BIOLOGY

NEET & AIIMS

CELL CYCLE AND CELL DIVISION

Example

1. What is a cell cycle ?

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2. Name the two phases of a cell cycle.

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3. Name the interval between the M and the S phase.

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4. The stage of cell cycle when cell decides to undergone differentiation is

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5. How do plants continue to grow all their lifespan ?

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6. Cytokinesis

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7. What happens during S phase ?

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8. What is mitosis ?

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9. Mitosis does not occur in _____ (gametes/somatic cells).

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10. Distinguish cytokinesis from karyokinesis.

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11. what is interkinesis?

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12. What is terminalisation of chiasmata?

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13. What happens during leptotone?

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14. What are homologous chromosomes?

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15. What is synapsis ?

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16. What is crossing over ?

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17. How are variations introduced during meiosis ?

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18. In Meiosis-I and meiosis-II, which is similar to mitosis?

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19. what happens during metaphase II?

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20. Which cell division is responsible for producing gametes essential for sexual reproduction ?

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Try Yourself

1. Select the phase from the following where actual cell division occurs

A. Quiescent stage

B. Interphase

C. G_1 Phase

D. Mitosis phase

Answer: A::D

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2. Interphase is called 'resting phase' why?

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3. Which of the following cell does not divide ?

A. Nerve cell

B. Yeast

C. Apical meristematic cell

D. E, coli

Answer: A

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4. Which of the following is incorrect ?

A. The cells in G_1 phase are metabolically active

B. The length of G_1 phase remains constaint in different organisms

C. Interphase is a period of intense growth

D. Mitosis is the phase where actual cell division occurs

Answer: A::B

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5. What is cell division ?

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6. Centrioles duplicate in the

A. Nucleus

B. Endoplasmic reticulum

C. Cytoplasm

D. Mitochondria

Answer: A::C

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7. If the initial amount of DNA is denoted by 2 C then the amount of DNA present after S phase will be

A. 4 C

B. 8 C

C. 2 C

D. 5 C

Answer: A

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8. If 46 chromosomes are present at G_1 phase, then the number of chromosomes after S phase would be

A. 23

B. 92

C. 47

D. 46

Answer: A::D

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9. M phase in humans lasts _____ of the duration of cell cycle.

A. 0.9

B. 0.6

C. 0.96

D. lt 5%

Answer: A::D

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10. Cell organelles replicate in/during

A. M phase

B. interphase

C. G_0 phase

D. Cytokinesis

Answer: A::B

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11. Two chromatids are hold together at

A. Spindle fibre

B. Microtubule

C. Centromere

D. Kinetochore

Answer: A::C

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12. During metaphase, the chromosomes align themselves at the

A. Periphery

B. Equator

C. Cell plate

D. Furrow

Answer: A::B

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13. Which of the following the correct sequence of cell division ?

A. Analphase $\rightarrow$ metaphase $\rightarrow$ Telophase $\rightarrow$ Prophase

B. Prophase $\rightarrow$ Telophase $\rightarrow$ Anaphase $\rightarrow$ Metaphase

C. Analphase $\rightarrow$ Prophase $\rightarrow$ Metaphase $\rightarrow$ Telophase

D. Prophase $\rightarrow$ Metaphase $\rightarrow$ Analphase $\rightarrow$ Telophase

Answer: A::D

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14. Why is mitosis called equational division ?

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15. Crossing-over occurs in the

A. Leptotene

B. Diplotene

C. Zygotene

D. Pachytene

Answer: A::D

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16. Synaptonemal complex is formed during

A. Pachytene

B. Zyotene

C. Leptotene

D. Diakinesis

Answer: A::B

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17. Which phase of prophase-I represents the transition to metaphase I ?

A. Diakinesis

B. Leptotene

C. Diplotene

D. Zygotene

Answer: A

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18. Dissolution of synaptonemal complex occurs during

A. Pachytene

B. Leptotene

C. Diplotene

D. Diakinesis

Answer: A::C

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19. Which of the following is the correct sequence ?

