

GPLUS EDUCATION

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BIOLOGY

CELL CYCLE AND CELL DIVISION

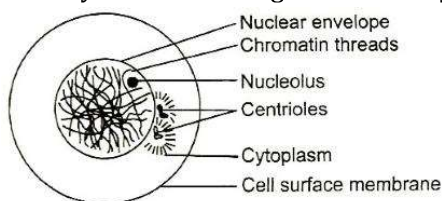
Single Correct Answer Type

- The second meiotic division leads to
 - Separation of sex chromosomes
 - Fresh DNA synthesis
 - Separation of chromatids and centromere
 - Separation of homologous chromosomes
- In meiosis, chromosome number becomes
 - Half of its parent chromosome
 - Same as that of parent chromosome
 - One fourth of its parent chromosome
 - None of the above
- Consider the following statements about plant cytokinesis
 - It usually occurs by cell plate method
 - The spindle usually persists during cytokinesis
 - Cell plate grows centrifugallyWhich of the statements given above are correct?
 - I and II
 - I and III
 - II and III
 - I, II and III
- ...A... phase corresponds to the interval between mitosis and initiation of DNA replication
 - In animal cells, during the ...B... phase, DNA replication begins in the nucleus and the centriole duplicates in the cytoplasm
 - During the ...C... phase, proteins are synthesized for the preparation of mitosis, while cell growth continuesIdentify the blanks (A-C) to complete the given statements (I-III) with reference to NCERT textbook
 - A-G₂, B-S, C-G₁
 - A-S, B-G₂, C-G₁
 - A-S, B-G₁, C-G₂
 - A-G₁, B-S, C-G₂
- Select the matched ones.
 - S-phase - DNA replication
 - Zygotene - Synapsis
 - Diplotene - Crossing over
 - Meiosis - Both haploid and diploid cells
 - G₂-phase - Quiescent stage
 - I and II only
 - III and IV only
 - III and V only
 - I, III and V only
- Which type of cell division helps in regeneration of cells?
 - Mitosis
 - Amitosis
 - Meiosis
 - Karyokinesis
- Which of the following statement(s) is/are not correct about meiosis?
 - Meiosis involves pairing of homologous chromosomes and recombination between them
 - Two diploid cells are formed at the end of meiosis-II
 - Meiosis involves two sequential cycles of nuclear and cell division called meiosis-I and meiosis-II, but only a single cycle of DNA replication
 - Meiosis-I is initiated after the parental chromosome replication which produce identical sister chromatids at the S-phaseThe correct option is
 - I and III
 - II only
 - II and III
 - I, II, III and IV

8. Choose the correct statements regarding cell cycle
 I. Interphase is called the resting phase
 II. Interphase is the time during which the cell is preparing for division
 III. The interphase is divided into phases, *i. e.*, G_1 , S and G_2 -phase
 IV. Interphase represents the phase between the two successive M-phases

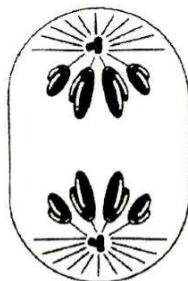
The option with correct statements is

- a) I and IV b) II and III c) I and III d) I, II, III and IV
9. Crossing over occurs during
 a) Leptotene b) Diplotene c) Pachytene d) Zygotene
10. During meiosis, the alleles of the parental pair separate or segregated from each other. How many allele(s) is/are then transmitted to a gamete?
 a) Four b) Two c) Six d) One
11. The phragmoplast is organized at the
 a) Beginning of anaphase
 b) End of anaphase
 c) Beginning of telophase
 d) End of telophase
12. The morphology of chromosomes can be studied most easily in
 a) Prophase b) Metaphase c) Anaphase d) Telophase
13. Identify the correct stage of mitosis by viewing the diagram carefully?



- a) Interphase b) Prophase c) Metaphase d) Anaphase
14. The number of chromosomes becomes half in
 a) Anaphase-I b) Anaphase-II c) Telophase-I d) Telophase-II
15. In which of the following phase of cell cycle, mitotic division got arrested?
 a) G_2 -phase b) G_0 -phase c) S-phase d) M-phase
16. Which of the following phase of cell cycle is also known as the resting phase?
 a) G_1 -phase b) M-phase c) S-phase d) Interphase
17. Differentiated cell remains at which stage?
 a) G_1 b) G_2 c) G_0 d) M
18. The process of cytokinesis refers to the division of
 a) Nucleus b) Chromosomes c) Cytoplasm d) None of these
19. Choose the correct combination of options to select the correct statement for prophase
 I. Chromosomal material condenses to form compact mitotic chromosomes
 II. The assembly of mitotic spindle is initiated by the microtubules
 III. Cells do not show organelles when viewed under the prophase
 IV. The nucleolus or nucleoli degenerate completely
 a) I only b) II and III c) I and II d) All of these
20. Which of the following event distinguishes prophase-I of meiosis from prophase of mitosis?
 a) Nuclear membrane breaks down b) Chromosomes become visible
 c) Homologous chromosomes pair up d) Spindle forms
21. During mitosis, number of chromosomes gets
 a) Change
 b) No change
 c) May be change if cell is mature
 d) May be change if cell is immature

22. I. Chromosomes cluster at opposite spindle poles their identity is lost as discrete elements
 II. Nuclear envelope assembles around the chromosome clusters
 III. Nucleolus, Golgi complex and ER reform
 Above features indicates which phase of mitosis
 a) Anaphase b) Telophase c) Cytokinesis d) S-phase
23. What would be the change in the chromosome number, during S-phase?
 a) No change
 b) The number of chromosome doubles
 c) The number of chromosome doubles only in case of diploid cell
 d) The number of chromosome doubles only in case of haploid cell
24. Arrange the following events of meiosis in a correct sequence and choose the correct option
 I. Terminalisation
 II. Crossing over
 III. Synapsis
 IV. Disjunction of genomes
 a) IV, III, II and I b) III, II, I and IV c) II, I, IV and III d) I, IV, III and II
25. What is the approximate percentage duration of cell cycle that comes under interphase in humans?
 a) 99% b) 95% c) 25% d) 5%
26. Which of the following stage of meiosis is responsible for deciding genetic constitution of gametes?
 a) Metaphase-II b) Anaphase-II c) Metaphase-I d) Anaphase-I
27. ...A.... mitotic cell division is only seen in the diploid somatic cells, while the ...B... can show mitotic divisions in both haploid and diploid cells.
 Identify A and B from the options given below
 a) A-Animals; B-plants b) A-Plants; B-animals c) A-Bacterial; B-viruses d) None of these
28. Given diagram indicates which of the following phase of mitosis? Choose the correct option

