

APOLLO

Cell and nuclear division

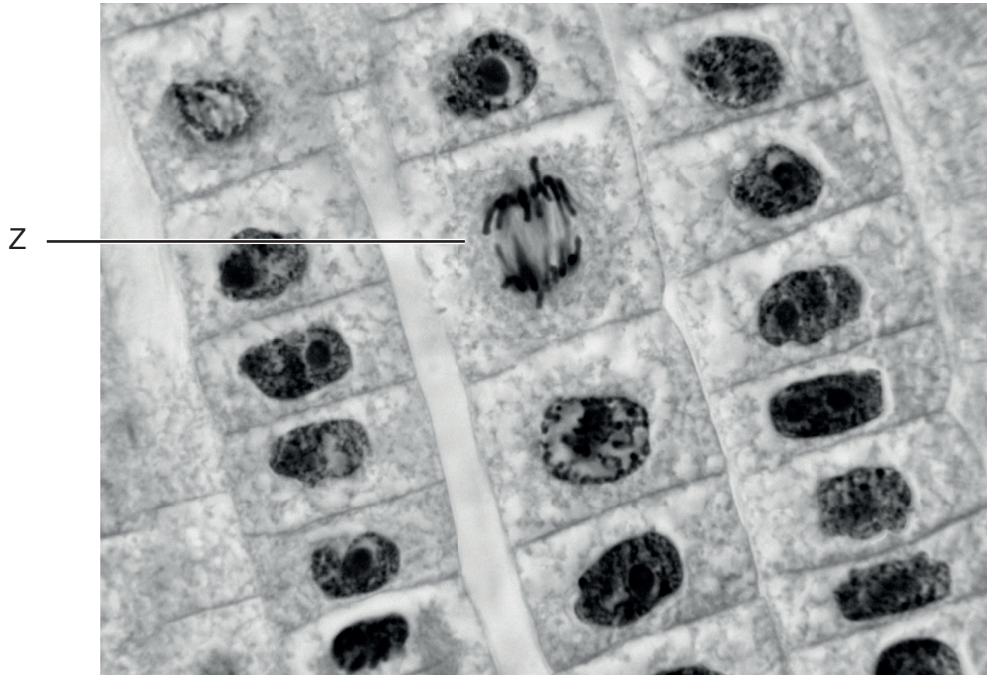
HL

Biology

First assessment 2025

9 questions | questions

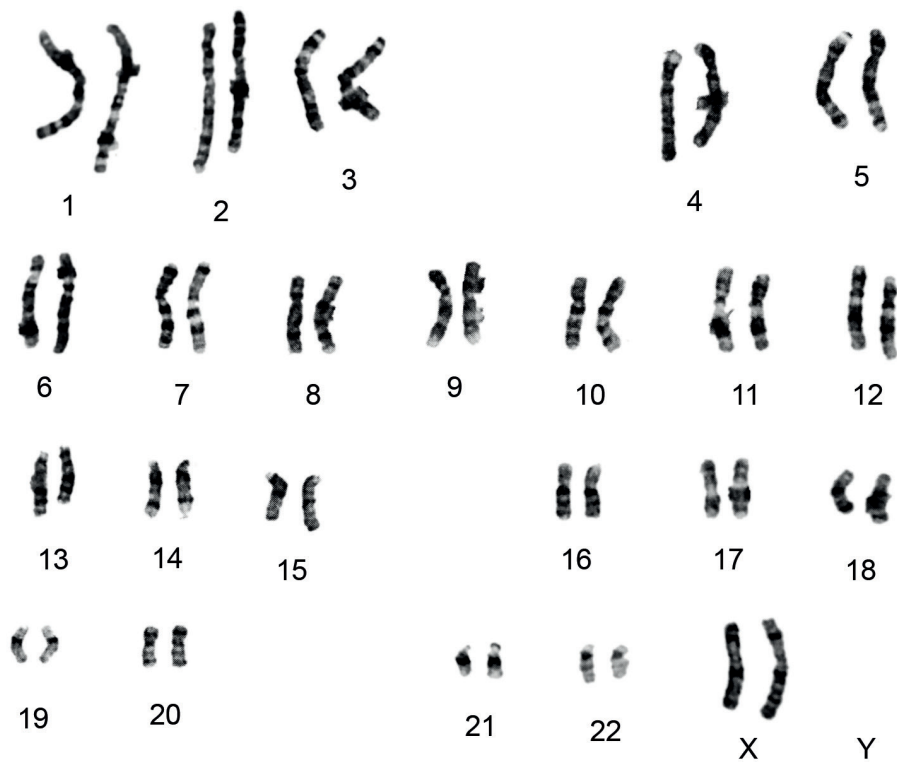
19. The micrograph shows onion (*Allium cepa*) root tip cells dividing by mitosis.



In which phase is cell Z?

- A. Interphase
- B. Prophase
- C. Metaphase
- D. Anaphase

22. The karyogram is taken from a primate.



All primates have the same sex determination chromosomes. From which primate is the karyogram?