A. Leptotene $\rightarrow$ Diakinesis $\rightarrow$ Diplotene $\rightarrow$ Zygotene $\rightarrow$ Pachytene

B. Diplotene $\rightarrow$ Leptotene $\rightarrow$ Zygotene $\rightarrow$ Pachytene $\rightarrow$ Diakinesis

C. Leptotene $\rightarrow$ Zygotene $\rightarrow$ Pachytene $\rightarrow$ Diplotene $\rightarrow$ Diakinesis

D. Diakinesis $\rightarrow$ Diplotene $\rightarrow$ Pachytene $\rightarrow$ Zygotene $\rightarrow$ Leptotene

Answer: A::C

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20. In oocytes of some vertebrates____stage can last for months or years.

A. Diplotene

B. Diakinesis

C. Leptotene

D. Zygotene

Answer: A

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21. Homologous chromosomes begin to separate during

A. Diakinesis

B. Leptotene

C. Zygotene

D. Diplotene

Answer: A::D

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22. Longest phase of meiosis is

A. Prophase I

B. Metaphase I

C. Anaphase I

D. Telophase I

Answer: A

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23. When paternal and maternal chromosomes mutually exchange their materials in cell division, the event is called

A. Bivalent formation

B. Recombination

C. Synapsis

D. Dyad formation

Answer: B

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24. When does synapsis take place in meiosis ?

A. Pachytene

B. Diplotene

C. Zygotene

D. Leptotene

Answer: C

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25. Meiosis I is

A. Equational division

B. Homotypic division

C. Reductional division

D. Multiplicational division

Answer: C

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26. Nucleolus and nuclear membrane disappears in

A. Metaphase II

B. Anaphase II

C. Telophase II

D. Prophase II

Answer: D

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27. In which of the following phases, splitting of the centrosomes of each chromosomes allow them to move towards opposite poles of the cell ?

A. Anaphase II

B. Metaphase II

C. Prophase II

D. Telophase II

Answer: A

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28. Microtubules attach with kinetochore in

A. Leptotene

B. Metaphase II

C. Zygotene

D. Diplotene

Answer: B

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29. Anaphase I is characterised by

A. Alignment of chromosomes on equatorial plate.

B. Reappearance of nucleolus nuclear membrane

C. Separation of homologous chromosomes.

D. Terminalisation of chasmata

Answer: A::C

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30. At the end of metosis _____ daughter cells are formed

A. Four haploid

B. Four diploid

C. Two haploid

D. Two diploid

Answer: A

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Exercise

1. Which one of the following statement is incorrect for interphase stage ?

A. Period of great metabolic activity

B. Also called preparatory Phase

C. Absence of replication of DNA

D. It covers over 95% of the total duration of cell cycle

Answer: C

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2. Post-mitolic gap phase is characterised by all, except

A. Synthesis of histone proteins

B. Synthesis of RNA and nucleotides

C. Most-variable in length

D. No change in DNA contents

Answer: A

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3. Duplication of DNA occurs in a phase which in a phase which is also associated with synthesis of

A. RNA

B. Histone

C. Cyclins

D. ATP

Answer: B

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4. Which of the following duplicates in cytoplasm in S-phase ?

A. Chromosomes

B. Centrioles

C. Chromatid

D. DNA

Answer: B

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5. Which of the following is correctly matched ?

A. Spireme stage - late prophase

B. Congresssion stage - Metaphase

C. Interzonal fibres formation - Telophase

D. Reappearance of ER and golgi bodies - Anaphase

Answer: B

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6. Centrifugal cytoinesis

A. Occurs in animals

B. Occurs by cell furrowing

C. Occurs by cell plate formation

D. Is characteristic of bacteria and lower plants only

Answer: C

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7. What will be the total number of mitotic divisions in the formation of 64 daughter cells ?

A. 6

B. 32

C. 63

D. 16

Answer: C

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8. Identify the phase at which most organelles duplicates

A. M-phase

B. G_1 phase

C. G_0 phase

D. G_2 phase

Answer: B

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9. A cell is destined to complete cell cycle

A. When it enters post-mitolic phase

B. When it crosses restriction point

C. Only when it crosses G_0 check point

D. When all check points are successfully crossed

Answer: B

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10. Chromosomes duplicate during $\underline{A}$ and increase in number of chromosomes is observed first during $\underline{B}$. Fill the blanks correctly

A. A- Interphase B - prophase

B. A - S-phase B - Telophase

C. A - Synthetic phase B - Gap 2 phase

D. A- Interphase B - Anaphase

Answer: D

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11. Which one of the following is not a diploid cell ?