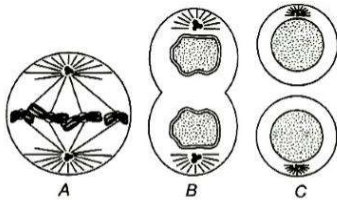


- a) Interphase b) Prophase c) Metaphase d) Anaphase
29. In meiosis, the chromosome number
 a) Reduces by half b) Increase by twice
 c) Increase by four times d) Reduces by one-fourth
30. The phase between two successive M-phase is called
 a) S-phase b) G₁-phase c) G₂-phase d) Interphase
31. At the end of meiosis-II, number of haploid cells formed are
 a) Two b) Four c) Eight d) None of these
32. The transition between meiosis-I and meiosis-II is
 a) Interkinesis b) Cytokinesis c) Diakinesis d) Karyokinesis
33. Synapsis occurs between
 a) A male and a female gamete
 b) mRNA and ribosomes
 c) Spindle fibres and centromere
 d) Two homologous chromosomes
34. In which stage of cell division, chromosomes are most condensed?
 a) Prophase b) Metaphase c) Anaphase d) Telophase

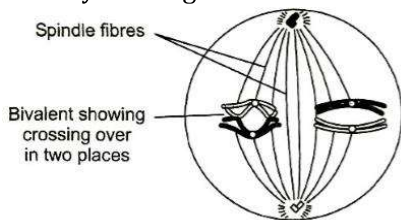
35. Which of the protein is found in spindle fibre?
 a) Tubulin b) Albumin c) Mucin d) Haemoglobin
36. Which of the following events occurs during G_1 -phase?
 a) DNA replication
 b) Growth and normal function of cell
 c) Mutation
 d) Fertilization
37. Select the correct statements regarding S-phase of interphase
 I. Occurs between G_1 and G_2
 II. DNA replication begins in the nucleus
 III. Centrioles duplicate in the cytoplasm
 IV. As DNA is doubled, number of chromosomes also doubles
 The option with correct statements is
 a) IV and III b) I, II, III and IV c) II, III and IV d) I, II and III
38. A material, which arrests cell division, is obtained from
 a) *Crocus* b) *Colchicum* c) *Dalbergia* d) *Chrysanthemum*
39. During cell division, sometimes there will be failure of separation of sister chromatids. This event is called
 a) Interference b) Complementation c) Non-disjunction d) Coincidence
40. I. The cells that do not divide further, exit G_1 -phase to enter an inactive stage called ...A... phase of the cell cycle
 II. The cells that are in G_2 -phase definitely continue with the ...B... phase.
 Identify A and B to complete the given NCERT statements
 a) A- G_0 ; B-S b) A-S; B- G_0 c) A-M; B- G_0 d) A- G_0 ; B-M
41. Which type of chromosomes segregate when a cell undergoes meiosis?
 a) Homologous chromosomes
 b) Non-homologous chromosomes
 c) Both (a) and (b)
 d) Centric and acentric chromosomes
42. Term 'meiosis' was proposed by
 a) Farmer and Moore b) Flemming c) Strasburger d) Darlington
43. Meiosis can be observed in
 a) tapetal cells
 b) Megaspores
 c) Micropores
 d) Spore mother cells
44. Crossing over that results in genetic recombination in higher organisms occurs between
 a) Sister chromatids of bivalent
 b) Non-Sister chromatids of a bivalent
 c) Two daughter nuclei
 d) Two different bivalents
45. In which of the following stage of the cell cycle, the attachment of spindle fibres to kinetochores of chromosomes occurs?
 a) Prophase b) Metaphase c) Anaphase d) Telophase
46. The sequence of events by which a cell duplicates its genome, synthesizes the other constituents of the cell and eventually divides into two daughter cells is termed as
 a) Cell division b) Cell cycle c) Cell growth d) Cell duplication
47. In animal cell has, cytokinesis involves
 a) The separation of sister chromatids
 b) The contraction of the contractile ring of micro filament
 c) Depolymerization of kinetochore microtubules

- d) A protein kinase that phosphorylates other enzymes
48. Which is correct for meiotic metaphase-I?
- Bivalents are arranged at equator
 - Univalents are arranged at equator
 - Non-homologous chromosomes form pairs
 - Spindle fibres are attached at chromomere
49. Crossing over is the exchange of genetic material between
- Non-sister chromatids of the homologous chromosomes
 - Sister chromatids of the homologous chromosome
 - Chromatids of non-homologous chromosomes
 - The genes those are completely linked
50. Which of the following phase of the cell cycle is not a part of interphase?
- S
 - M
 - G₀
 - G₁
51. Colchicine arrests which of the following stage of cell division?
- Prophase
 - Anaphase
 - Telophase
 - Metaphase
52. Select the correct option with respect to mitosis.
- Chromatids start moving towards opposite poles in telophase
 - Golgi complex and endoplasmic reticulum are still visible at the end of prophase
 - Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
 - Chromatids separate but remains in the centre of the cell in anaphase
53. Small disc-shaped structures at the surface of the centromeres that appear during metaphase are
- Kinetochores
 - Metaphase plate
 - Spindle fibres
 - Chromatid
54. Cell division can not be stopped in which phase of the cell cycle?
- G₁-phase
 - G₂-phase
 - S-phase
 - Prophase
55. Meiosis in AaBb will produce gametes
- AB, aB, Ab, ab
 - AB, ab
 - Aa, bb
 - Aa, Bb
56. The stage between two meiotic division is called
- Interphase
 - Cytokinesis
 - Interkinesis
 - Karyokinesis
57. If we ignore the effect of crossing over, how many different haploid cells arise by meiosis in a diploid cell having $2n = 12$?
- 8
 - 16
 - 32
 - 64
58. Which of the following CdKs and cyclins comes under G₁ check point?
- CdK₄/ Cyclin D
 - CdK₆/ Cyclin D
 - Both (a) and (b)
 - CdK₂/ Cyclin B
59. Crossing over occurs at
- Single strand stage
 - Two strand stage
 - Four strand stage
 - Eight strand stage
60. Chromosome number can be doubled by using which of the following?
- Indole acetic acid
 - GA
 - Zeatin
 - Colchicines
61. Dictyotene is prolonged
- Leptotene
 - Pachytene
 - Diplole
 - Zygotene
62. Which of the following is unique to mitosis and not a part of meiosis?
- Homologous chromosomes behave independently
 - Chromatids are separated during anaphase
 - Homologous chromosomes pair and form bivalents
 - Homologous chromosomes crossover

