

AGA KHAN UNIVERSITY EXAMINATION BOARD
SECONDARY SCHOOL CERTIFICATE
CLASS X
ANNUAL EXAMINATIONS 2022

Biology

Total Time: 1 hour 40 minutes

Total Marks: 50 (40-Theory & 10-Alternate to Practical)

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. Question Distribution:

Theory	Alternate to Practical (ATP)
40 MCQs	10 MCQs

5. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.

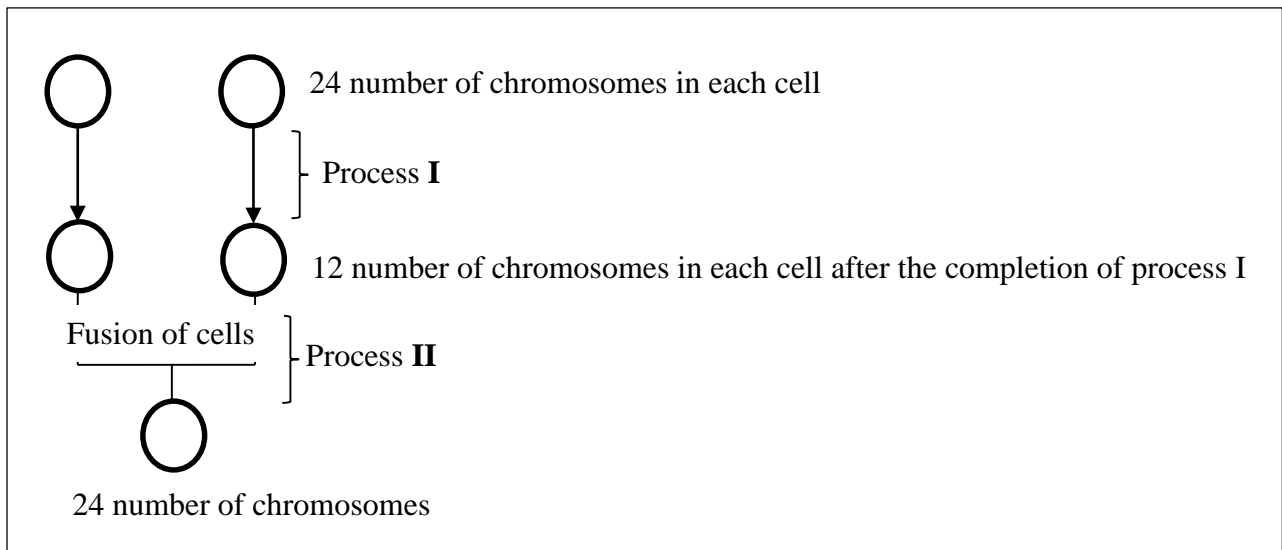
Correct Way	Incorrect Ways
1 (A) (B) (C) (D)	1 (A) (B) (C) (D)
	2 (A) (B) (C) (D)
	3 (A) (B) (C) (D)
	4 (A) (B) (C) (D)

Candidate's Signature

6. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
7. DO NOT write anything in the answer grid. The computer only records what is in the circles.
8. The marks obtained on the 40 MCQs will be equated to the total marks of 65 for the theory examination results.
9. You may use a simple calculator if you wish.

THEORY (Questions 1-40)

1. The given diagram shows two different processes (**I** and **II**) occurring in the sexually reproducing animals.

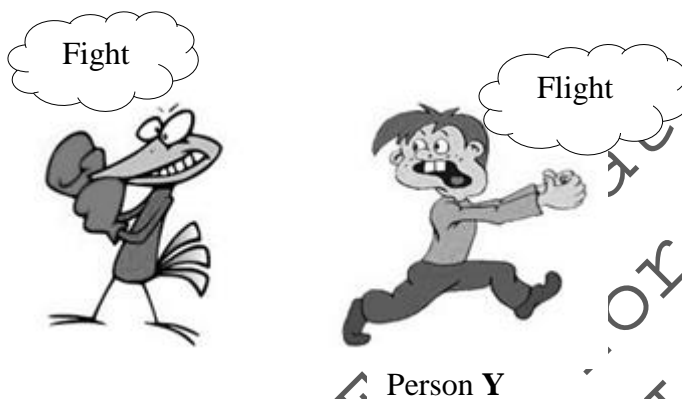


The statement that is CORRECT about the process **I** is that it

- A. takes place in gonads.
 B. completes in only one phase.
 C. produces the exact copy of parents.
 D. alters the number of chromosomes in organisms.
2. During gametogenesis, DNA replicates once but cell division occurs twice. This results in the formation of gametes consisting of
- I. a single copy of each homologous chromosome
 II. non-homologous chromosomes with their sister chromatids
 III. a pair of homologous chromosomes with its sister chromatids
- A. I only.
 B. I and II.
 C. III only.
 D. II and III.
3. Consider the given statement.
 'In humans, somatic cells (cells other than reproductive cells) are diploid (2n).'
- The CORRECT interpretation of this statement is that somatic cells
- A. contain two chromosomes.
 B. undergo meiotic cell division.
 C. can pass mutations through generations.
 D. have pairs of homologous chromosomes.

4. The structural feature which CORRECTLY identifies a sensory neuron is the presence of
- A. short dendrites and long axons.
 - B. myelin sheath on the axon terminal.
 - C. dendrites at both ends of the neuron.
 - D. a cell body in the centre of the neuron.
5. After fasting for 12 hours, a person's blood glucose level is reported to be abnormally high. In this medical condition, the gland which is associated with the elevated blood glucose level is
- A. liver.
 - B. pancreas.
 - C. adrenal gland.
 - D. pituitary gland.

