

CBSE TEST PAPER-02
CLASS - XI BIOLOGY
(Cell Cycle and Cell Division)

General Instruction:

- All questions are compulsory.
 - Question No. 1 to 3 carries one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.
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1. At which stage of meiosis crossing over of genetic material takes place?
2. What is G_0 phase?
3. Name the cell division concerned with cancer.
4. Why is meiosis called reductional division & mitosis called equational division?
5. Write three processes which take place in interphase?
6. Enumerate the significance of mitosis.
7. Write six differences between mitosis & meiosis.
8. What are homologous chromosomes? What happens to homologous chromosomes during meiosis?
9. What is mitosis? Give a brief account of mitosis in an animal cell?

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[ANSWERS]

1. Pachytene.

2. Some cells in the adult animals do not appear to exhibit division (e.g., heart cells) and many other cells divide only occasionally, as needed to replace cells that have been lost because of injury or cell death. These cells that do not divide further exit G_1 phase to enter an inactive stage called quiescent stage (G_0) of the cell cycle. Cells in this stage remain metabolically active but no longer proliferate unless called on to do so depending on the requirement of the organism

3. Mitosis

4. In meiosis, the number of chromosomes is reduced to half hence, it is called reductional division. While in mitosis, the number of chromosomes remains constant after division hence, it is called equational division.

5. Three processes in interphase:-

- **G1 phase (Gap 1):** It corresponds to the interval between mitosis and initiation of DNA replication. During G1 phase the cell is metabolically active and continuously grows but does not replicate its DNA.
- **S phase (Synthesis):** This phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA per cell doubles. If the initial amount of DNA is denoted as $2C$ then it increases to $4C$. However, there is no increase in the chromosome number; if the cell had the diploid or $2n$ number of chromosomes at G_1 , even after S phase the number of chromosomes remains the same, i.e., $2n$. In animal cells, during the S phase, DNA replication begins in the nucleus, and the centriole duplicates in the cytoplasm.
- **G2 phase (Gap 2):** During the G2 phase, proteins are synthesized in preparation for mitosis while cell growth continues.

6.

- Mitosis results in the production of diploid daughter cells with identical genetic complement usually.

- The growth of multicellular organisms is due to mitosis.
- Cell growth results in disturbing the ratio between the nucleus and the cytoplasm. It, therefore, becomes essential for the cell to divide mitotically to restore the nucleo-cytoplasmic ratio.
- A very significant contribution of mitosis is cell repair. The cells of the upper layer of the epidermis, cells of the lining of the gut, and blood cells are being constantly replaced.
- Mitotic divisions in the meristematic tissues – the apical and the lateral cambium, result in a continuous growth of plants throughout their life.

7.

MITOSIS	MEIOSIS
i) Mitosis occurs in all the somatic cells.	i) It occurs in reproductive or germ cells.
ii) Occurs in both sexually as well as asexually reproducing organisms.	ii) Occurs only in sexually reproducing organisms.
iii) The cell divides only once.	iii) The whole process completes into two successive divisions
iv) Synapsis is absent.	iv) Synapsis is present.
v) No crossing over & chiasmata formation.	v) Crossing over & chiasmata formation occurs.
vi) A cell produces two diploid cells.	vi) A cell produces four haploid cells.

8. Homologous chromosomes are pairs of similar chromosomes having corresponding genes governing the same set of traits.

During the heterotypic division of meiosis in leptotene, chromosomes are thread shaped & coiled. During zygotene, the homologous chromosomes start pairing. In pachytene, the chromosomes show thickening & shortening. Diplotene is marked by the cessation of attraction force between two homologous chromosomes uncoiling of homologous chromosomes tends to separate them from each other but remain attached at chiasmata. During diakinesis, the separation of the homologous chromosome is complete. Exchange of

parts between chromatids of homologous chromosomes may take place.

During Anaphase I the centromere of homologous compounds of bivalents repel each other. After separation of the centromere, the homologous chromosomes begin to move apart. In telophase-I, the chromosomes reach poles & become shortened.

9. Mitosis is an equational cell division in which the number of chromosomes in parent & progeny cell remains same.

STAGES OF MITOSIS:-

1) PROPHASE:- a) chromosome material condenses to form compact mitotic chromosomes. Chromosomes are seen to be composed of two chromatids attached together at the centromere.

b) Initiation of an assembly of the mitotic spindle, the microtubules the protein components of the cell cytoplasm help in the process.

2) METAPHASE:- a) Spindle fibers attach to kinetochores of chromosomes

b) Chromosomes are moved to spindle equator & get aligned along metaphase plate through spindle fibers to both poles.

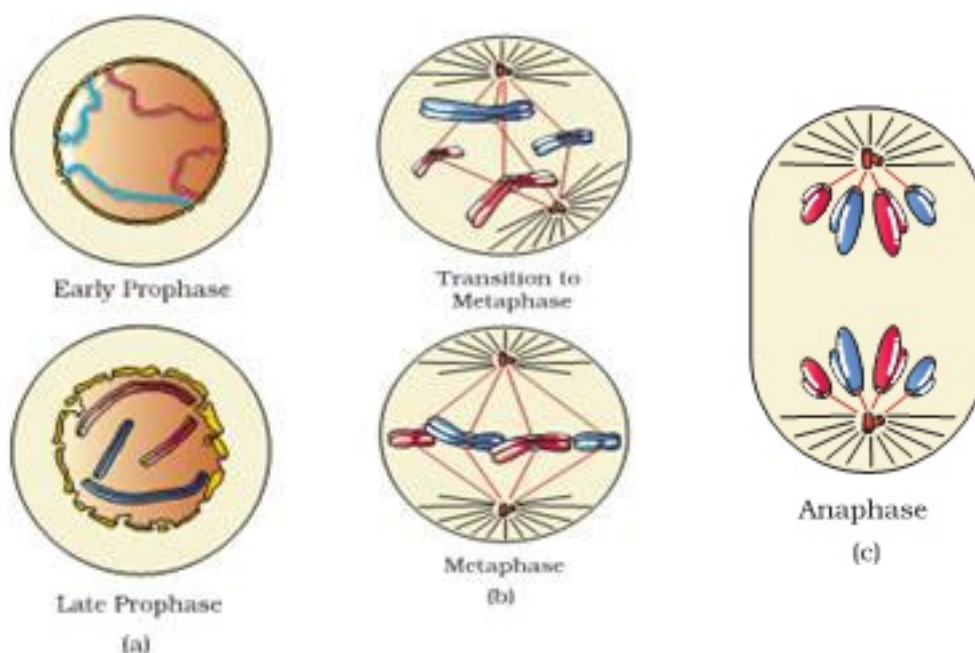
3) ANAPHASE:- a) centromere splits and chromatids separate

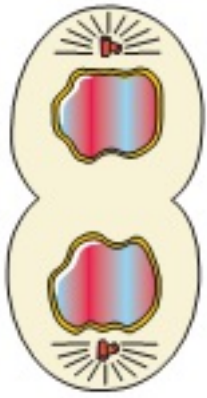
b) Chromatids move to opposite poles.

4) TELOPHASE:- a) Chromosomes cluster at opposite spindle poles & their identity is lost as discrete elements

b) Nuclear envelope assembles around the chromosome clusters.

c) Nucleolus, Golgi complex & ER reform.





Telophase
(d)



Interphase
(e)