63. Spindle fibre is made up of
 a) Humulin
 b) Intermediate filament
 c) Flagellin
 d) Tubulin
64. There are three genes *a, b, c* with percentage of crossing over between *a* and *b* is 20%, *b* and *c* is 28% and *a* and *c* is 8%. What is the sequence of genes on chromosome?
 a) *b, a, c* b) *a, b, c* c) *a, c, b* d) None of these
65. See the diagrams carefully and identify the different stages of mitosis (A – C) by choosing appropriate options given below



- a) A-Metaphase; B-Telophase; C-Interphase
 b) A-Telophase; B-Metaphase; C-Prophase
 c) A-Anaphase; B-Telophase; C-Interphase
 d) A-Telophase; B-Anaphase; C-Prophase
66. During which stage of meiosis, do tetrads line up at the equator?
 a) Prophase-I b) Telophase-I c) Metaphase-I d) Anaphase-I
67. The anaphase promoting complex is activated by
 a) M cdk cyclin b) G_1 cdk cyclin c) S cdk cyclin d) Transaction factor
68. A cell plate is laid down during
 a) Cytokinesis
 b) Karyokinesis
 c) Interphase
 d) None of these
69. During which stage of meiosis, do the sister chromatids begin to move towards the poles?
 a) Prophase-I b) Telophase-I c) Anaphase-II d) Anaphase-I
70. In a cell cycle, which structures serves as the site of attachment of spindle fibres?
 a) Chromosomes b) Histone c) Chromonemeta d) Kinetochore
71. Identify the diagram and name the phase of meiosis carefully



- a) Telophase-I b) Anaphase-I c) Metaphase-I d) Prophase-I
72. Which of the following serves as mitotic spindle poison?
 a) Ca^{2+} b) Mg^{2+} c) Tubulin d) Colchicine
73. Chromosomes are visible with chromatids at which phase of mitosis?
 a) Interphase b) Prophase c) Metaphase d) Anaphase
74. RNA and proteins are formed in
 a) G_1 -phase b) G_2 -phase c) S-phase d) G_0 -phase
75. Give the name of the phases of meiosis, in which
 I. the chromosome number is reduced to haploid state
 II. the amount of DNA is reduced to haploid state

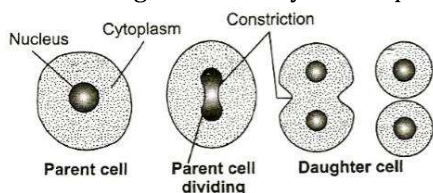
The correct option is

- a) Anaphase-II; anaphase-I
 b) Anaphase-I, metaphase-II
 c) Anaphase-I, anaphase-II
 d) Anaphase-II, metaphase-I
76. What type of cell division takes place in the functional megaspore initially in angiosperms?
 a) Homeotypic without cytokinesis
 b) Reductional without cytokinesis
 c) Somatic followed by cytokinesis
 d) Meiotic followed by cytokinesis
77. Which of the following statements are correct for multicellular cell division?
 I. Cell division brings about embryonic development and growth
 II. It plays a role in repair and maintenance of the body
 III. It is important for reproduction
 The correct option is
 a) Only I b) I and III c) Only II d) I, II and III
78. Meiosis involves two sequential cycles of ...A... called meiosis-I and meiosis-II but only a single cycle of ...B...
 Identify A and B to complete the given statement
 a) A-nuclear and cell division, B-DNA replication b) A-cell division, B-DNA replication
 c) A-DNA replication, B-cell division d) A-nuclear division, B-DNA replication
79. During, meiosis-I, the bivalent chromosomes clearly appear as tetrads during
 a) Diakinesis b) Diplotene c) Leptotene d) Pachytene
80. DNA replicates
 a) Twice in each cell cycle
 b) Only once in each cell cycle
 c) Once in mitotic cell cycle, once in meiotic-I (reductional division) and once in meiotic-II (equational division)
 d) None of the above
81. Select the correct sequence of a cell cycle
 a) $G_2 \rightarrow M \rightarrow G_1 \rightarrow S$ b) $S \rightarrow G_2 \rightarrow M \rightarrow G_1$
 c) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$ d) $M \rightarrow G_1 \rightarrow G_2 \rightarrow M$
82. Which of the following statements are correct for meiosis?
 I. Meiosis is a double division. It gives rise to four cells
 II. The cells undergoing meiosis may be haploid or diploid
 III. No bouquet stage is recorded
 IV. Pairing or synapsis of homologous chromosomes takes place during zygotene of prophase-I and continues upto metaphase-I
 Option containing correct statement is
 a) I only b) I and IV c) II and III d) All of these
83. Mature nerve cells are incapable of cell division. These cell are probably considered in
 a) G_2 -phase b) S-phase c) Mitosis d) G_0 -phase
84. Mitosis or the equational division is usually restricted to ...A... cells. However, in some lower plants and in some social insects ...B... cells also divide by mitosis.
 Choose the correct option for A and B from the given options
 A B
 a) Haploid; diploid b) Haploid; haploid c) Diploid; diploid d) Diploid; haploid
85. The spindles are formed of
 a) Chromosome b) Actin c) Microtubules d) Myosin
86. During mitosis, ER and nucleolus begin to disappear at