6. The given image depicts the fight or flight situation.



The gland that will be activated in the person Y is

- A. gonad.
 - B. pancreas.
 - C. adrenal gland.
 - D. thyroid gland.
7. The blood report of a patient with acromegaly will reveal the high level of
- A. thyroxin.
 - B. calcitonin.
 - C. vasopressin.
 - D. somatotrophin.
8. The point of exit for the optic nerve and blood vessels from the eye is called blind spot. This is because it is devoid of
- A. vitreous humour.
 - B. aqueous humour.
 - C. photosensitive cells.
 - D. suspensory ligaments.

9. Read the given statement.

‘In a human body, the anterior pituitary gland controls activities of the other hormone-secreting glands.’

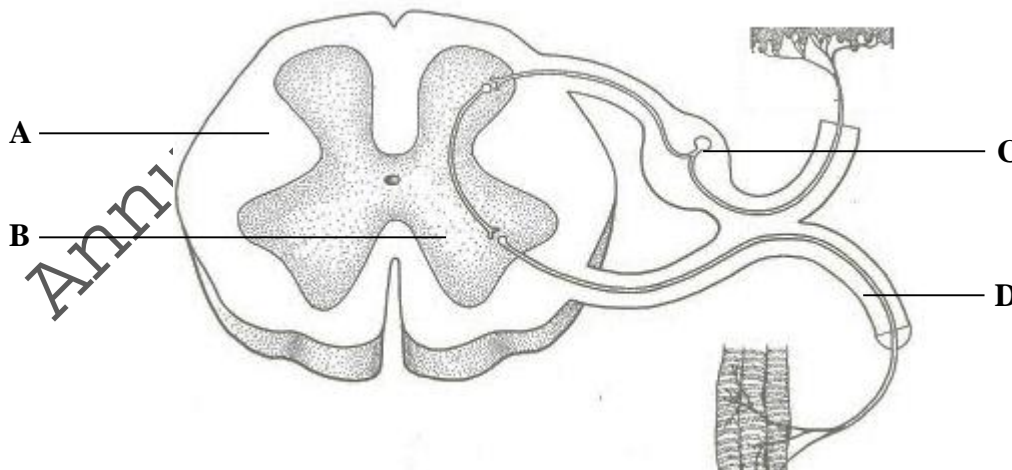
Which of the following examples CORRECTLY relates to the given statement?

- A. Estrogen stimulates the release of eggs from the ovary.
- B. Vasopressin stimulates the water reabsorption by kidneys.
- C. Somatotrophin hormone stimulates adrenal glands to release testosterone.
- D. Thyroid stimulating hormone activates the thyroid gland to secrete thyroxine.

10. The option that CORRECTLY matches the gland with its location in the human body is

	Gland	Location
A	adrenal gland	liver
B	pituitary gland	brain
C	pancreas	stomach
D	thyroid gland	abdomen



11. The given diagram represents the cross-sectional view of spinal cord. The labelled part which contains the cell bodies of motor neurons is



12. In the human ear, the eustachian tube does NOT

- A. amplify the sound waves.
- B. drain secretions from the middle ear.
- C. protect the middle ear from bacteria and viruses.
- D. keep air pressure equal on both sides of the eardrum.

13. The table shows two different states of the pupil (**R** and **S**) in a human eye.

	
R	S

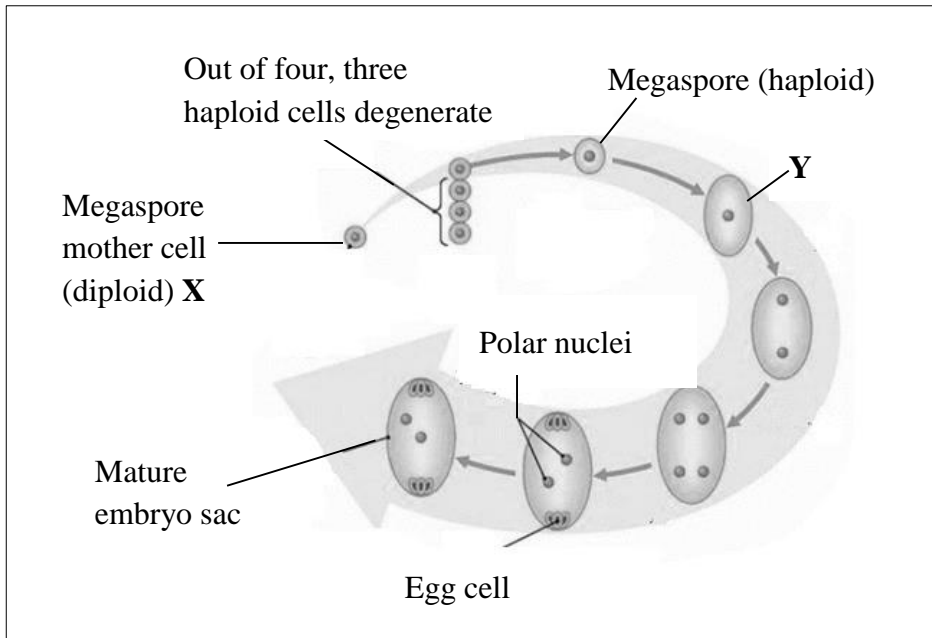
The state of pupil **R** shows that a person

- I. is focusing a close object
 - II. is looking at a distant object
 - III. has entered into a dark room
 - IV. has entered into a bright room
- A. I and III.
 - B. I and IV.
 - C. II and III.
 - D. II and IV.
14. In flowering plants, the set of structures formed during double fertilisation is
- A. embryo and seed.
 - B. zygote and embryo.
 - C. endosperm nucleus and seed.
 - D. zygote and endosperm nucleus.
15. Consider the given statements.
- I. It is formed by the stigma.
 - II. It produces an enzyme to dissolve the tissue of style.
 - III. It enters into the ovary through micropyle.
- With reference to the pollen tube of a flower, the TRUE statement(s) is/ are
- A. I only.
 - B. I and II.
 - C. III only.
 - D. II and III.
16. Offspring produced by asexual reproduction are called clones. This is because they are
- A. phenotypically different from their parents.
 - B. genotypically and phenotypically similar to their parents.
 - C. phenotypically similar to and genotypically different from their parents.
 - D. genotypically similar to and phenotypically different from their parents.

