

CELL CYCLE AND CELL DIVISION

1. Which statement about the cell cycle is not true?
 - 1) It consists of mitosis and interphase
 - 2) The cell's DNA replicates during G1
 - 3) A cell can remain in G1 for weeks or much longer.
 - 4) Most proteins are formed throughout all subphases of interphase.

2. Which of the following statements is true?
 - 1) A diploid cell produces four diploid cells in meiosis.
 - 2) the chromosomes number is reduced to half in daughter cells in mitosis.
 - 3) the chromosome number remains the same like parent cell in meiosis.
 - 4) None of these.

3. Which of the following is true for mitosis?
 - 1) No chiasma formation
 - 2) No crossing over.
 - 3) Prophase has no substage
 - 4) All above.

4. In mitotic cell division the
 - 1) amount of DNA in the daughter cells will be equal to the parent cell.
 - 2) size will be half of the parent cell.
 - 3) DNA will be double of the parent cell.
 - 4) both 1 and 2

5. In the anaphase of mitosis
 - 1) chromosomes are in the middle of the cell.
 - 2) chromosomes are at one pole
 - 3) chromosomes move away towards the poles from the middle.
 - 4) there are no chromosomes.

6. During mitotic metaphase the position of centromere is
- 1) towards the equator
 - 2) anywhere in the spindle
 - 3) variable from plant to plant
 - 4) poleward.
7. During mitosis ER and nucleolus begin to disappear at
- 1) early prophase
 - 2) late prophase
 - 3) early metaphase
 - 4) late metaphase.
8. Select the correct option with respect to mitosis.
- 1) Chromosomes move to the spindle equator and get aligned along equatorial plate in meta-phase.
 - 2) Chromatids separate but remain in the centre of the cell in anaphase.
 - 3) Chromatids start moving towards opposite poles in telophase.
 - 4) Golgi complex and endoplasmic reticulum are still visible at the end of prophase.
9. Which of the following is true?
- 1) Meiosis maintains constant number of chromosomes in an organism.
 - 2) Meiosis provides opportunity for the exchange of genes.
 - 3) Meiosis causes genetic variations among the species.
 - 4) all above.
10. In meiosis
- 1) a single nucleus gives rise to two identical daughter nuclei.
 - 2) the daughter nuclei are genetically identical to the parent nucleus.
 - 3) the centromeres separate at the onset of anaphase I
 - 4) homologous chromosomes synapse in prophase I.
11. Which of the statement is incorrect regarding meiosis?
- 1) No duplication of centromeres occur in meiosis I
 - 2) chromosomes do not duplicate in meiosis II
 - 3) none
 - 4) both 1 and 2

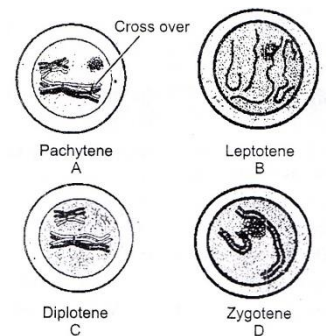
12. 'Chiasma' is a cross-shaped configuration formed between
- 1) sister chromatids of homologous chromosomes.
 - 2) sister chromatids of non-homologous chromosomes.
 - 3) non-sister chromatids of homologous chromosomes.
 - 4) non-sister chromatids of non-homologous chromosomes.

13. Which is the correct order of phases in prophase –I ?
- 1) Leptotene, diakinesis, pachytene, diplotene, zyotene.
 - 2) Leptotene, zygotene, pachytene, diplotene, diakinesis.
 - 3) Diakinesis, diplotene, pachytene, zygotene, leptotene.
 - 4) Leptotene, pachytene, zygotene, diplotene, diakinesis.

14. Bouquet stage is observed in
- 1) Leptotene 2) zygotene 3) diplotene 4) pachytene.

15. Arrange these figures in ascending order of cell.

- 1) C,D,A,B. 2) B,A,D,C.
 3) A, B, C, D. 4) B, D, A, C.



16. Pick the correct statements.
- a- Synapsis of homologous chromosomes takes place during prophase I of meiosis.
 - b- division of centromeres takes place during anaphase I of meiosis.
 - c- Spindle fibres disappear completely in telopase of mitosis.
 - d- Nucleoli reappear at telophase I of meiosis.
- 1) a- only 2) c- only 3) a, c, and d-only 4) a-and c- only.