- a) Late prophase b) Early metaphase c) Late metaphase d) Early prophase
87. The plane of alignment of chromosome at the metaphase stage of cell cycle is referred to as the
a) Prophase plate b) Metaphase plate c) Anaphase plate d) Telophase plate
88. From the following, identify the two correct statements with reference to meiosis
I. Bead-like structures are absent on chromosomes
II. Displacement of chiasmata occurs in diakinesis
III. Separation of two basic sets of chromosomes
IV. No division of centromere
The correct option is
a) II and III b) II and IV c) III and IV d) I and III
89. Consider the following statements about colchicine
I. It is an alkaloid widely used in plant breeding for doubling the chromosome number
II. Colchicine induced polyploidy has been used in raising several varieties of horticulture and agricultural plants
Which of the statements given above is/are correct?
a) Only I b) Only II c) Both I and II d) None of these
90. Separation of linked genes is called
a) Linkage b) Segregation c) Crossing over d) Genetic mutation
91. Sequence of four phases of cell cycle is
a) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$
b) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$
c) $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$
d) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
92. The division of the cytoplasm is termed as
a) Karyokinesis b) Mitosis c) Cytokinesis d) Meiosis
93. Cell would normally proceed to mitosis without interruption
a) Once it had started the S-period
b) Once it had entered the G_2 -phase
c) At anytime during cell division
d) None of the above
94. The two chromatids of a metaphase chromosome represent
a) Replicated chromosomes to be separated at anaphase
b) Homologous chromosomes of a diploid set
c) Non-homologous chromosomes joined at the centromere
d) Maternal and paternal chromosomes joined at the centromere
95. In the process of mitotic division during interphase, chromosome material remains in the form of very loosely coiled threads called
a) Chromosome b) Chromatin c) Chromatid d) Microtubules
96. Which is synthesized in G_1 -phase?
a) DNA polymerase b) Histones c) Nucleolar DNA d) Tubulin protein
97. Which of the following occurs more than one and less than five in a chromosome?
a) Chromatid b) Chromomere c) Centromere d) Telomere
98. Longest phase of meiosis, is
a) Prophase-I b) Prophase-II c) Anaphase-I d) Metaphase-II
99. Mitotic stages are not observed in
a) *Cosmarium* b) *E. coli* c) *Saccharomyces* d) *Chlorella*
100. Crossing over is also an enzyme mediated process and the enzyme involved is called
a) Ligase b) Polymerase c) Recombinase d) Endonuclease
101. Which one of the following stages corresponds to Mendel's law of independent assortment?
a) Anaphase-II b) Anaphase-I c) Metaphase-I d) Telophase-I

102. Which stages of mitosis is known for occurrence of cytokinesis?
 a) Metaphase b) Telophase c) Anaphase d) None of these
103. Characteristic of meiosis is
 a) Two nuclear and two chromosome divisions
 b) Two nuclear and one chromosome division
 c) One nuclear and two chromosome divisions
 d) One nuclear and one chromosome division

104. See the diagram carefully and sequentially arrange the steps of amitosis given below?



- I. The constriction appears in the cytoplasm
 II. The nucleus of cell elongates and develops a constriction round its middle
 III. The constriction in nucleus gradually deepens and finally cuts the nucleus into two daughter nuclei
 IV. The cytoplasmic constriction divides the parent cell into two daughter cells, each with a nucleus
 Option containing correct sequence of events is

- a) I → III → II → IV b) I → II → III → IV c) II → I → III → IV d) II → III → I → IV
105. The number of mitotic cell divisions required to produce 256 cells from single cell would be
 a) 10 b) 12 c) 6 d) 8
106. The second check point in cell cycle occurs at
 a) $G_0 - G_1$ b) $G_1 - G_2$ c) $G_1 - S$ d) $G_2 - M$
107. The M-phase starts with the ...A..., corresponding to the separation of daughter chromosomes, known as ...B... and usually ends with division of cytoplasm which is known as ...C...

Identify A-C to complete the given NCERT statement

- a) A-cell division; B-cytokinesis; C-karyokinesis
 b) A-nuclear division; B-karyokinesis; C-cytokinesis
 c) A-cell division; B-karyokinesis; C-cytokinesis
 d) A-nuclear division; B-cytokinesis; C-karyokinesis
108. DNA replication in a cell cycle occurs during
 a) G_1 -phase b) S-phase c) G_2 -phase d) M-phase
109. If the cell has 14 chromosomes at interphase. Than how many chromosomes will the cell have at G_1 -phase of cell cycle?
 a) 28 b) 14 c) 7 d) 21
110. When parental and maternal chromosomes change their material with each other in cell division, this event is called
 a) Bivalent forming b) Crossing over c) Synapsis d) Dyad forming
111. Which of the following stage is responsible for the appearance of Lampbrush chromosomes?
 a) Meiotic prophase b) Mitotic prophase c) Mitotic anaphase d) Mitotic metaphase
112. The given figure is the representation of a certain event at a particular stage of a type of cell division. Identify the stage and choose the correct option?

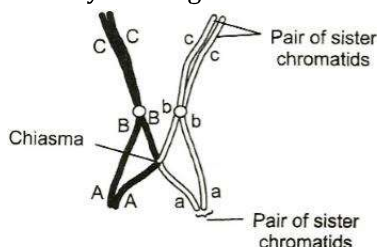


- a) Prophase-I during meiosis b) Prophase-II during meiosis
 c) Prophase during meiosis d) Both prophase and metaphase of mitosis