17. The animal in which external fertilisation takes place is

- A. hen.
- B. frog.
- C. rabbit.
- D. mouse.

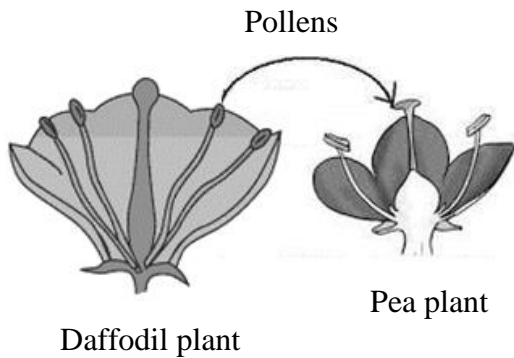
18. The given diagram represents one of the stages in life cycle of flowering plants.



The type of cell division(s) that cells **X** and **Y** undergo is/ are

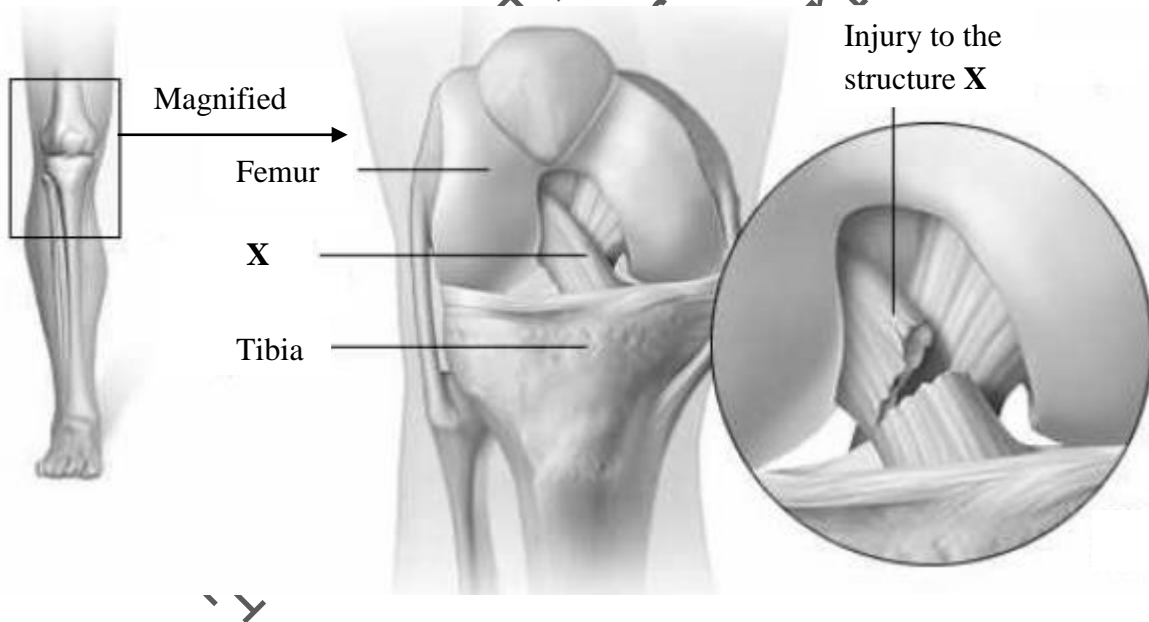
	X	Y
A	mitosis	meiosis
B	mitosis	mitosis
C	meiosis	meiosis
D	meiosis	mitosis

19. Consider the given diagram.



In this case, fertilisation will NOT take place because

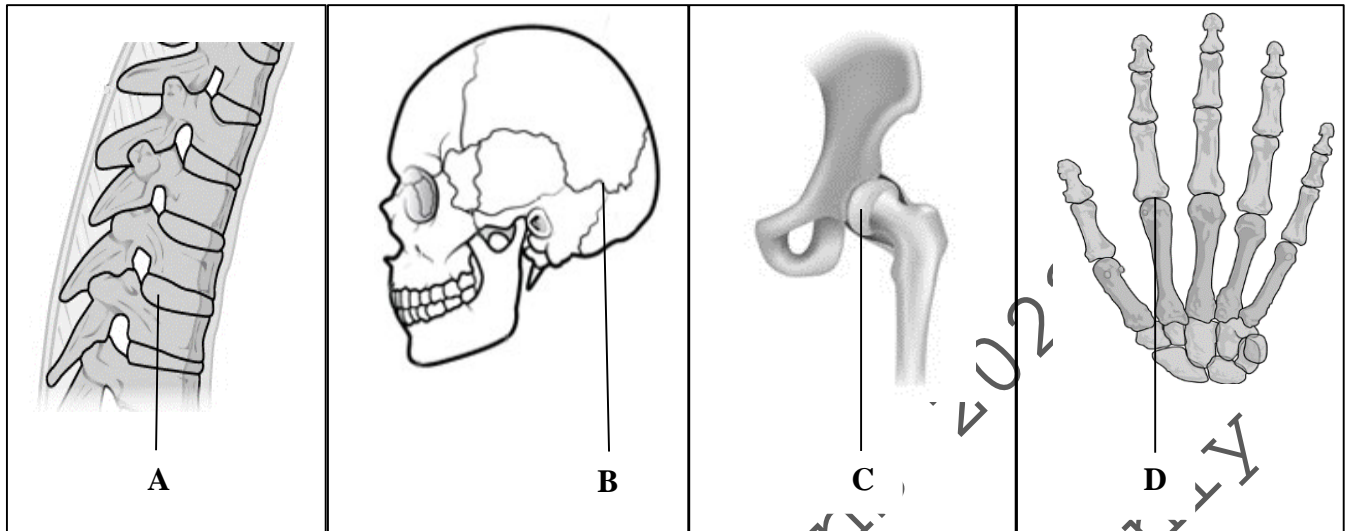
- A. both plants are of different species.
 - B. both plants produce gametes by mitosis.
 - C. the daffodil plant has more anthers than the pea plant.
 - D. the pea plant has flattened stigma while the daffodil plant has rounded stigma.
20. The given diagram represents a type of joint. The magnified image further specifies its parts along with the condition of structure **X** when injured.