A. Zygote

B. Microspore mother cell

C. Primary oocyte

D. Ovum

Answer: D

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12. Ends of chromosomes are attached with nuclear envelope at attachment plate in

A. Leptotene

B. Zygotene

C. Pachytene

D. Diplotene

Answer: A

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13. If there are 30 chromosomes in G_1 -phase, then what will be number of bivalents in zygotene stage ?

A. 30

B. 15

C. 45

D. 60

Answer: B

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14. Nucleoprotein complex formation stage is

A. Pachytene

B. Zygotene

C. Diplotene

D. Leptotene

Answer: B

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15. Match the column I with Column II.

column I	Column II
a. Appearance of recombination nodules	(i) Diplotene
b. Desynapsis	(ii) Pachytene
c. Disjunction of homologous chromosomes	(iii) Anaphase-I
d. Centromere divsion	(iv) Anaphase - II

A. a(ii), b(i), c(iii), d(iv)

B. a(ii), b(i), c(iv), d(iii)

C. a(i), b(ii), c(iii), d(iv)

D. a(iii), b(ii), c(i), d(iv)

Answer: A

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16. Bivalent chromosomes clearly appears as tetrad in

A. Zygotene

B. Pachytene

C. Diplotene

D. Diakinesis

Answer: B

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17. Chromosomes separation and centromere division occur in

A. Anaphase

B. Anaphase I

C. Anaphase II

D. More than one option is correct

Answer: D

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18. What will be the amount of DNA in meiosis-II products if meiocyte contains 30 pg DNA is G_1 - phase ?

A. 30 pg

B. 60 pg

C. 15 pg

D. 120 pg

Answer: C

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19. Interkinesis or intrameiotic interphase shows/ is

A. Centriole duplication

B. DNA synthesis

C. Generally short lived

D. More than one option is correct

Answer: D

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20. How many meiotic divisions are required to produce 1000 pollen grains

A. 250

B. 500

C. 1000

D. 1250

Answer: A

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Assignment Section A Objective Type Questions

1. The sources of events by which cells duplicate their genome, synthesize the other components of cell which eventually distribute into two daughter cells is called

A. Quiescent stage

B. Generation time

C. Cell cycle

D. Kinetochore

Answer: C

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2. DNA replication occurs in

A. S Phase

B. G_1 phase

C. G_2 Phase

D. M phase

Answer: A

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3. The phase between the two successive M phase is called as

A. Metaphase

B. Anaphase

C. Prophase

D. Interphase

Answer: D

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4. A biosynthetic phase where cell organelles duplicate itself is

A. Interphase

B. Anaphase

C. Prophase

D. Telophase

Answer: A

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5. Yeast cell can progress through the cell cycle in about

A. 90 sec

B. 90 min

C. 90 hrs

D. 90 yrs

Answer: B

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6. _____ represents the most active stage of the cell cycle.

A. Metaphase

B. Anaphase

C. Telophase

D. Interphase

Answer: D

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7. Interphase is called the resting phase because

A. It is the most active phase of the cell cycle

B. There is no apparent activity related to cell division

C. It does not prepare cell for cell division

D. It is the phase where cell rests before entering into mitosis

Answer: B

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8. _____ phase synthesizes enzymes required during S phase.

A. G_2

B. M

C. S

D. G_1

Answer: D

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9. Non-dividing cells enter the

A. G_2 phase

B. M phase

C. G_0 phase

D. S phase

Answer: C

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10. The cells which enter _____ phase start differentiating into specific types of cell.

A. G_1

B. G_2

C. S

D. G_0

Answer: D

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11. If the initial amount of DNA is 8, C then after S phase the amount of DNA would be

A. 4 C

B. 8 C

C. 64 C

D. 16 C

Answer: D

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12. The number of chromosomes in G_1 phase is 36, the number of chromosomes in S phase is

A. 36

B. 18

C. 22

D. 37

Answer: A

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13. A phase of the cell cycle which lasts more than 95% of the total duration is

A. Prophase

B. Interphase

C. Anaphase

D. Telophase

Answer: B

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14. The most dramtic period of the cell cycle is

A. G_1

B. G_2 phase

C. S phase

D. M phase

Answer: D

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15. Two daughter cells formed after mitosis are

A. Non-identical to each other

B. Identical to each other

C. Non-identical to parents

D. Irregular is size

Answer: B

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16. A cell division in which a diploid somatic cell divides into two identical daughter cells is called

A. Meiosis I

B. Meiosis II

C. Mitosis

D. Cytokinesis

Answer: C

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17. Which type of cell division is called somatic cell division ?