113. Chiasmata are most appropriately observed in meiosis during
 a) Diakinesis b) Diplotene c) Metaphase-II d) Pachytene
114. In which of the following stages, the chromosome is single thin and like long thread?
 a) Leptotene b) Zygotene c) Pachytene d) Diakinesis
115. From the following, identify the two correct statements with reference to meiosis
 I. Bead like reference to meiosis
 II. Displacement of chiasmata occurs in diakinesis
 III. Separation of two basic sets of chromosomes
 IV. No division of centromere
 The correct option is
 a) II, III b) II, IV c) III, IV d) I, III
116. Which of the following stage of cell cycle is known as quiescent stage?
 a) G₁-phase b) S-phase c) G₀-phase d) G₂-phase
117. At which stage of mitosis, chromatids separated and passes to different poles?
 a) Prophase
 b) Metaphase
 c) Anaphase
 d) Telophase
118. When dividing cells are examined under a light microscope, chromosomes become visible in
 a) Interphase b) S-phase c) Prophase d) G₁-phase
119. Phenomenon of crossing over in diploid organisms is responsible for
 a) Linkages between genes
 b) Recombination between linked genes
 c) Segregation between genes
 d) Dominance of gene
120. In G₁-phase of cell cycle, what would be the change in DNA content of the cell?
 a) DNA content increases to double b) DNA content gets reduced
 c) Four fold increase of DNA content d) No change in DNA content
121. What is the approximate duration of cell cycle for a mammalian cell?
 a) 90 min b) 24 hrs c) 24 days d) 12 hrs
122. Karyokinesis refers to the division of
 a) The cytoplasm b) The nucleus
 c) Cytoplasm and nucleus d) all constituents of the cell
123. Which of the following statements are correct for cell cycle?
 I. Cell cycle is the sequence of events involving growth and division of a cell from the time of its formation to its own division into daughter cells
 II. Cell growth (in terms of cytoplasmic increase) is a continuous process
 III. DNA synthesis occurs only during one specific stage in the cell cycle
 IV. The replicated chromosomes (DNA) are distributed to daughter nuclei during cell division
 a) I and III b) I and II c) III and IV d) I, II, III and IV
124. Which of the following statement is true for cells in G₀ stage of cell cycle?
 a) Cells in G₀ stage are metabolically more active
 b) Cells are metabolically inactive
 c) Cells are metabolically active but no longer proliferate in normal condition
 d) None of the above
125. In which stage of the first meiotic division, two sister chromatids are formed?
 a) Leptotene b) Zygotene c) Pachytene d) Diplotene
126. Synapsis occurs in phase of meiosis.
 a) Zygotene
 b) Diplotene

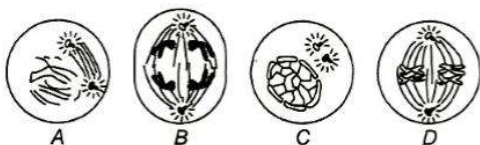
- c) Pachytene
d) Leptotene
127. Mitosis usually results in the
a) Production of diploid daughter cells b) Growth of multicellular organisms
c) Cell repair d) All of the above
128. Which of the following type of cell cycle is known as equational division?
a) Amitosis b) Mitosis c) Meiosis d) None of the above
129. The complete disintegration of nuclear envelope in a cell cycle marks the
a) Start of prophase of mitosis b) Start of metaphase of mitosis
c) End of anaphase of mitosis d) Start of telophase of mitosis
130. Chromosomes are arranged along the equator during
a) Prophase b) Metaphase c) Anaphase d) Telophase
131. What is the average duration for mitosis?
a) 3 min 30 min b) 3 hr to 5 hr c) 30 min to 3 hr d) 2 hr to 3 hr
132. Which of the following stage of mitosis follows the S and G₂-phases of interphases?
a) Prophase b) Metaphase c) Anaphase d) Telophase
133. I. Phases of cell cycle are controlled by proteins, ...A... and ...B...
II. There are two regulatory mechanisms, called ...C... which take decision about cell division.
III. The second check point, called ...D... is responsible for transition from G₂ to M-phase.
Identify A-D to complete the given statements (I-III)
a) A-cyclins; B-CdKs; C-check points; D-mitotic cyclin b) A-cyclins; B-check points; C-mitotic cyclin, D-CdKs (Cm)
c) A-mitotic cyclin (Cm), B-CdKs; C-check points, D- d) A-mitotic cyclin (Cm), B-cyclins; C-check points, D-CdKs
Cyclin
134. When synapsis is complete all along the chromosome, the cell is said to have entered a stage called
a) Zygotene b) Pachytene c) Diplotene d) Diakinesis
135. 'XX' is a phase of mitosis, in which the chromatin condenses into discrete chromosomes. During 'XX' phase, nuclear envelope breaks down and spindles forms at opposite ends of the cell
Identify 'XX'
a) Interphase b) Anaphase c) Telophase d) Prophase
136. Which of the following CdKs and cyclins comes under G₂ check point?
a) CdK₄/ Cyclin B b) CdK₂/ Cyclin B c) CdK₆/ Cyclin B d) CdK₂/ Cyclin D
137. Mitosis is divided into
a) Five stages b) Three stages c) Four stages d) Six stages
138. Which of the following statements (events) is/are true for mitotic telophase?
a) Nucleolus, GB and ER form
b) NM assembles around each chromosomes clusters
c) Arrival of chromosomes cluster at opposite poles and loss of their identity as discrete elements
d) All of the above
139. Identify A-C in the given statements, and choose the correct option
I. Spindle microtubules that extend from the two poles of a dividing cell are called ...A...
II. A centromere connects two identical copies of a single chromosomes. These two copies are called ...B...
III. In 'X' phase, the paired chromosomes separate and begin moving to opposite ends of the cell. This 'X' is called ...C...
a) A-kinetochore fibres; B-chromatids; C-metaphase
b) A-polar fibres; B-homologous chromosomes; C-Prophase
c) A-polar fibres; B-sister chromatids; C-anaphase
d) A-kinetochore fibres; B-asters; C-anaphase
140. Among the following, which one is longest phase in prophase of meiosis?
a) Leptotene b) Zygotene c) Pachytene d) Diplotene

141. The interphase is divided into three main phases. These phases are
 a) G_1 -phase, M-phase and G_2 -phase
 b) M-phase, S-phase and divisional phase
 c) Gap 1 phase, synthesis phase and gap 2 phase
 d) M-phase G_2 -phase and divisional phase
142. In which of the following stages of the cell cycle chromosome number becomes half?
 a) Metaphase-I b) Anaphase-I c) Prophase-I d) Metaphase-II
143. What type of plant is formed when colchicines is used in the process of development of *Raphanobrassica*?
 a) Triploid b) Haploid c) Autotetraploid d) Allotetraploid
144. The proteins involved in the movement of chromosomes towards the poles during cell division are
 a) Actin b) Myosin c) Tubulin d) Elastin
145. Which of the following specie's haploid cell has maximum chromosome counts?
 a) *Ophioglossum* b) Cat c) *Allium* d) Dog
146. Which one of the following precedes re-formation of the nuclear envelope during M-phase of the cell cycle?
 a) Decondensation from chromosome and reassembly of the nuclear lamina
 b) Transcription from chromosomes and reassembly of the nuclear lamina
 c) Formation of the contractile ring and formation of the phragmoplast
 d) Formation of the contractile ring and transcription from chromosomes
147. Synaptonemal complex is formed during
 a) Pachytene b) Zygotene c) Leptotene d) Diplotene
148. Identify the diagram and name the stage of meiosis correctly



