CBSE Class 11 Biology

Important Questions

Chapter 10

Cell Cycle and Cell Division

1 Marks Questions

1.Name the stage of cell division in which paired homologous chromosomes get shortened & thickened?

Ans. Pachytene

2.Which structure of animal cell forms the asters of spindle?

Ans. Centrosome

3.Name the cells in which meiosis occurs?

Ans. Reproductive cells or germ cells.

4.At which stage of meiosis crossing over of genetic material takes place?

Ans. pachytene.

5.What is G_o phase?

Ans. A stage when cell cycle is arrested during interphase is called G_0 phase

6.Name the cell division concerned with cancer?

Ans. Mitosis

7.What are kinetochores ?

Ans. Small disc-shaped structure at the surface of the centromeres.

8.What is interkinesis ?

Ans. The stage between two meiotic dividions.

9.Why is mitosis called equational division ?

Ans. The chromosome number in daughter cells is equal to that of the parent cell.

10.Name the stage of meiosis during which synaptonemal complex is formed.

Ans. Zygotene.

11.What is G_0 phase of cell cycle?

Ans. Cells which enter a stage where they are metabolically active but no longer proliferate.

12.Where does mitosis take place in plants and animals?

Ans. Plants – Meristematic tissue; Animals – somatic cells.

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2 Marks Questions

1.What is the importance of chromosomes replication during interphase?

Ans. Interphase is a stage between the successive cell divisions. It is considered as the resting stage of nucleus as it does not show any morphological changes. But physiologically it is a very active stage in the life of a cell as the cell prepares itself for division & many biochemical changes occur during this stage.

2.Distinguish between metaphase of mitosis & metaphase I of meiosis?

Ans.

METAPHASE OF MITOSIS	**METAPHASE OF MEIOSIS: I**
i) Each chromosome consist of two chromatids which are held together by centromere	i) Homologous chromosomes form bivalent each bivalent consists of four chromatids & two centromeres
ii) The chromosomes line up in one plane to make up the equatorial plate.	ii) Bivalents become arranged in the plane of the equator forming equatorial plate.

3.How does duration affect the cell cycle in organism?

Ans. The duration depends on type of cell & external factors like temperature, food & oxygen. Time period for G, S, G, & M-phase is species under specific environmental conditions like 20 min. for bacterial cell, 10 hrs for intestinal epithetial cell 20 hrs for onion root tip cell. It shows that time required for every step have been pre-set within cell of organisms.

4.Why is meiosis called reductional division & mitosis called equational division?

Ans. In meiosis, the number of chromosomes is reduced to half so, it is called, reductional division. The gametes are formed in sexually reproducing organisms in germ cell. While in mitosis, number of chromosomes remains constant after division hence, it is called equational division.

5.Write three processes which take place in interphase?

Ans. Three processes in interphase:-

i)The replication of DNA with the synthesis of histones & nuclear proteins.

ii) Division of centriole to new centriole which lie at right to each other.

iii) The synthesis of energy- rich compound to provide energy for mitosis.

6.Enumerate the significance of mitosis?

Ans. i) The number of chromosomes in mitosis cell division remains constant in daughter cells

ii) Asexual reproduction occurs with the help of mitosis.

iii) Size of cell is controlled by mitosis.

iv) Growth & development of the zygote is maintained through mitosis

7. Differentiate between chromatin and chromate.

Ans.

Chromatin	**Chromatid**
a)Diffuse, deep staining hereditary material **b)Metabolically inert**	Longitudinally split half of a chromosome, light staining hereditary material Metabolically active

8.Give the terms for the following:

a) The pet between 2 successive mitotic divisions

b) Colt division in which chromosome number is halved.

c) Phase in cell cycle where DNA is synthesized.

d) Division of nuclear material.

Ans. (a) Interphase

(b) Meiosis

(c) S phase

(d) Karyokinesis

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3 Marks Questions

1.What is the significance of meiosis?

Ans. Significance of Meiosis:-

a)It reduces number of chromosomes to half in daughter cells.

b)It is very essential phenomenon in life cycle of sexually reproducing animals as it restores the fixed number of chromosomes.

c)Gametes are formed as a result of meiosis. Each gamete possesses half the number of chromosomes present in somatic cells.

d)It avoids the multiplication of chromosomes & thus maintains the stability & constant number of chromosomes of the species.

e)During the crossing over, exchange of nuclear material, genetic variations within the species takes place with the result that new combinations of genetic material are formed.