A. Meiosis I

B. Meiosis II

C. Reduction division

D. Mitosis

Answer: D

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18. Mitosis occurs in

A. Meristematic cells

B. Undifferentiated germ cells

C. Somatic cells

D. More than one option is correct

Answer: D

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19. The first phase of mitosis which follows interphase is

A. Metaphase

B. Prophase

C. Telophase

D. Anaphase

Answer: B

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20. Initiation of condensation of chromatin material occurs in

A. Prophase

B. Anaphase

C. Telophase

D. Metaphase

Answer: A

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21. Mitotic spindle initiates during

A. Telophase

B. Anaphase

C. Prophase

D. Metaphase

Answer: C

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22. Nucleolus and nuclear membrane disappears in

A. Anaphase

B. Interphase

C. Telophase

D. Prophase

Answer: D

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23. The chromosomes are shortest and thickest during

A. Anaphase

B. Metaphase

C. Telophase

D. Interphase

Answer: B

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24. The chromosomes align at the equator during

A. Interphase

B. Prophase

C. Metaphase

D. Telophase

Answer: D

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25. Read the following statements

(a) Complete disintegration of the nuclear envelope marks the start of the second phase of mitosis.

(b) Metaphase chromosome is made up of one sister chromatid

A. Only (b) is correct

B. Both (a) & (b) are incorrect

C. Only (a) is correct

D. Both (a) & (b) are correct

Answer: D

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26. The morphology of the chromosomes is studied during

A. Metaphase

B. Interphase

C. Prophase

D. Telophase

Answer: A

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27. The point of attachment of microtubules on the chromosomes is called as

A. Centromere

B. Kinetochore

C. Chromatid

D. Spindle

Answer: B

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28. Chromosomes move towards the pole during

A. Prophase

B. Metaphase

C. Telophase

D. Anaphase

Answer: D

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29. The centromere spilts during

A. Anaphase

B. Telophase

C. Interphase

D. Prophase

Answer: A

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30. The chromosomes cluster at opposite poles and their identity is lost as discrete elements during

A. Telophase

B. Anaphase

C. Metaphase

D. Prophase

Answer: A

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31. The mitotic spindle disappears in

A. Prophase

B. Metaphase

C. Anaphase

D. Telophase

Answer: D

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32. Decondensation of chromosomes occurs during

A. Prophase

B. Metaphase

C. Anaphase

D. Telophase

Answer: D

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33. The nuclear envelope reassembles during

A. Prophase

B. Metaphase

C. Anaphase

D. Telophase

Answer: B

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34. _____ phase marks the end of M-phase.

A. Karyokinesis

B. Prophase

C. Cytokinesis

D. Telophase

Answer: C

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35. It karyokinesis is not followed by cytokinesis, then gives rise to

A. Zygote

B. Fertilised egg

C. Multinucleate condition

D. Embryo

Answer: C

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36. A single cell containing large number of nuclei is called

A. Syncytium

B. Cell plate

C. Monad

D. Bivalent

Answer: A

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37. A type of cell division which reduces chromosomes number to half is

A. Mitosis

B. Multiple fission

C. Fragmentation

D. Meiosis

Answer: D

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38. In meiosis-I condensation and coiling of chromatin fibres started during

A. Metaphase

B. Leptotene

C. Diakinesis

D. Diplotene

Answer: B

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39. In pachytene, each tetrad contains

A. Two chromatids

B. One chromatids

C. Four chromatids

D. Three chromatids

Answer: C

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40. Crossing over occurs during

A. Anaphase I

B. Leptotene

C. Diplotene

D. Pachytene

Answer: D

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41. The homologous chromosomes move towards the opposite poles during

A. Anaphase I

B. Anaphase II

C. Leptotene

D. Pachytene

Answer: A

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42. _____ marks the site where crossing over had occurred.

