclei (n).

(2) (X) 2n → (Y) n → (Z) n → (L) n

(3) Stage (Y): 4 cells resulting from the meiotic division of the spore mother cell (X).

Stage (L): 7 cells (3 antipodal cells + 2 synergid cells + the egg cell + the embryo sac cell «which has two nuclei»).

(4) The number of chromosome sets, as cell (X) is diploid (2n) and cell (Z) is haploid (n).

3 **Model answer**

(X) the anther , (M) the ovule.

4 **Model answer**

The carpel of this flower contains 4 ovules, and the number of antipodal cells in each ovule = 3 cells.

The number of antipodal cells in the ovary of the flower = 4 × 3 = 12 antipodal cells.

5 **Model answer**

(1) (1) the embryo sac.

(2) (3) the egg cell nucleus.

(3) (2) the micropyle.

6 **Model answer**

To make sure that cross-pollination happens, causing great genetic variation in the resulting individuals, which improves their genetic traits.

7 **Model answer**

The flower withers and falls without forming the fruit.

8 **Model answer**

Flowers (1) , (3) / flowers that contain the ovary and other parts of the flower, such as the receptacle, which may become fleshy with food forming a false fruit, as in the apple fruit, while flower (2) is a male flower.

9 **Model answer**

Flowers (1) , (3) / the male organ (androecium) is absent from flower (3), and the level of the anther is lower than the level of the stigma in flower (1), so pollination in both flowers is cross-pollination, which gives individuals with high genetic variation.

10 **Model answer**

(1) (4) the filament , (7) the style.

(2) (1) the stigma, the pollen grains inside the anther (2) , (3) the petals.

11 **Model answer**

(1) Tendrils.

(2) The fruit coat / the ovary wall.

12 **Model answer**

(4) the two nuclei of the embryo sac , (5) the egg cell , (6) the two male nuclei.

13 **Model answer**

Because castor oil seeds resemble monocotyledonous seeds in keeping the endosperm (endospermic seeds), and resemble dicotyledonous seeds in that their embryo has two cotyledons.

14 **Model answer**

Both fruits result from pollination and fertilization of a flower whose ovary contains only one ovule.

Both fruits contain only one seed.

15 **Model answer**

The number of pollen grains needed for fertilization = the number of seeds formed = 240 pollen grains.

Each spore mother cell in the ovule inside the ovary finally gives one egg cell, which is fertilized to form the zygote, which divides mitotically forming the embryo to form the seed.

The number of spore mother cells in the ovary needed to form 240 seeds = 240 cells.

16 **Model answer**

(1) (X) the calyx.

(2) (X) the calyx, (Z) the androecium (stamens).

(3) (Y) the corolla.

(4) (X) the calyx.

17 **Model answer**

(X) sexual reproduction by gametes , (Y) a fern plant (the sporophyte) , (Z) sexual reproduction by gametes or asexual reproduction by tissue culture.

18 **Model answer**

Because parthenocarpy does not involve producing new individuals, unlike parthenogenesis, which produces new individuals.

Past exam questions

1	2	3	4	5	6	7	8	9	10
C	D	B	B	C	B	D	B	C	B
11	12	13	14	15	16	17	18	19	20
D	D	B	D	A	C	D	B	B	A
21	22	23	24	25	26	27	28	29	30
A	D	C	B	B	A	D	A	A	C
31	32	33	34	35	36	37	38	39	40
C	A	C	A	D	A	A	C	D	C
41	42	43	44	45	46	47	48	49	50
D	D	B	B	B	C	A	C	B	D
51	52	53	54	55	56	57	58	59	60
B	A	C	D	C	A	C	A	D	A
61	62	63	64	65	66	67			
D	B	B	A	A	C	—			

1 **Answer (C)**

The arrow points to the calyx, whose main role is protecting the inner parts of the flower while it is a bud, as in figure (2).