2.Differentiate between animal cell mitosis & plant cell mitosis?

Ans.

ANIMAL CELL MITOSIS	**PLANT CELL MITOSIS**
i) occurs in bone marrow & many epithelia	i) occurs in meristems
ii) Animal cell becomes spherical before cell division	ii) Cell shape does not change before division
iii) Several hormones induce cell division	iii) Induced by plant hormone cytokine

iv) Centro some present	iv) Centrosome absent
v) mitotic apparatus contains asters	v) mitotic apparatus has no asters
vi) Mid body is formed	vi) Mid body is not formed.
vii) occurs through cleavage	vii) Occurs by cell-plate formation
viii) Microfilaments are involved in it	viii) Microfilaments are not formed
ix) Cleavage proceeds centripetally in it	ix) Cell grows centrifugally in it.

3.Write six differences between mitosis & meiosis?

Ans.

MITOSIS	**MELOSIS**
i) Chromosome doubling is followed by separation of daughter chromosomes the cell divides only once.	i) There is doubling of chromosomes once but it is followed by two nuclear divisions. The cell divides twice.
ii) Mitosis occurs in all the somatic cells	ii) It occurs in reproductive or germ cells
iii) It is completed in one sequence of stages	iii) The whole process completes into two successive divisions
iv) Synopsis is absent	iv) Synopsis is present
v) No crossing over & chaisnata formation	v) crossing over & chaismata formation occurs
vi) A cell produces two diploid cells.	vi) A cell produces four haploid cells.

4.What are homologous chromosomes? What happens to homologous chromosomes during meiosis ?

Ans. 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 cessation of attraction force between two homologous chromoses uncoiling of homologous chromosomes tends to separate them from each other but remain attached at chiasmata. During diakinesis, the separation of 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 centromere, the homologous chromosomes begin to move apart. In telophase-I the chromosomes reach poles & become shortened.

5. What will bethe DNA content of a cell at G_1 , after S and G_2 ., ,if the content after Mphaseis2C.

Ans. $G_1 - 2C, S_1 - 4C, G_2 - 4C$

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5 Marks Questions

1.Explain the various phases of meiosis II division?