The injury to structure **X** will result in the

- A. destruction of cartilage.
- B. destruction of osteocytes.
- C. instability of adjacent bones.
- D. accumulation of synovial fluid.

21. All of the given images of different types of joints contain articular cartilage EXCEPT



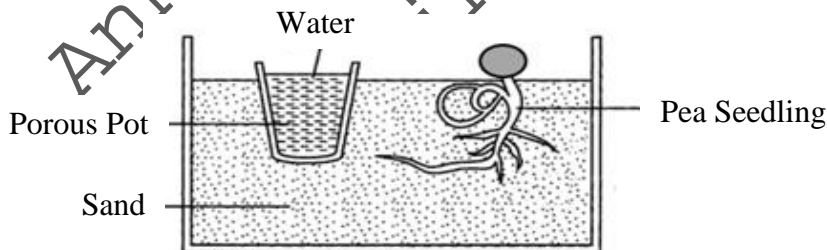
22. The PRIMARY reason for the swelling of joints in osteoarthritis is the

- A. swelling of cartilage.
- B. accumulation of blood clots.
- C. accumulation of white blood cells.
- D. rubbing of bones against each other.

23. The function of the human skeleton that maintains mineral balance in the body is

- A. storage.
- B. support.
- C. protection.
- D. blood production.

24. The given image shows an experimental set-up to determine tropism in plants.

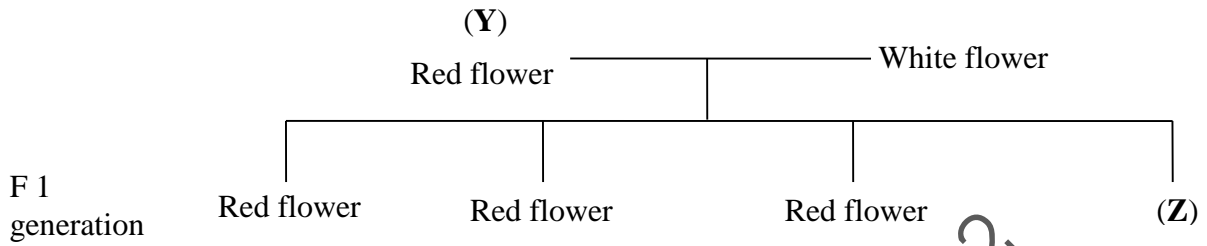


The type(s) of tropism illustrated in this experiment is/ are

- I. phototropism
- II. hydrotropism
- III. geotropism

- A. I only.
- B. I and II.
- C. III only.
- D. II and III.

25. The given pedigree shows cross between red and white flowers. The allele (R) for red flower is completely dominant over the allele for white flower (r).



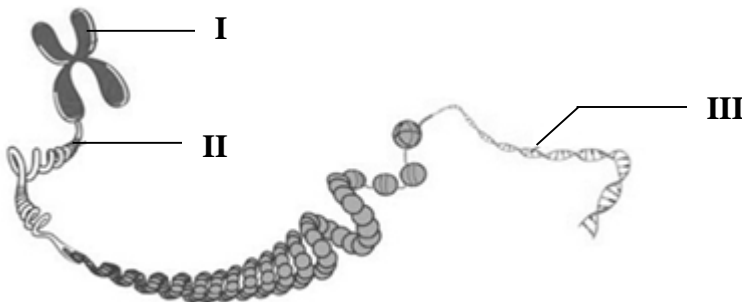
Which of the following options CORRECTLY identifies Y and Z?

	Genotype of Red Parent Flower (Y)	Unknown Phenotype of Offspring (Z)
A	RR	Red
B	Rr	Red
C	RR	White
D	Rr	White

26. The cell of human body which will cause changes in the phenotype of the offspring, if it is genetically modified, is

- A. ovum.
- B. chondrocyte.
- C. red blood cell.
- D. pancreatic cell.

27. In the given diagram, the labelled parts I, II and III represent



	I	II	III
A	gene	DNA	chromosome
B	chromatid	gene	chromatin
C	chromosome	chromatin	DNA
D	gene	chromosome	chromatid

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28. Mehak wrote the given statement that is incorrect.

‘The phenotype of a homozygote is always dominant.’

The CORRECTION for the given statement is that the

- A. recessive phenotypes can have heterozygous genotype.
 - B. homozygous genotype can be either dominant or recessive.
 - C. appearance of the phenotype is independent of the genotype.
 - D. dominant allele can only be appear in the phenotype of heterozygote.
29. In a habitat, there are two different populations of bugs, red bugs and green bugs. Birds and other animals prefer to eat the red bugs for their taste; therefore, there are many green bugs and a few red bugs. The green bugs reproduce and make more green bugs and eventually there are no more red bugs.

The given scenario exemplifies

- A. natural selection.
 - B. artificial selection.
 - C. variation within a population.
 - D. competition within a population.
30. The parental genotypes which can produce offspring with 50 % A and 50% AB blood group is
- A. $I^A i$ and $I^B i$.
 - B. $I^A I^A$ and $I^B I^B$.
 - C. $I^A I^A$ and $I^B i$.
 - D. $I^A I^A$ and $I^B I^B$.

31. In humans, the allele for brown eye colour (B) is dominant over the allele for blue eye colour (b). If two brown-eyed parents produce 25% of the offspring with blue eyes, then the genotype of parents would have been

- A. BB x bb.
- B. Bb x Bb.
- C. BB x Bb.
- D. BB x BB.