2 **Answer (D)**

The calyx and the corolla (the floral envelope) protect the inner parts of the flower.

3 **Answer (B)**

The male flower has only the calyx, the corolla and the androecium (the rows of petals form one whorl), so there are 3 whorls.

4 **Answer (B)**

The receptacle is the swollen end of the flower pedicel that carries the parts of the flower.

5 **Answer (C)**

In the tulip flower both the calyx and the corolla are coloured and attract insects.

6 **Answer (B)**

Pollen grain: meiotic division then mitotic division once; ovule: meiotic division then mitotic division 3 times, so the difference is in the number of times of mitotic division.

7 **Answer (D)**

(A) is meiotic division of the spore mother cell (2n), giving 4 cells.

(B) the nucleus of the remaining cell divides mitotically 3 times, giving 8 nuclei.

8 **Answer (B)**

Process (2) is mitotic division of the microspore nucleus to form the nuclei of the pollen grain (the tube nucleus and the generative nucleus).

9 **Answer (C)**

The nucellus is the tissue that nourishes the contents of the embryo sac.

10 **Answer (B)**

The embryo sac results from the growth of the cell that remains from the meiotic division of the spore mother cell.

11 **Answer (D)**

The carpel has 4 ovules, and each ovule has two synergid cells, so the number = 4 × 2 = 8

12 **Answer (D)**

The ovule feeds on nutrients from the ovary wall and the nucellus.

13 **Answer (B)**

The pollen sacs are full of spore mother cells before pollen grains are produced, then these cells divide to form them.

14 **Answer (D)**

The nucleus of the (n) cell produced by meiotic division divides mitotically (1) then mitotically (2) to form 8 nuclei.

15 **Answer (A)**

The degeneration of three cells lets the remaining cell (n) feed on them, so the chromosome number is reduced and food is provided for the ovule.

16 **Answer (C)**

The ovary (X) contains 6 ovules, and each ovule results from a meiotic division of a spore mother cell, so the number of divisions is 6

17 **Answer (D)**

One or more swellings may be attached to the ovary wall, according to the number of ovules.

18 **Answer (B)**

The mature pollen grain has two nuclei: the tube nucleus and the generative nucleus.

19 **Answer (B)**

Self-pollination happens when the male organ (Z) and the female organ (L) mature at the same time.

20 **Answer (A)**

(A): 7 + 7 = 14 is the formation of the zygote, and (B): 7 + 7 + 7 = 21 is triple fusion, and together they make double fertilization.

21 **Answer (A)**

Flowers pollinated by wind produce numerous, light pollen grains.

22 **Answer (D)**

Flowers pollinated by insects have large, brightly coloured petals, and flower (4) has petals clearly larger than its sepals.

23 **Answer (C)**

Structure (2) is the petals that enclose the androecium and the gynoecium in the pea flower, so they determine the type of pollination (self).

24 **Answer (B)**

The pollen grains of the male flowers move to the female flowers on the same plant, so pollination is self-pollination for the plant.

25 **Answer (B)**

The length of the filament determines the level of the anther relative to the stigma, so it determines the type of pollination in hermaphrodite flowers.

26 **Answer (A)**

In (X) the anthers are higher than the stigma, so pollination is self-pollination, and in (Y) the stigma is higher than the anthers, so pollination is cross-pollination.

27 **Answer (D)**

In flower (3) both the anther (mature pollen grains) and the ovary (mature ovule) matured together, so self-pollination happens.

28 **Answer (A)**

Double fertilization produces the zygote (2n) and the endosperm nucleus (3n).

29 **Answer (A)**

The fruit has 6 seeds, and each seed needs one pollen tube with two male nuclei, so the number is 6 / 12

30 **Answer (C)**

(C) are spores in a non-flowering plant and (D) are cells in a primitive organism that produce new individuals.

While (A) , (B) are the pollen grains and the embryo sac.

31 **Answer (C)**

Triple fusion produces the endosperm nucleus (3n).