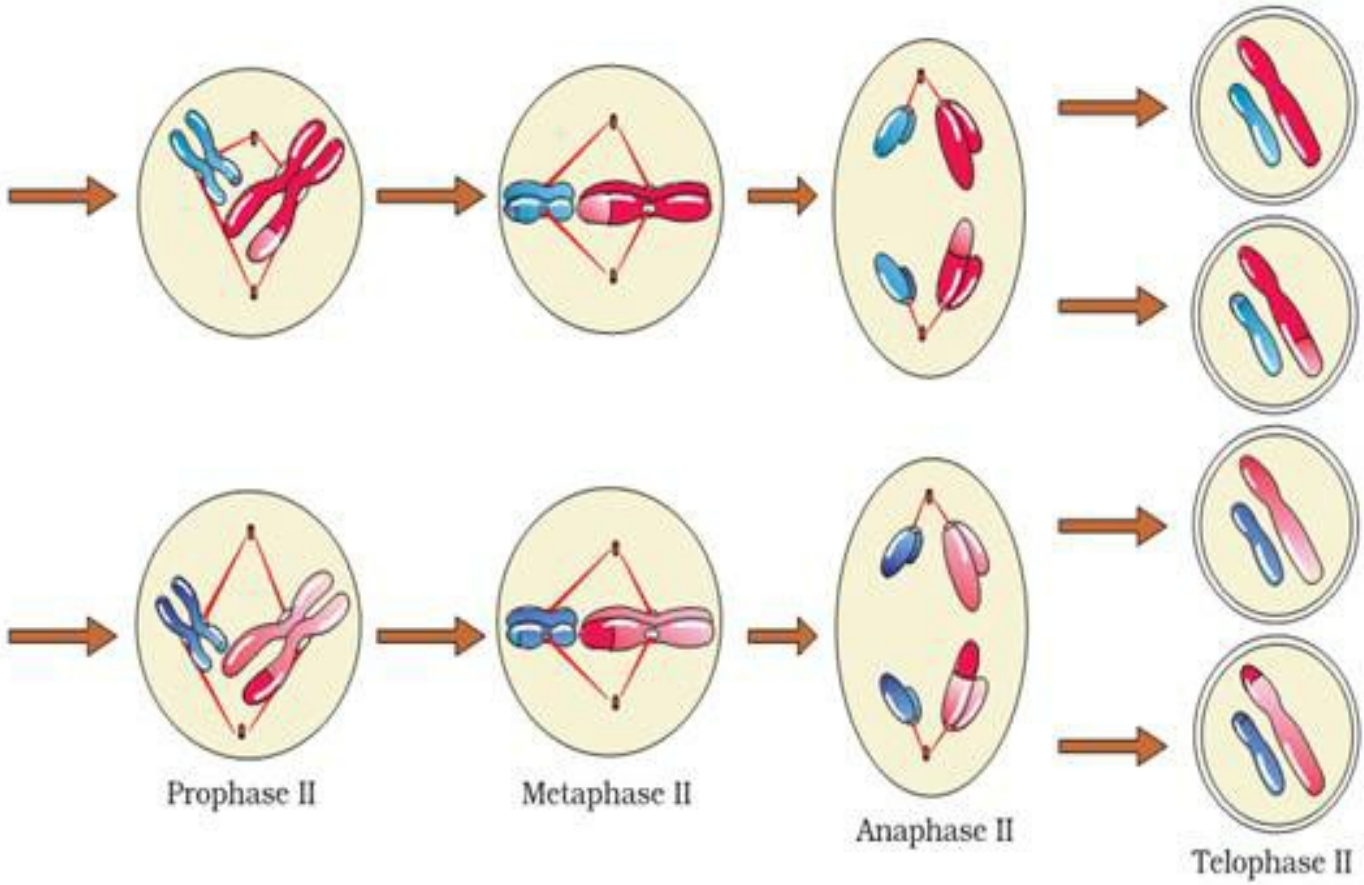
Ans. STAGES OF MELOSIS – II:-

i)PROPHASE II:- Meiosis II is initiated immediately after cytokinesis usually before chromosomes have fully elongated. The nuclear membrane disappears by the end of prophase-II. The chromosomes again become compact.

ii)METAPHASE-II:- At this stage the chromosomes align at the equator & the microtubules form opposite poles of the spindle get attached to the kinetochores of sister chromatids.

iii) ANAPHASE-II:- It begins with the simultaneous splitting of the centromere of each chromosome allowing then to move towards opposite poles of the cell.

iv) TELOPHASE-II:- Meiosis ends with telophase-II, in which two groups of chromosomes once again get enclosed by nuclear envelope, cytokinesis follows resulting in the formation of tetrad of cell i.e. four haploid daughter cells.



2.What is mitosis? Give a brief account of mitosis in animal cell?

Ans. Mitosis is an equational cell division in which 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 centromere.

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

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

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

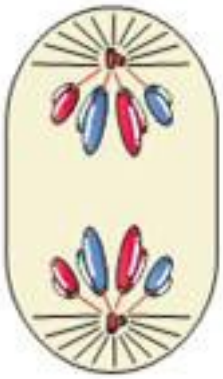
3)ANAPHASE:- a) centromere splits and chromatids separate

b) Chromatids move to opposite poles.

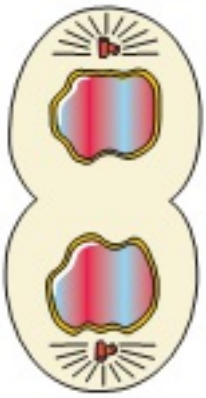
4)TELOPHASE:- a) Chromosomes cluster at opposite spindle poles & their identity is lost as discrete elements

b) Nuclear envelope assembles around the chromosome clusters.

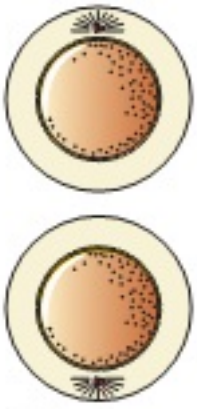
c) Nucleolus, Golgi complex & ER reform.



Anaphase
(c)



Telophase
(d)



Interphase
(e)