17. In meiosis I, a bivalent is an association of
- 1) four chromatids and four centromeres
 - 2) two chromatids and two centromeres
 - 3) two chromatids and one centromere
 - 4) four chromatids and two centromeres.
18. During meiosis separation of homologous chromosomes takes place at
- 1) metaphase-1
 - 2) anaphase –II
 - 3) anaphase-I
 - 4) Diakinesis.
19. During which stage of prophase I the crossing over takes place?
- 1) Leptotene
 - 2) Zygotene
 - 3) Diplotene
 - 4) Pachytene
20. Two chromatids of metaphase chromosome
- 1) non homologous chromosomes joined at centromere.
 - 2) maternal and paternal chromosomes joined at centromere
 - 3) replicated chromosomes to be separated at anaphase.
 - 4) homologous chromosomes joined at centromere.
21. In an eukaryotic cell number of chromosomes are 36. After meiosis I and II it results into 4 daughter cells. Then each daughter cell will have how many chromosomes?
- 1) 36
 - 2) 18
 - 3) 9
 - 4) 27
22. This figure represents certain event at a particular stage of a type of cell division identify the stage?
- 1) Prophase II of meiosis
 - 2) Both prophase and metaphase of mitosis
 - 3) Prophase I during meiosis
 - 4) Prophase of mitosis.



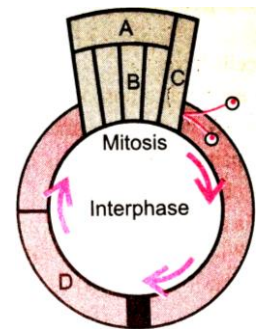
24. In the somatic cell cycle
 (a) In G₁- phase DNA content is double the amount of DNA present in the original cell
 (b) DNA replication takes place in S- phase
 (c) A short interphase is followed by a long mitotic phase
 (d) G₂- phase follows mitotic phase
25. Chiasmata are most appropriately observed in meiosis during
 (a) Diplotene (b) Pachytene (c) Metaphase II (d) Diakinesis
26. Which is not true for anaphase?
 (a) Golgi body and ER are reformed (c) Spindle poles move further apart
 (b) Chromosomes move to opposite poles (d) Centromeres split and chromatids separate
27. Colchicine brings about
 (a) Gene mutations (c) Chromosome aberrations
 (b) Duplication of chromosomes (d) Quick replication
28. At which stage of cell cycle are histones proteins Synthesised in a eukaryotic cell?
 (a) During G₂ stage of interphase (c) During entire prophase
 (b) During S- phase (d) During telophase
29. DNA duplication takes place during
 (a) Cell division phase (b) Entire interphase (c) Only in G₂ phase (d) Only in S-phase
30. A diploid living organisms develops from zygote by which type of repeated cell division?
 (a) Meiosis (b) Mitosis (c) Amitosis (d) Segmentation
31. During meiotic division
 (a) Homologous chromosomes are separated (c) The homologous chromosomes do not segregate
 (b) Linkage is disturbed (d) All the above

- 32 In which stage of meiosis, the structure, shape and number of chromosomes can be observed?
 (a) Telophase I (b) Anaphase I (c) Metaphase I (d) Prophase I
- 33 A cell plate is laid down during
 (a) Interphase (b) karyokinesis (c) Cytokinesis (d) None of these
- 34 Crossing over occurs in
 (a) Diplotene (b) Leptotene (c) Zygotene (d) Pachytene
- 35 Differentiated cell arrests at which stage?
 (a) G₁ (b) G₀ (c) G₂ (d) S
- 36 In certain cells, genetic recombination can occur during
 (a) Mitosis (b) Meiosis (c) Amitosis (d) Both (a) and (c)
- 37 Crossing over takes place between
 (a) Two sister chromatids (c) Two homologous chromosomes
 (b) Two non-sister chromatids (d) Two non-homologous chromosomes
- 38 Lampbrush Chromosomes are found in
 (a) Pachytene stage (b) Diplotene stage (c) Leptotene stage (d) Diakinesis stage
- 39 Characteristics of meiosis is
 (a) Two nuclear and two chromosome divisions (c) one nuclear and two chromosome divisions
 (b) Two nuclear and one chromosome divisions (d) one nuclear and one chromosome divisions
- 40 Which of the following event occurs during G₁ phase?
 (a) DNA replication (c) Growth and normal function of cell
 (b) Mutation (d) Fertilization