- A. Human female
- B. Chimpanzee female
- C. Human male
- D. Chimpanzee male

- 19.** What occurs in cell division during both mitosis and meiosis?
- A. Condensation of DNA by supercoiling in telophase
 - B. Movement of microtubules to move chromatids in anaphase
 - C. Pairing of homologous chromosomes in prophase
 - D. Crossing over between chromosomes in metaphase

- 30.** A cell with 46 chromosomes goes through the process of spermatogenesis. What is the outcome of this process?
- A. One cell with 46 chromosomes and 3 polar bodies
 - B. Four cells with 46 chromosomes each
 - C. One cell with 23 chromosomes and 3 polar bodies
 - D. Four cells with 23 chromosomes each

Section B

Answer **two** questions. One additional mark is available for the construction of your answers for each question. Answers must be written within the answer boxes provided.

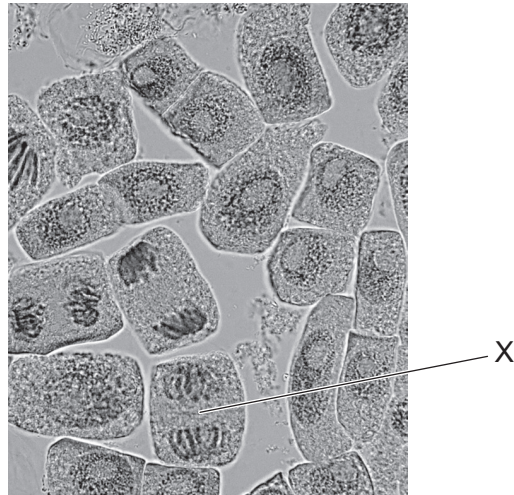
8. Eukaryotes are a diverse group of organisms, including animals and plants.
- (a) Distinguish between structures in animal and plant cells. [3]
 - (b) Outline adaptations of animals to herbivory and ways in which plants are adapted to resist herbivores. [4]
 - (c) Compare and contrast the processes of mitosis and cytokinesis in animal and plant cells. [8]

Section B

Answer **two** questions. Up to one additional mark is available for the construction of your answers for each question. Answers must be written within the answer boxes provided.

8. Members of a species typically all have the same number of chromosomes.
- (a) Explain the need for both fusion of gametes and meiosis in a **sexual** life cycle. [4]
 - (b) Describe the events in interphase and mitosis that ensure that the chromosome number does not change during an **asexual** life cycle. [7]
 - (c) Discuss the barriers to hybridization between species and how polyploidy can overcome these barriers. [4]

19. The micrograph shows cells in an onion root (*Allium cepa*) undergoing mitosis.



What is happening at X?

- A. Unequal cytokinesis by budding
- B. Assembly of cell membrane and cell wall by vesicles
- C. Contraction of a ring of actin and myosin proteins
- D. Movement of chromosomes by microtubules

19. In which order do the following steps occur in a cell that divides by meiosis?

1 Separation of homologous chromosomes

2 DNA replication

3 Crossing over

4 Pairing of homologous chromosomes

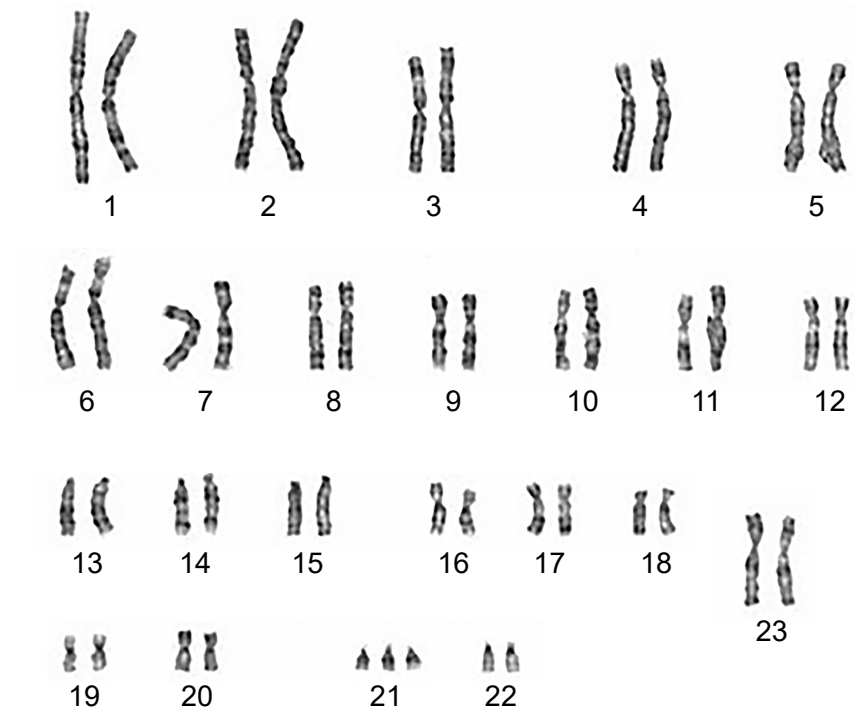
A. 2 → 4 → 3 → 1

B. 2 → 3 → 4 → 1

C. 4 → 3 → 2 → 1

D. 4 → 2 → 3 → 1

23. The karyogram shows a chromosome abnormality in a human female.



What could cause the abnormality to arise?

- A. Failure of homologous chromosomes to separate during gamete formation
- B. Chromosome 21 replicating after fertilization
- C. A gene mutation of the mother's chromosomes during cell division
- D. Polyploidy occurring during anaphase I of meiosis in both parents