

Section A: Multiple Choice

1. The main purpose of maintaining a constant chromosome number in a species is to:
a) Increase variation
b) Prevent mutation
c) Ensure stability of genetic information
d) Speed up cell division
2. Which process reduces the chromosome number by half in the formation of gametes?
a) Mitosis
b) Meiosis
c) Fertilisation
d) Cytokinesis
3. The halving of the chromosome number during gamete formation is important because it:
a) Causes variation
b) Prevents disease
c) Maintains the chromosome number of the species after fertilisation
d) Speeds up cell division
4. During which stage of mitosis do chromosomes line up at the equator of the cell?
a) Prophase
b) Metaphase
c) Anaphase
d) Telophase
5. Which stage of meiosis involves the separation of homologous chromosomes?
a) Prophase I
b) Anaphase I
c) Metaphase I
d) Telophase II
6. Mitosis results in daughter cells that are:
a) Haploid and different
b) Haploid and identical
c) Diploid and identical
d) Diploid and different
7. Which of the following occurs in meiosis but not in mitosis?
a) DNA replication
b) Halving of chromosome number
c) Separation of sister chromatids
d) Cytokinesis
8. Asexual reproduction produces genetically identical offspring because:
a) Gametes are formed
b) There is no fusion of nuclei
c) Crossing over occurs
d) Chromosome number is halved
9. Which of the following is a role of meiosis?
a) Growth and repair
b) Production of identical cells
c) Formation of gametes with variation
d) Tissue regeneration

10. In meiosis, sister chromatids separate during:

- a) Anaphase II b) Metaphase II c) Anaphase I d) Telophase I

11. Which statement best distinguishes meiosis from mitosis?

- a) Meiosis occurs in body cells only and produces 2 diploid daughter cells
b) Meiosis produces genetically identical cells that are diploid
c) Meiosis involves two nuclear divisions and produces 4 different haploid daughter cells
d) Meiosis does not involve chromosomes

12. Which process ensures variation in inherited characteristics?

- a) Mitosis b) Meiosis c) Cytokinesis d) Growth

13. An organism that reproduces asexually produces offspring that:

- a) Are genetically identical to the parent b) Have half the chromosome number
c) Are genetically varied d) Always mutate

14. The transmission of inheritable genetic characteristics occurs through:

- a) Mitosis in body cells b) Meiosis and fertilisation
c) Growth and repair d) Cytokinesis

15. Which cell division process is responsible for maintaining chromosome number across generations?

- a) Mitosis only b) Meiosis only
c) Fertilisation only d) Meiosis and fertilisation

16. During which stage of meiosis does crossing over occur?

- a) Prophase I b) Metaphase I c) Anaphase I d) Prophase II

17. Which of the following are NOT natural examples of asexual reproduction?

- a) binary fission in bacteria and amoeba
b) vegetative propagation in plants i.e. stolons and runners
c) cloning in identical twins
d) tissue culture and grafting

18. Which event occurs in Meiosis II but not in Meiosis I?

- a) Separation of homologous chromosomes b) Pairing of homologous chromosomes
c) Separation of sister chromatids d) Crossing over

19. The halving of chromosome number during meiosis is important because it:

- a) Increases growth
- b) Prevents mutation
- c) Maintains chromosome number after fertilisation
- d) Produces identical offspring

20. Which of the following is a correct comparison between mitosis and meiosis?

- a) Both produce genetically identical cells
- b) Mitosis involves two nuclear divisions while meiosis involves only one
- c) Meiosis produces haploid cells while mitosis produces diploid cells
- d) Meiosis is used for growth and repair while mitosis is used for asexual reproduction

21. Which feature distinguishes meiosis from mitosis?

- a) DNA replication occurs
- b) Cytokinesis occurs
- c) Homologous chromosomes pair up in meiosis
- d) Sister chromatids separate

22. The role of meiosis in the transmission of inheritable characteristics is to:

- a) Repair damaged DNA
- b) Ensure offspring are identical
- c) Produce gametes with genetic variation
- d) Increase the size of organisms

23. Genetic variation resulting from meiosis is mainly due to:

- a) Mitosis
- b) Fertilisation only
- c) Crossing over and independent assortment in metaphase I and II
- d) Cytokinesis

24. Which process links meiosis to the maintenance of chromosome number in a species?

- a) Growth
- b) Asexual reproduction
- c) Fertilisation
- d) Tissue repair

25. Which statement best explains why sexual reproduction produces variation?

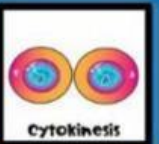
- a) Offspring are produced by mitosis only
- b) Gametes are genetically identical
- c) Meiosis produces genetically different gametes
- d) Chromosome number remains constant

Section B: Structured Questions

The Cell Cycle & PMAT

Put the pictures in order.

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What happens during Cell Cycle & PMAT?

Match the correct phase to the activity.

Interphase

Chromosomes condense and the nucleus is still visible

Prophase

90% of cells time spent for cell growth, DNA replication, and cell normal functions.

Metaphase

Chromosomes move to opposite sides of the cell by spindle fibers

Anaphase

Cytoplasm is split into two identical cells.

Telophase

Nucleus forms around each set of chromosomes

Cytokinesis

Nucleus is gone, spindle fibers form and chromosomes line up in the middle.

Meiosis Stages

Put the pictures in order.

PMAT I:

PMAT 2:



What happens during PMAT I and II?

Match the descriptions to the phases of Meiosis by drawing lines to their descriptions.

Chromosome pairs line up in the middle.

Nuclei reform forming 2 daughter cells.

Sister chromatids are pulled apart and Independent assortment occurs.

Chromosomes line up single file in the middle of the cells.

Prophase I

Metaphase I

Anaphase I

Telophase I

Prophase II

Metaphase II

Anaphase II

Telophase II

Chromosomes (with sister chromatids attached) pull away to opposite poles of the cell.

Nuclear membranes form around four unique cells.

DNA condense, homologous pairs made, Crossing over occurs in this phase, spindle fibers form.

The 2 cells from PMAT I begin to condense their chromosomes. Spindle fibers form.

Let's Compare Mitosis & Meiosis

	Mitosis	Meiosis
Type of cell it occurs in		
Function of cell produced		
# of divisions (PMAT)		
Number of chromosome in daughter cells(humans)		
Type of daughter cells produced		
Are chromosomes exchanged or do they remain identical?		
new cells are used for repair & growth	ends with 23 chromosomes	PMAT occurs twice
ends with 2 identical cells	ends with 46 chromosomes	occurs in somatic (body) cells
	new cells are used for reproduction	ends with 4 genetically different cells
		identical copies of chromosomes are made
		PMAT occurs once
		"crossing over" occurs in this process
		occurs in sperm and egg cells