32. In pea plants, the allele for the pod colour green (G) is dominant over the allele for the pod colour yellow (g) and the pod shape inflated (I) is dominant over the a constricted one (i).

A pea plant, that is heterozygous dominant for the pod colour and homozygous recessive for the pod shape, is crossed with another pea plant, that is homozygous recessive for the pod colour and heterozygous dominant for the pod shape.

The percentage of offspring with green inflated pods would be

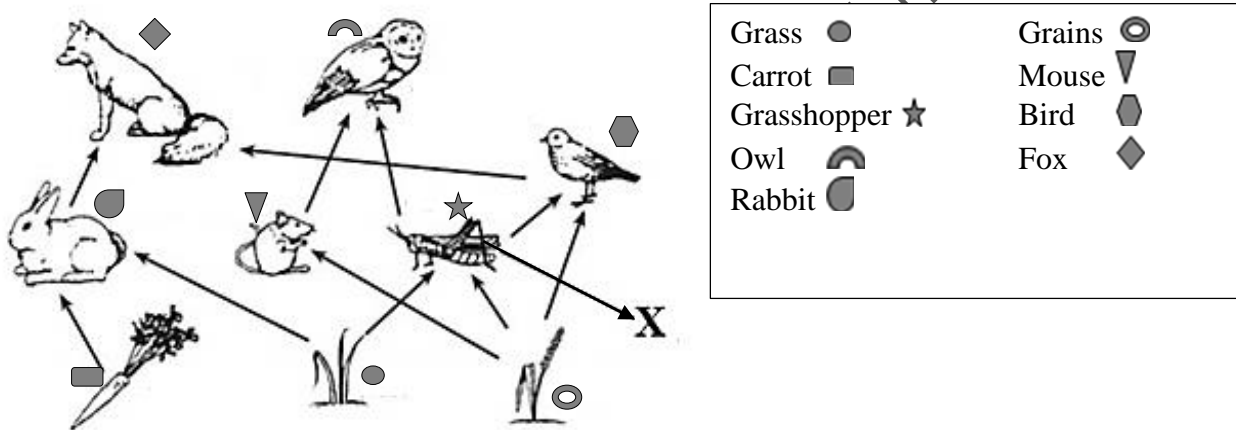
- A. 25%.
- B. 50%.
- C. 75%.
- D. 100%.

33. The given table shows blood types in a family.

Family Members	Blood Type
Wife	AB
Husband	B
Child X	O
Child Y	B

Which of the following inferences is CORRECT regarding the given table with respect to genotypes of blood groups of both wife and husband?

- A. Wife is the biological mother of both children.
 - B. Husband is only the biological father of child X.
 - C. Husband is the biological father of both children.
 - D. Neither the wife nor the husband are biological parents of child X.
34. In the given food web, a foreign species, labelled as X, is introduced which feeds on grasshoppers.



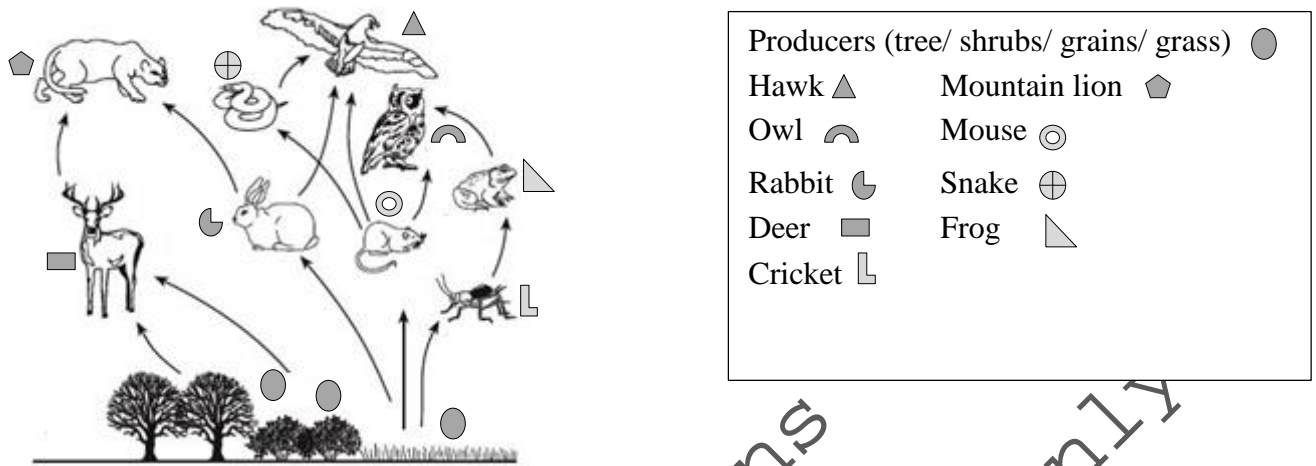
The possible outcome of the introduction of this species would be that

- A. birds will have less grains to feed.
 - B. carrots will grow more in number.
 - C. the biomass of grass will increase.
 - D. the population of rabbits will decrease.
35. Which of the following options is CORRECT about parasitism?

	Parasites are Mostly Less in Number	Host is Not Killed Immediately	Parasitism is Done for food and Shelter
A	True	False	True
B	False	True	True
C	True	False	False
D	False	True	False

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36. Consider the given food web.