- 41 In mitosis the chromosomes replicate during
 (a) Prophase (b) Metaphase (c) Anaphase (d) Interphase
- 42 Which one of the following precedes reformation of nuclear envelope during M-phase of cell cycle?
 (a) Transcription from chromosomes reassembly of the nuclear lamina
 (b) Decondensation of chromosomes and reassembly of the nuclear lamina
 (c) Formation of the contractile ring and formation the phragmoplast
 (d) Formation of the contractile ring and transcription from chromosomes
- 43 When synapsis is complete all along the chromosome, the cell is said to have entered a stage called
 (a) Pachytene (b) Zygotene (c) Diplotene (d) Diakinesis
- 44 Spindle fibre is made of
 (a) Humulin (b) Tubulin (c) Flagellin (d) Intermediate filament
- 45 Replication of centriole occurs during
 (a) Interphase (b) Prophase (c) Late prophase (d) Late telophase

- 46 Given below is a schematic break-up of the phases/stages of the cell cycle. Which one of the following is the correct indication of the stage/phase in the cell cycle?

- (a) A - Cytokinesis
 (b) B - Metaphase
 (c) C - Karyokinesis
 (d) D - Synthetic phase



- 47 Which of the following characters is not related with telophase?
 (a) Formation of nucleolus (c) Elongation of chromosomes
 (b) Formation of two daughter nuclei (d) Formation of nuclear membrane
48. Which of the following is unique to mitosis and not a part of meiosis?
 (a) Chromatids are separated during anaphase (c) Homologous chromosomes pair and form bivalents
 (b) Homologous chromosomes behave independently (d) Homologous chromosomes cross over

- 49 Diploid cells have
- (a) One set of chromosomes
 - (b) Two sets of chromosomes
 - (c) Two pairs of homologous chromosomes
 - (d) Two chromosomes
- 50 Crossing over is also an enzymes mediated process and the enzyme involved is called
- (a) Recombinase
 - (b) Endonuclease
 - (c) Polymerase
 - (d) Ligase

Test paper: Cell Cycle and Cell Division

1. In anaphasic movement to carry a chromosome towards pole, what is needed?

- a) Glucose b) ATP c) Glycogen d) Lipid

2. Cell plate grows from

- a) Wall to center b) Centre to wall c) One wall to another d) Simultaneously

3. Cell division is initiated by

- a) Cytokinin b) Auxin c) Gibberellin d) ABA

4. Between mitosis a cell is called to be in the

- a) Resting stage b) Sleeping stage c) Active stage d) None of these

5. The longest period in the cell cycle is.

- a) Interphase b) Prophase c) Metaphase d) G₁ phase

6. Diploid living organism develops from zygote by repeated cell divisions is called

- a) Meiosis b) Amitosis c) Mitosis d) Cleavage

7. For viewing diakinesis which one of the following would be a suitable material?

- a) Onion root tip b) Leaf of Dichanthium c) Rat tail d) Flower bud

8. Period of active mitosis ranges from

- a) 10 minutes to a few hours b) A few hours to a one day c) One day to a week d) Less than a minute

9. The replication of Centrioles occurs during

- a) Early prophase b) Late prophase c) Late telophase d) Interphase

10. Terminalisation occurs during

- a) Mitosis b) Meiosis II c) Diakinesis d) Cytokinesis

11. Read the statements and select the answer from the following

Statement A: Mitosis occurs on both diploid and haploid cells, if it occurs on diploid cells the resultant cells are diploid and if occurs on haploid cells then the resultant cells are haploid

Statement B: Meiosis occurs only on diploid cells and the resultant cells are haploid.