- a) Pachytene (crossing over) b) Zygotene
 c) Leptotene d) Diplotene
149. G_0 -phase is
 a) Phase after G_2 -phase
 b) Phase after M-phase, in which daughter cell enters new cell cycle
 c) Arrest of cell cycle on the onset of differentiation
 d) All of the above
150. During cell division, chromosome attaches with spindles
 a) Kinetochore
 b) Centrosome
 c) Centriole
 d) Secondary constriction
151. The spindle microtubules are polar, their orientation is
 a) Positive (+) and negative (-) both ends towards the equator
 b) Positive (+) ends towards the poles
 c) negative (-) ends towards the poles
 d) Positive (+) and negative (-) both ends towards the poles
152. The non-sister chromatids twist around and exchange segments with each other during
 a) Diplotene b) Diakinesis c) Leptotene d) Pachytene
153. Two basic stages of cell cycle are
 a) Interphase and M-phase/divisional phase

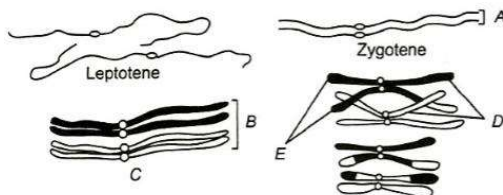
- b) Karyokinesis and cytokinesis
 c) Prophase, metaphase, anaphase and telophase
 d) G_1 , S and G_2 phases
154. Which of the following statements are correct for G_1 -phase?
 I. It is the last substage of interphase
 II. Cell organelles do not increase in number
 III. Both cell and nucleus grow in size
 IV. It synthesizes RNAs, proteins and other biochemical for cell growth and subsequent replication of DNA
 Choose the correct option
 a) I and II b) II and IV c) I and III d) II and III
155. From the following identify the two correct statements with reference to meiosis
 I. Bead-like structures are absent on chromosomes.
 II. Displacement of chiasmata occurs in diakinesis.
 III. Separation of two basic sets of chromosomes.
 IV. No division of centromere.
 a) II,III b) II,IV c) III,IV d) I,III
156. The S-phase of cell cycle is characterized by
 a) Duplication of chromosome
 b) Shortening of chromosome
 c) Duplication of DNA
 d) Duplication of centriole
157. Congestion is a phenomenon of
 a) Movement of sister chromatids towards the poles
 b) Pairing of homologous chromosomes
 c) Separation of paired chromosomes
 d) Bringing the chromosomes on equator of spindle apparatus
158. Find the correctly matched pairs and choose the correct option
 I. Leptotene – The chromosomes become invisible
 II. Zygotene – Pairing of homologous chromosomes
 III. Pachytene – Dissolution of the synaptonemal complex takes place
 IV. Diplotene – Bivalent chromosomes appear as tetrads
 V. Diakinesis – Terminalisation of chiasmata takes place
 a) I and II b) II and IV c) II and V d) II and III
159. The number of DNA strands in chromosome at G_2 -stage is
 a) One b) Two c) Four d) Eight
160. Meiosis occurs in which of the following cells?
 a) Sperm cells b) Unicellular organisms c) Liver cells d) All of these
161. Identify the following figures (A – D) and choose the correct option



- a) A-Metaphase-II, B-Anaphase-I, C-Prophase-I, D-Anaphase-II
 b) A-Prophase-I, B-Anaphase-I, C-Interphase, D-Metaphase-I
 c) A-Metaphase-I, B-Anaphase-I, C-Prophase-I, D-Anaphase-II
 d) A-Prophase-II, B-Anaphase-I, C-Interphase, D-Metaphase-II
162. During the G_1 -phase of cell division
 a) RNA and proteins are synthesized
 b) DNA and proteins are synthesized
 c) Cell prepares for M-phase

d) Cell undergoes duplication

163. Study the diagram showing meiosis carefully and choose the correct options for A – E



- a) A –Tetrad, B –Bivalent, C –Zygotene stage, D –Sister chromatids, E –Non-sister chromatids
- b) A –Bivalent, B –Tetrad, C –Pachytene stage, D –Crossing over, E –Non-sister chromatids
- c) A –Bivalent, B –Tetrad, C –Pachytene stage, D-Non-Sister chromatids, E-Sister chromatids
- d) A –Bivalent, B –Tetrad, C –Pachytene stage, D –Sister chromatids, E –Non-Sister chromatids

164. In ...A.... phase, there is synthesis of RNAs and proteins that are needed for cell growth and replication of DNA. While it is ...B... phase, where synthesis of protein occur that is needed for spindle formation and mitosis to continue.

Identify A and B to complete the given statement

- a) A-G; B-S
- b) A-G₂; B-S
- c) A-G; B-G₂
- d) None of these

165. Interphase nucleus is enclosed by

- a) Non-porous nuclear membrane
- b) Porous double nuclear membrane
- c) Non-porous double discontinuous nuclear membrane
- d) A single porous unit membrane

166. Read the following statements and select the correct option

- I. M-phase represents the phase when the actual cell division or mitosis occurs
- II. Interphase represents the phase between two successive M-phases
- III. In the 24 hrs average duration of cell cycle of a human cell, cell division proper lasts for only about an hour
- IV. The M-phase lasts more than 95% of the duration of cell cycle

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

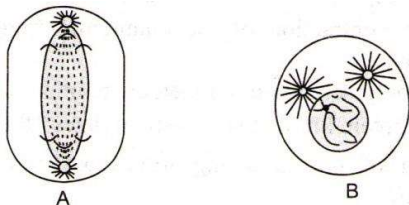
167. What change would occur in DNA content, during S-phase?