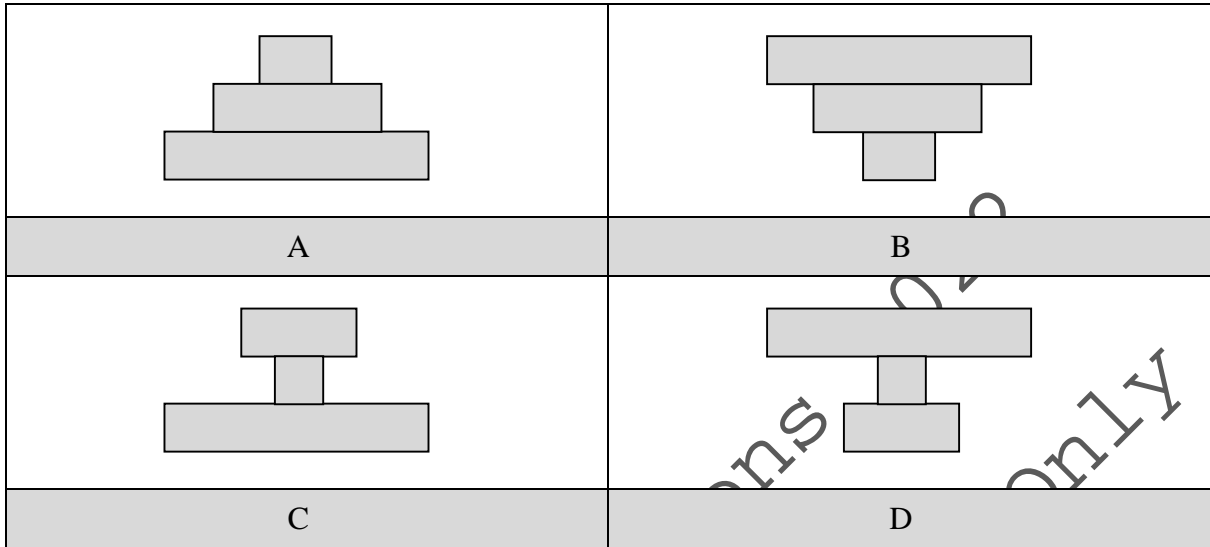


The population of frogs in this food web can be increased by increasing the population of

- A. owls.
 - B. mice.
 - C. snakes.
 - D. crickets.
37. All of the following actions lead to water pollution EXCEPT
- A. flushing harmful chemicals in the toilets.
 - B. disposing extra oil from cooking into kitchen sink.
 - C. making composting piles of vegetables and scrapes.
 - D. using pesticides in water bodies to kill harmful organisms.
38. The population of a green plant disappears from the ecosystem due to an increased temperature and flooding. In this case, the reason for extinction of green plants is
- A. a decrease in competition among green plants.
 - B. a change in the biotic factors of the ecosystem.
 - C. a change in the abiotic factors of the ecosystem.
 - D. an increase in the commercial use of green plants.
39. In a particular school, students of grade 10 are following the '3R' principle of environmental care. As for them, an example of 'reduce' should be to
- A. store spices in empty bottles of jam.
 - B. compost kitchen waste in the garden.
 - C. avoid giving presents with excess packaging.
 - D. repair broken items rather than buying new ones.

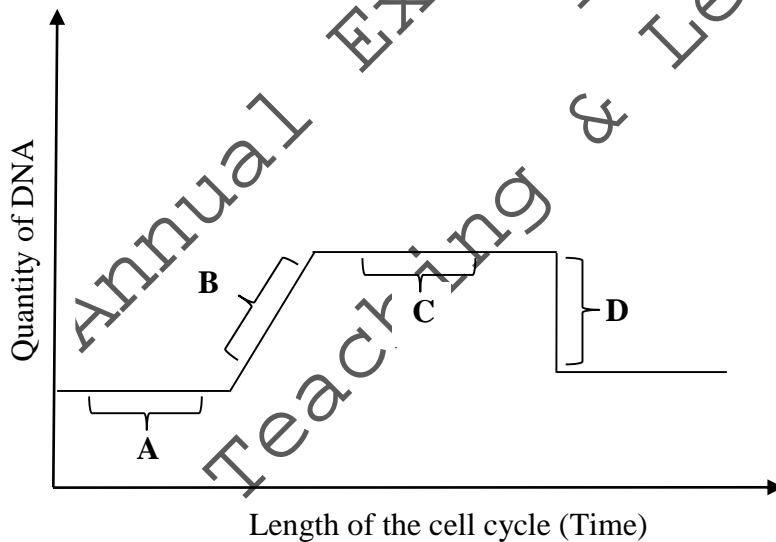
40. The pyramid of number that CORRECTLY represents the given food chain is

Food Chain: Tree → Birds → Mosquitoes



ALTERNATE TO PRACTICAL (ATP: Questions 41-50)

41. The given graph depicts the change in the DNA quantity during a cell cycle. The labelled part which shows the division phase of the cell cycle is



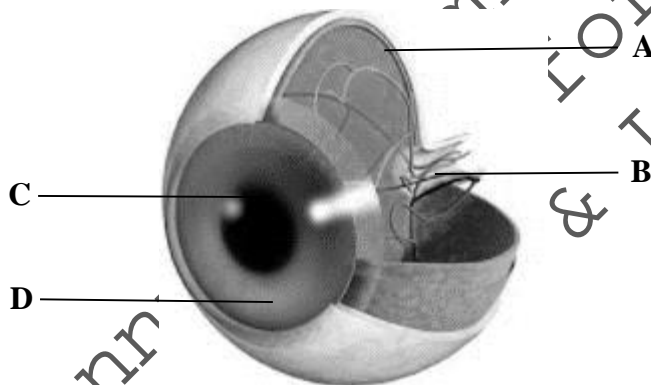
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42. The given image represents photomicrograph of one of the stages of cell division.