- a) Statement A is correct and statement B is incorrect.
b) Statement B is correct and statement A is incorrect
c) Both the statement are correct
d) Both the statement are incorrect

12. Anastral mitosis is found in

- a) All living organisms b) Higher plants c) Higher animals d) Lower animals

13. Which one is present on a chromosome?

- a) Centrosome b) Centromere c) Nucleus d) Golgi body

14. Chromosomes counting is best done during

- a) Late anaphase b) Late prophase c) Telophase d) Metaphase

15. During mitosis, metaphase differ from anaphase in having

- a) same number of chromosomes and half number of chromatids
b) half number of chromosomes and half number of chromatids
c) half number of chromosomes and same number of chromatids
d) same number of chromosomes and same number of chromatids

16. Cell lineage “all cells arise from the preexisting cells” is the famous generalisation of

- a) Schleiden b) Virchow c) Schwann d) Lamarck

17. Stage of mitosis in which the chromosomes move towards the poles is

- a) Prophase b) Metaphase c) Anaphase d) Telophase

18. Match the following

	Column I		Column II
A	Hexose	i	Heteropoly saccharide
B	ATP	ii	Fructose
C	Chitin	iii	Homopoly sacchride
D	Glycogen	iv	Nucleoside
		v	Nucleotide

- a) A –v B - ii C - iii D – iv b) A –ii B - v C - i D – iii
 c) A –ii B - v C - iii D – iv d) A –i B - iii C - iv D – v

19. In tomato, meiosis occurs in the

- a) Microspore and megaspore mother cells b) Pollen sac and ovule c) Zygote d) Both (a) and (b)

20. Four daughter cells formed after meiosis are

- a) Genetically similar b) Genetically different c) Anucleate d) Multinucleate

21. The meiotic process by which homologous chromosomes are paired during prophase I is called

- a) Interkinesis b) Crossing over c) Chiasma d) Synapsis

22. Significance of Mitosis is

- a) production of cells genetically similar to the parent cell
 b) Quick division c) Increasing in cell mass d) Occurrence every tissue

23. Disjunction process takes place in

- a) Prophase b) Metaphase c) Anaphase d) Telophase

24. G₁, G₂, S phases are seen in which phase of cell cycle?

- a) Metaphase b) Prophase c) Interphase d) Anaphase

25. Nucleolar organizer is

- a) Primary constriction b) Secondary constriction c) Nuclear matrix d) Nucleolus

26. G₂ phase of mitosis takes

- a) 50% time of cell cycle b) 4 hours of cell cycle
 c) 12 to 16% time of cell cycle d) 4% time of cell cycle

27. Nuclear envelope reappears at

- a) Metaphase b) Anaphase c) Cytokinesis d) Telophase

28. Cell plate is formed from the cell organel

- a) ER b) Golgi complex c) Lysosome d) Mitochondria

29. Meiosis II performs:

- a) Separation of sex chromosomes b) Synthesis of DNA and centromere
 c) Separation of homologous chromosomes d) Separation of chromatids

30. Synaptonemal complex occur between

- a) Paired homologous chromosomes b) Paired heterologous chromosomes
 c) Any two chromosomes of paternal and maternal chromosomes d) sister chromosomes

31. Match the following meiotic sub stages with special characters occur during the phases

	Sub stage		Event
A	Leptotene	i	Terminalisation
B	Zygotene	ii	Bouquet stage
C	Pachytene	iii	Synapsis
D	Diplotene	iv	Crossing over
		v	Chiasmata

- a) A –v B - ii C - iii D – iv b) A –ii B - iii C - iv D – v
 c) A –ii B - v C - iii D – iv d) A –i B - iii C - iv D – v

32. Read the statements and select the answer from the following

Statement A: The enzyme work best at body temperature

Statement B: High temperature denatures the enzyme permanently and freezing make them temporary inactive

- a) Statement A is correct and statement B is incorrect.
- b) Statement B is correct and statement A is incorrect
- c) Both the statement are correct
- d) Both the statement are incorrect

33. Zygote meiosis takes place in

- a) Marchantia
- b) Pinus
- c) Chlamydomonas
- d) Dryopteris

34. Crossing over in diploid organism is responsible for

- a) dominance of gene
- b) Linkage between genes
- c) Recombination of linked genes
- d) Segregation of alleles

35. In meiosis homologous chromosomes separate during

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

36. The complex formed by a pair of synapsed homologous chromosomes separate while the sister chromatids remain associated at their centromeres.