- a) No change
- b) The amount of DNA per cell doubles
- c) The amount of DNA per cell increase four folds
- d) The amount of DNA per cell decreases

168. In meiosis, the daughter cells are not similar to that of parent because of

- a) Crossing over
- b) Synapsis
- c) Both (a) and (b)
- d) None of these

169. Which stages of cell division do the following figures 'A' and 'B' represent respectively?



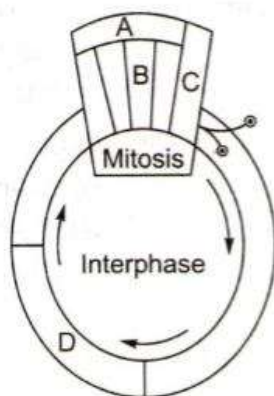
- a) Metaphase - Telophase
- b) Telophase - Metaphase
- c) Late anaphase - Prophase
- d) Prophase - Anaphase

170. During cell cycle, RNA and non-histone proteins are synthesized in

- a) S-phase
- b) G₀-phase
- c) G₁-phase
- d) M-phase

171. Alleles of different genes that are on the same chromosome may occasionally separated by a phenomenon known as

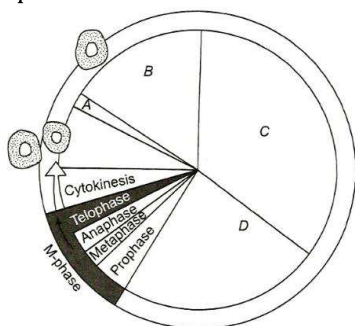
- a) Pleiotropy
 - b) Epistasis
 - c) Continuous variation
 - d) Crossing over
172. In meiosis, division is
- a) I reductional and II equational
 - b) I equational and II reductional
 - c) Both reductional
 - d) Both equational
173. Cells in G_0 -phase of cell cycle
- a) Exit cell cycle
 - b) Enter cell cycle
 - c) Suspend cell cycle
 - d) Terminate cell cycle
174. Given below is a schematic break-up of the phases/stages of cell cycle



- Which one of the following is the correct indication of the stage/phase in the cell cycle?
- a) B-Metaphase
 - b) C-Karyokinesis
 - c) D-Synthetic phase
 - d) A-Cytokinesis
175. Choose the correct answer for the statements given below
- I. Protein involved in the shortening and thickening of chromosome fibres
 - II. The name of early prophase when elongated chromosomes occur in overlapped condition like a ball of wool without their ends being visible
 - III. Each group of astral rays along with its centriole pair
 - IV. Name the narrow point which is responsible for attaching two sister chromatids to each other
- a) I-Codensins, II-Aster, III-Spirme stage, IV-Kinetochore
 - b) I-Codensins, II-Aster, III-Spirme stage, IV-Centromere
 - c) I-Codensins, II-Spirme stage, III-Aster, IV-Centromere
 - d) I-Tubulins, II-Spirme stage, III-Amphiaster, IV-Kinetochore
176. If you are provided with root-tips of onion in your class and are asked to count the chromosomes, which of the following stages can you most conveniently look into?
- a) Metaphase
 - b) Telophase
 - c) Anaphase
 - d) Prophase
177. In cell cycle, during which phase chromosomes are arranged at equatorial plate?
- a) Metaphase
 - b) Anaphase
 - c) Telophase
 - d) Prophase
178. Meiosis in a plant occurs when there is a change
- a) From gametophyte to sporophyte
 - b) From sporophyte to gametophyte
 - c) From gametophyte to gametophyte
 - d) From sporophyte to sporophyte

179. When number of chromosomes is already reduced to half in the first reductional division of meiosis, what is the necessity of second meiotic division?
- The division is required for the formation of four gametes
 - Divisions ensures equal distribution of haploid chromosomes
 - Division ensures equal distribution of genes on chromosomes
 - Division is required for segregation of replicated chromosomes
180. Select the correct option
- Division of the cytoplasm occurs before the division of the nucleus
 - Division of the nucleus occurs before the division of the cytoplasm
 - Both the division of the nucleus and cytoplasm occurs at the same time
 - None of the above
181. During meiotic division, the
- Homologous chromosomes are separated
 - The linkage is disturbed
 - The homologous chromosomes do not segregate
 - All of the above
182. Recombination is involved in the process of
- Cytokinesis
 - Spindle formation
 - Crossing over
 - Chromosome duplication
183. A diploid living organism develops from zygote by which type of the following repeated cell divisions?
- Meiosis
 - Amitosis
 - Mitosis
 - Segmentation
184. Pick out the correct statements.
- Synapsis of homologous chromosomes takes place during prophase-I of meiosis.
 - Division of centromeres takes place during anaphase-I of meiosis.
 - Spindle fibres disappear completely in telophase of mitosis.
 - Nucleoli reappear at telophase-I of meiosis.
- I only
 - III only
 - I and II only
 - I, III and IV only
185. An egg cell has 5pico gram of DNA in its nucleus. How much amount of DNA will be, in this animal, at the end of G_2 -phase of mitosis?
- 2.5pico gram
 - 5pico gram
 - 5 g
 - 20pico gram
186. The term 'meiosis' was given by
- Rusk
 - Flemming
 - Johannsen
 - Former and Moore
187. After the separation of centromeres during mitosis, the chromatids move towards opposite poles of the spindle. Name the term used for these chromatids
- Daughter chromosomes
 - Kinetochores
 - Half spindles
 - Centrosomes
188. In which phase, proteins for spindle fibre are synthesized?
- G_1 -phase
 - G_2 -phase
 - S-phase
 - Anaphase
189. In meiosis-I, a bivalent is an association of
- Four chromatids and four centromeres
 - Two chromatids and two centromeres
 - Two chromatids and one centromeres
 - Four chromatids and two centromeres
190. Colchicine arrests spindle at
- Anaphase
 - Prophase
 - Telophase
 - Metaphase
191. How many chromosomes will the cell the cell have at G_1 , after S and after M-phase respectively, if it has 14 chromosomes at interphase?
- 14,14,7
 - 14,14,14
 - 7,7,7
 - 7,14,14