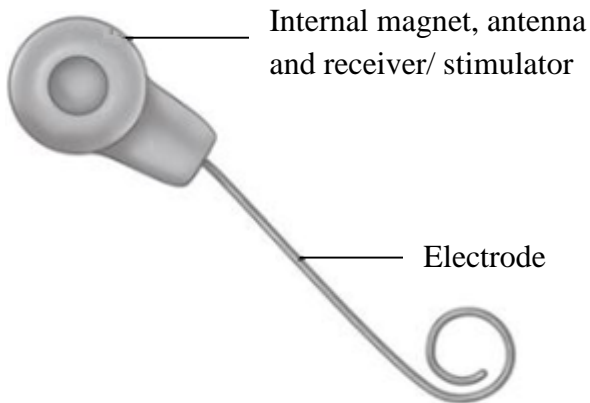


The stage of cell division identified is

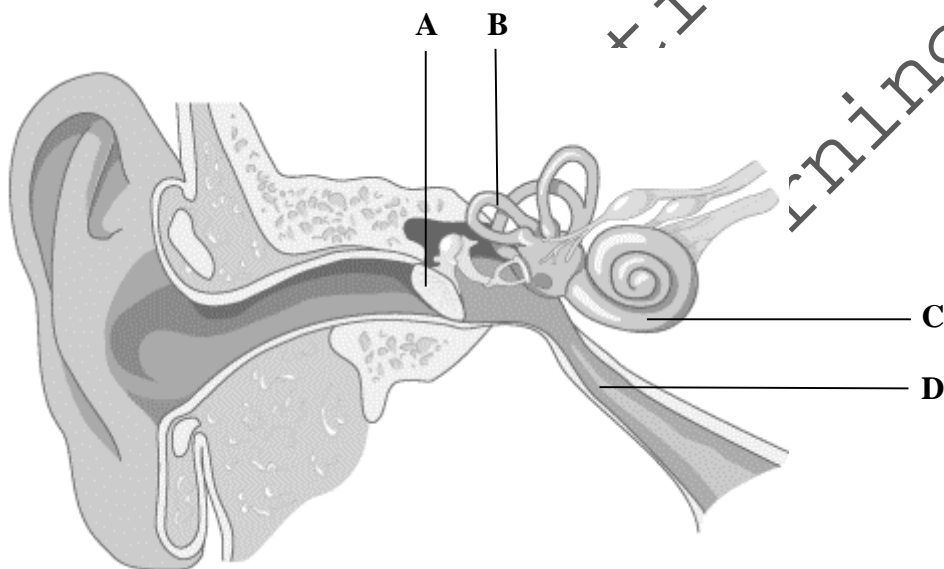
- A. prophase.
 - B. anaphase.
 - C. telophase.
 - D. metaphase.
43. In the given image of a human eye, the labelled part which contains photoreceptors, rods and cones is



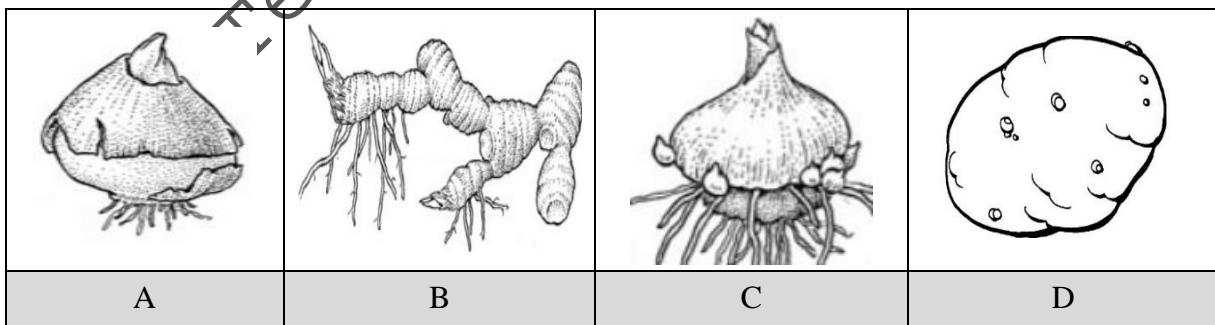
44. An ENT (Ear Nose Throat) specialist recommends a cochlear implant (hearing device) to a patient with hearing problem. The given diagram represents the component of the hearing device that has to be implanted into the ear of the patient.