- a) bivalent
- b) axoneme
- c) equatorial plate
- d) kinetochore

37. In which stage of mitosis chromosomes arrange on equatorial plate?

- a) Prophase
- b) Metaphase
- c) Anaphase
- d) Telophase

38. During gamete formation, the enzyme recombinase participates during

- a) metaphase – I
- b) anaphase – II
- c) prophase – I
- d) prophase – II

39. The substance which causes doubling of the chromosome is called?

- a) Carcinogen
- b) Teratogen
- c) Clasteogen
- d) Colchicine

40. Synaptonemal complex is formed during

- a) pachytene
- b) leptotene
- c) zygotene
- d) diakinesis

41. Select the correct option with respect to mitosis.

- a) Chromatids start moving towards opposite poles in telophase
- b) Golgi complex and endoplasmic reticulum are still visible at the end of prophase
- c) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
- d) Chromatids separate, but remains in the centre of the cell in anaphase

42. The phragmoplast is organized at the

- a) beginning of anaphase
- b) end of anaphase
- c) beginning of Telophase
- d) end of Telophase

43. Select the matched ones

I. S phase – DNA replication

II. Zygote – synapsis.

III. Diplotene – Crossing over

IV. Meiosis – Both haploid and diploid cells

IV. G₂ phase – Quiescent stage

- a) I and II
- b) III and IV
- c) III and V
- d) I, II and V

44. The stage between two meiotic division is called

- a) Interphase
- b) Cytokinesis
- c) Interkinesis
- d) Karyokinesis

45. How many chromosomes will the cell have at G₁, after S and after M phase respectively, if it has 14 chromosomes at interphase?

- a) 14, 14, 7
- b) 14, 14, 14
- c) 7, 7, 7
- d) 7, 14, 14

46. Colchicine arrests spindle at

- a) anaphase
- b) prophase
- c) Telophase
- d) metaphase

47. Which of the protein is found in spindle fibre?

- a) Tubulin
- b) Albumin
- c) Mucin
- d) Haemoglobin

48. Chromatid formation takes place in

- a) S - phase
- b) Metaphase
- c) G₁- phase
- d) G₂- phase

49. Crossing over is the exchange of genetic material between

- a) non-sister chromatide of the homologous chromosomes b) the genes those are completely linked
c) chromatids of non-homologous chromosome d) sister chromatids of the homologous chromosome

50. During mitosis, ER and nucleolus begin to disappear at

- a) early prophase b) late prophase c) early metaphase d) late metaphase

51. During meiosis I, the bivalent chromosomes clearly appear as tetrads during

- a) diakinesis b) diplotene c) leptotene d) pachytene

52. In which phase, DNA content will be double?

- a) Interphase b) anaphase c) Prophase d) Telophase

53. Synapsis occurs between

- a) a male and a female gamete b) mRNA and ribosomes
c) spindle fibres and centromeres d) two homologous chromosomes

54. Best material for the study of mitosis in laboratory is

- a) tubulin b) root tip c) leaf tip d) ovary

55. Crossing over helps in

- a) pure line selection b) inducing mutation c) inducing polyploidy d) recombination between the genes

56. During meiosis I, the bivalent is an association of

- a) four chromatids and four centromeres b) two chromatids and two centromeres
c) two chromatids and one centromere d) four chromatids and two centromeres

57. During pachytene stage of meiosis, the chromosomes appear

- a) single-stranded b) four-stranded c) six-stranded d) eight- stranded

58. In the somatic cell cycle,

- a) in G_1 phase, DNA content is double the amount of DNA present in the original cell
b) DNA replication takes place in S phase
c) a short interphase is followed by a long mitotic phase
d) G_2 phase follows mitotic phase

59. The second meiotic division leads to

- a) separation of sex chromosomes b) fresh DNA synthesis
c) separation of chromatids and centromeres d) separation of homologous chromosome

60. When paternal and maternal chromosomes change their material with each other in cell division, this event is called

- a) synapsis b) crossing over c) bivalent forming d) dyad forming