192. Chiasmata are formed due to
 a) Crossing over of same part between homologous chromosomes
 b) Crossing over of same part between non-homologous chromosomes
 c) Duplication of homologous and non-homologous chromosomes
 d) Loss of some part of chromosomes
193. Which of the following shows diplotene stage of cell cycle?
 a) Separation of synapsed homologous chromosomes except at the site of cross overs
 b) Degeneration of nucleolus
 c) Chiasmata shift towards chromosome ends
 d) All of the above
194. Given diagram represents the events occurring in cell cycle. Identify A, B, C and D and select the correct option



- A B C D
 a) G_0 G_1 S G_2 b) G_1 G_0 S G_2 c) S G_0 G_1 G_2 d) G_1 S G_2 G_0
195. 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
196. Which phase comes in between the G_1 and G_2 phases of cell cycle?
 a) M-phase b) G_0 -phase c) S-phase d) Interphase
197. Select the event of cell cycle which shows the importance of synapsis and the formation of chiasmata
 a) An increase in the variation of progeny occurs b) The DNA on homologous chromosomes mix
 c) Reciprocal exchange of chromosomal sections occurs d) All of the above
198. Mitosis is a process by which eukaryotic cells
 a) Grow
 b) Get specialized in structure
 c) Multiply
 d) Expose the genes
199. Phragmoplast is
 a) Proplated in cytoplasm of dividing cells
 b) Cell plate formed by vesicles ER and dictyosomes during cytokinesis
 c) Cell plate formed by ER, dictyosomes, secretory vesicles and spindle fibre
 d) None of the above
200. Mitosis is characterized by
 a) Reduction division b) Equal division
 c) Both (a) and (b) d) Absence of spindle formation
201. Choose the correct sequence of two main events in mitosis
 a) Karyokinesis followed by cytokinesis
 b) Cytokinesis followed by karyokinesis

- c) Karyokinesis followed by separation of the daughter cells
d) Cytokinesis followed by separation of the daughter cells
202. What is the correct sequence of the steps given here?
Also work out the process depicted in the steps?
V. Homologous chromosomes move toward opposite poles of the cell; chromatids do not separate.
VI. Chromosomes gather together at the two poles of the cell and the nuclear membranes reform.
VII. Homologous chromosomes pair and exchange segments.
VIII. Homologous chromosomes align on a central plate.
IX. The haploid cells separate completely.
- a) The correct sequence is III → IV → I → II → V and the process is meiosis-I
b) The correct sequence is II → I → V → IV → III and the process is mitosis
c) The correct sequence is IV → I → III → II → V and the process is meiosis-I
d) The correct sequence is II → V → IV → I → III and the process is mitosis
203. What is the nature of cells formed at the end of meiosis-II?
a) Haploid b) Diploid c) Tetrad d) None of these
204. Significance of meiosis lies in
a) Reduction of chromosome number to one half
b) Maintaining consistency of chromosome number during sexual reproduction
c) Production of genetic variability
d) All of the above
205. The major event that occurs during the anaphase of mitosis, which brings about the equal distribution of chromosomes is
a) Replication of the genetic material
b) Splitting of the chromatids
c) Splitting of the centromeres
d) Condensation of the chromatin
206. Chiasma shows the sites of
a) Spindle formation b) Synapsis c) Crossing over d) None of these
207. What is the function of centromere?
a) Cell division
b) Cell plate formation
c) Cell differentiation
d) Cell wall formation
208. The cell cycle of yeast takes about
a) 24 hrs b) 60 min c) 30 min d) 90 min
209. What is not seen during mitosis in somatic cells?
a) Spindle fibre
b) Chromosomes movement
c) Disappearance of nucleolus
d) Synapsis
210. In which phase, DNA content will be doubled?
a) Interphase b) Anaphase c) Prophase d) Telophase
211. At which stage of cell cycle colchicine arrests the spindle?
a) Anaphase b) Prophase c) Telophase d) Interphase
212. Arrange the following events of meiosis in the correct sequence.
X. Terminalization
XI. Crossing over
XII. Synapsis
XIII. Disjunction of genomes
The correct sequence is

- a) 4, 3, 2, 1 b) 3, 2, 1, 4 c) 2, 1, 4, 3 d) 1, 4, 3, 2
213. Spindle fibre is made up of
a) Tubulin
b) Humulin
c) Intermediate filament
d) Flagellin
214. Diakinesis is marked by
a) Terminalisation of chiasmata b) Degeneration of nucleolus
c) Chiasmata shift towards chromosome ends d) All of the above
215. Cleavage is a unique form of mitotic cell division in which
a) There is no growth of cells
b) The nucleus does not participate
c) No spindle developers to guide the cells
d) The plasma membranes of daughter cells do not separate
216. In plant cell has 12 chromosomes at the end of mitosis. How many chromosomes would it have in the G₂-phase of its next cell cycle?
a) 6 b) 8 c) 12 d) 24
217. Meiosis occurs in organism during
a) Vegetative reproduction b) Sexual reproduction
c) Both (a) and (b) d) None of these
218. Chromosome reaches their respective poles in which of the following stages of mitosis?
a) Cytokinesis b) Interphase c) S-phase d) Telophase
219. Replication of centriole occurs during
a) Interphase b) Prophase c) Late prophase d) Late telophase
220. Genetic recombination is due to
a) Fertilization and meiosis
b) Mitosis and meiosis
c) Fertilization and mitosis
d) None of these
221. Pick out the correct statements.
I. Mitosis takes place in the somatic cells and meiosis takes place in the germ cells
II. During mitosis, the DNA replicates once for one cell division and in meiosis the DNA replicates twice for two cell divisions.
III. Mitosis and meiosis occur both in sexually and asexually reproducing organisms.
a) I only b) II only c) III only d) I and II only
222. Chromatid formation takes place in
a) S-phase b) Metaphase c) G₁-phase d) G₂-phase
223. 56 cells are produced in meiosis where first division is
a) Equal
b) Reduction
c) Mitosis
d) None of these
224. A cell in post reproductive stage remains in
a) G₂-phase b) S-phase c) G₁-phase d) M-phase
225. Most cytogenic activities occur during
a) Interphase b) Telophase c) Prophase d) Anaphase
226. The term, mitosis was coined by
a) Flemming b) Strasburger c) Remak d) Moore
227. Which of the following character is related with telophase?
a) Formation of nuclear membrane

- b) Formation of nucleolus
- c) Elongation of chromosome
- d) Formation of two daughter nuclei