The surgeon will implant the electrode of this device at the part labelled as

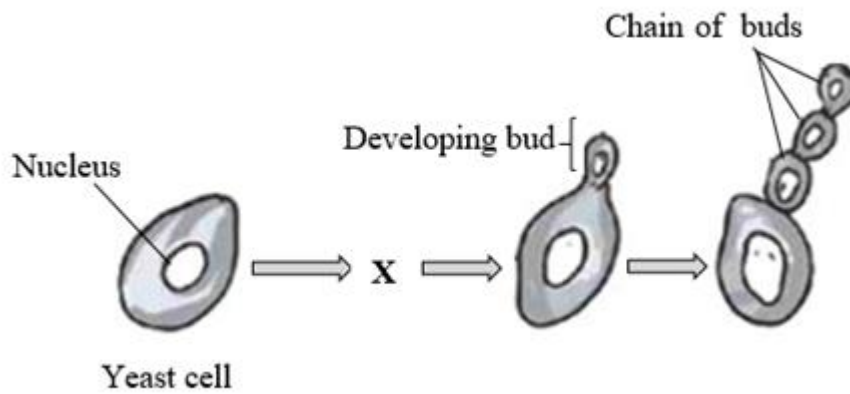


45. A student CORRECTLY identified tuber from the following images. His/ her answer is represented as

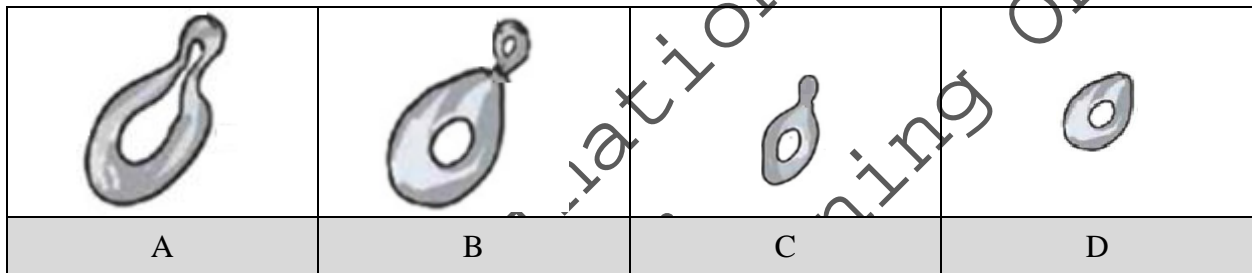


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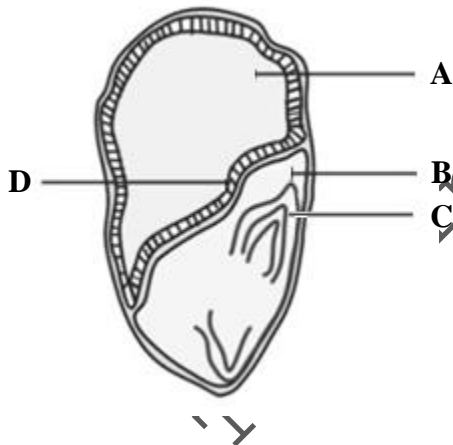
46. The given image represents the process of budding in a yeast cell.



In this image, the missing stage X is



47. In the given diagram of maize seed, the part that stores food is labelled as



48. An orthopaedic surgeon has recommended an implant for an injured joint. Diagram I represents the individual components of implant while diagram II shows the complete implant.

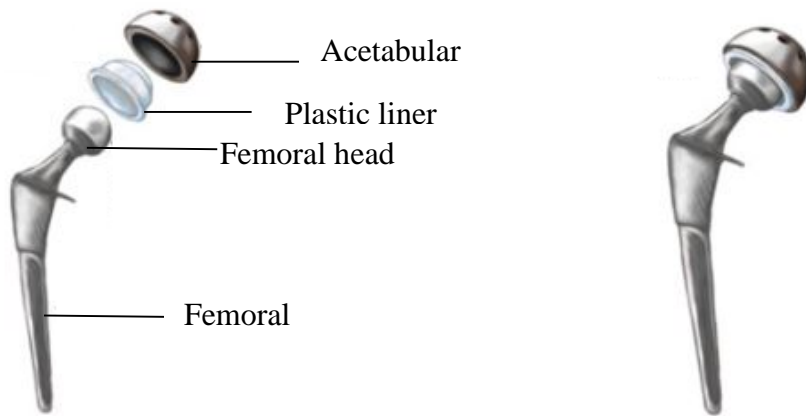
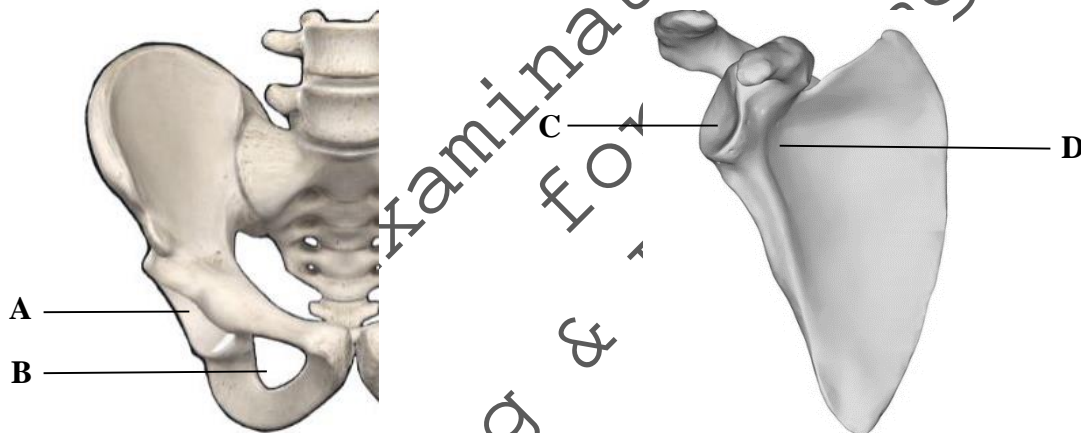


Diagram I

Diagram II

The surgeon will fix this implant at the position labelled as



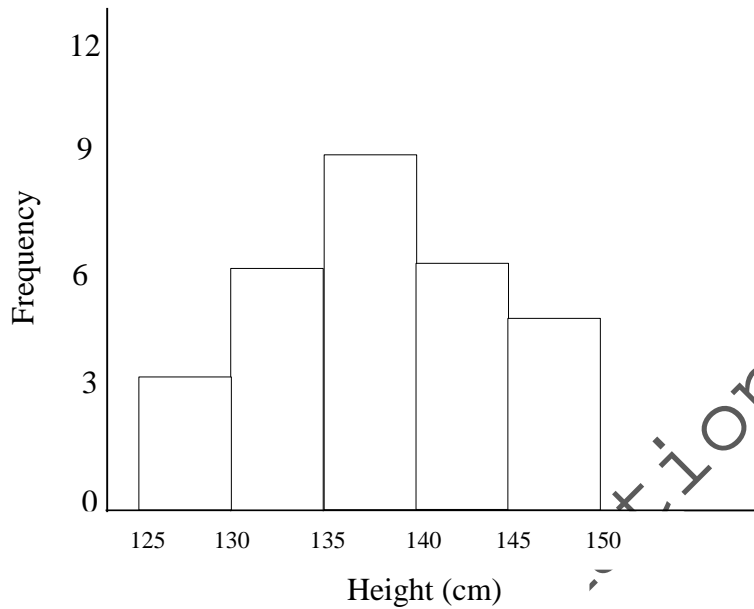
49. A DNA sample contains 15% of adenine nitrogenous base.

What would be the percentage of cytosine in this DNA sample?

- A. 85%
- B. 70%
- C. 35%
- D. 15%

50. A medical survey team recorded the heights (cm) of Grade X students to provide supplements for their proper growth. Their data is represented in the given histogram.

After their survey, they concluded that the students below 135 cm height need to consume growth supplements regularly.



According to the given data, how many students are required to consume growth supplements regularly?

- A. 3
- B. 6
- C. 9
- D. 12

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