32 **Answer (A)**

The pollen tube carries the male nuclei to the ovule.

33 **Answer (C)**

The pollen tube has the tube nucleus and the two male nuclei, so the number of nuclei is 3

34 **Answer (A)**

The eggplant fruit forms from the ovary after fertilization, so it is a true fruit.

35 **Answer (D)**

Apple is a false fruit (its receptacle becomes fleshy), and the rest are true fruits.

36 **Answer (A)**

Pollen grain powder in ether contains auxins, so fruits form without fertilization, empty of seeds.

37 **Answer (A)**

Both bean seeds and maize grains have a micropyle through which water passes during germination.

38 **Answer (C)**

Seedless oranges form by parthenocarpy as a result of pollination without fertilization.

39 **Answer (D)**

Spraying the plant with indole acetic acid (an auxin) stimulates the formation of flowers and fruits.

40 **Answer (C)**

(A) is a non-endospermic seed (bean) from which the endosperm disappears, and (B) is an endospermic seed.

41 **Answer (D)**

Fruit formation is linked to hormonal activity (auxins).

42 **Answer (D)**

Substance (X) is auxins that stimulate the ovary to form fruits.

43 **Answer (B)**

The pear fruit has seeds, so it resulted from fertilization, and it is the receptacle that became fleshy.

44 **Answer (B)**

Part (X) is an auxin paste put on the stigma, so the ovary becomes fleshy, forming a fruit.

45 **Answer (B)**

The seed (1) results from the ovule (A), so fertilization happened, and the fleshy part (2) is from the receptacle (B), so the fruit is false.

46 **Answer (C)**

Inhibiting auxins in the fruiting stage leads to stopping of vegetative growth.

47 **Answer (A)**

Structure (4), the seed, results from double fertilization.

48 **Answer (C)**

The embryo does not use up all the endosperm while it forms, so it is kept in endospermic seeds.

49 **Answer (B)**

In maize the ovary wall fuses with the seed coat and no food is stored outside the seed.

50 **Answer (D)**

All seeds get the food for embryo formation from the endosperm.

51 **Answer (B)**

The sepals and stamens may stay with the fruit, as in pomegranate.

52 **Answer (A)**

The purpose of sexual reproduction in flowering plants is producing seeds that grow into new plants.

53 **Answer (C)**

The ovary of the wheat flower turns into a grain in which the ovary wall fuses with the seed coat.

54 **Answer (D)**

The ovary is part of the structure of all types of fruits.

55 **Answer (C)**

The onion flower is hermaphrodite, and its ovule can turn into a seed after fertilization.

56 **Answer (A)**

Apple is a false fruit that forms from the fleshy receptacle, not from the ovary.

57 **Answer (C)**

The wheat grain has the triploid endosperm (3n), so its nuclei have a larger amount of DNA

58 **Answer (A)**

Bean is a non-endospermic seed, so all its cells (the embryo) are diploid.

59 **Answer (D)**

The food needed for germination is in the endosperm or the cotyledons, i.e. in endospermic and non-endospermic seeds.

60 **Answer (A)**

One carpel forms one fruit whatever the number of fertilized ovules.

61 **Answer (D)**

The banana fruit forms from the ovary by parthenocarpy, so statement (D) is not correct.

62 **Answer (B)**

Castor oil seeds are endospermic.

63 **Answer (B)**

In pomegranate the calyx and the androecium stay with the fruit.

64 **Answer (A)**

Bean seeds are non-endospermic.

65 **Answer (A)**

The ovary wall turns into the fruit coat.

66 **Answer (C)**

Each separate carpel forms a fruit, so the number of fruits is 10

67 **Model answer**

Inside the pollen sac: the microspore nucleus divides mitotically to form the tube nucleus and the generative nucleus.

Inside the pollen tube: the generative nucleus divides mitotically to form two male nuclei that carry out double fertilization.