A. Diakinesis

B. Synapsis

C. Chiasmata

D. Leptotene

Answer: C

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43. teminalisation of chiasmata occurs during

A. Prophase-I

B. Metaphase-I

C. Anaphase-I

D. Telophase-I

Answer: A

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44. Bivalent chromosomes align themselves at the equator during

A. Metaphase I

B. Prophase I

C. Metaphase II

D. Anaphase II

Answer: A

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45. Major check point of cell cycle is

A. $G_1 \rightarrow S$ transition

B. $S \rightarrow G_1$ transition

C. $G_2 \rightarrow M$ transition

D. $M \rightarrow G_2$ transition

Answer: A

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46. $G_1 \rightarrow S$ transition is regulated by

A. Cyclins only

B. Cyclin independent kinases

C. Mitotic cyclin and cdc2 kinase

D. G_1 cyclin cdc2 kinase

Answer: D

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47. What will be the total number of mitotic divisions in the formation of 64 daughter cells ?

A. 6

B. 32

C. 63

D. 16

Answer: C

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48. If there are 30 chromosomes in G_1 -phase, then what will be number of bivalents in zygotene stage ?

A. 30

B. 15

C. 45

D. 60

Answer: B

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49. What will be the amount of DNA in meiosis-II products if meiocyte contains 30 pg DNA is G_1 - phase ?

A. 30 pg

B. 60 pg

C. 15 pg

D. 120 pg

Answer: C

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50. Agglutination of chromosomes is caused by a mitotic poison called

A. Mustard gas

B. Ribonuclease

C. Azide

D. Chalones

Answer: A

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Section B

1. Select an incorrect statement w.r.t cell cycle

A. Duplication of genes occurs twice in meiosis

B. Karyokinesis occurs twice during meiotic division

C. Cyclins are proteins that activate protein kinases to regulate the cell cycle

D. After telophase-I, chromosome number is reduced to half.

Answer: A

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2. Maturation promoting factor formation triggers the cell to cross

A. $G_1 \rightarrow S$

B. $S \rightarrow G_2$

C. $G_2 \rightarrow M$

D. $M \rightarrow G_1$

Answer: C

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3. Cyclin Dependent kinases (CDKs)

A. Act as mitotic poisons

B. Cause disassembly of the mircrotubules

C. Control various phases of cell cycle

D. Arrest cell division due to non-formation of spindle

Answer: C

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4. What is not true about cell cycle ?

a. During G_1 phase there is active synthesis of RNA and proteins but no change in its DNA content

b. In synthesis or S phases, each chromosome carriers a duplicate set of genes

c. During G_2 phase, a cell contains double the amount ($C) of DNA present in the original diploid cell (2C)

d. In S-phase a cell doubles the original diploid (2n) chromosome number

A. c & d

B. b & c

C. d only

D. b, c & d

Answer: C

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5. Which phase of interphase is the most important point in regulation of the cell cycle, during which it must decide whether the cell will start a new cycle or will enter in G_0 phase ?

A. G_1 phase

B. S phase

C. G_2 phase

D. Quiescent stage

Answer: A

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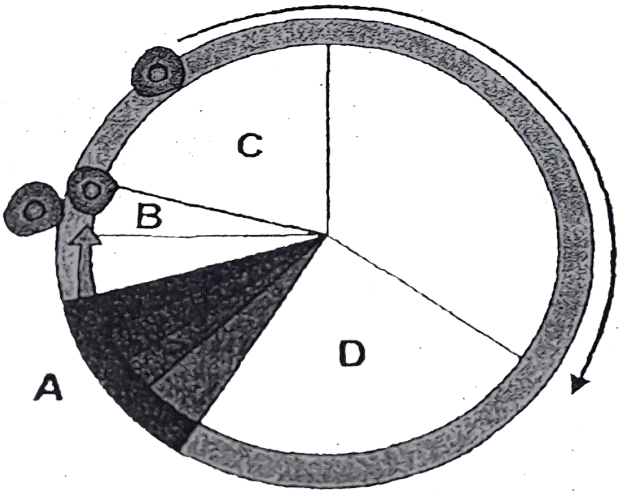
6. Identify the mismatched pair



A. A - Starts with karyokinesis and ends with cytokinesis

B. B - Stage where cells are inactive metabolically

C. C - Cell grows and carries out normal metabolism

D. D - Period of cytoplasmic growth

Answer: B

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7. Chromatin fibres duplication, Genetic material -4C, Histone protein synthesis, Membranous organelle duplication, DNA replication, centriole duplication.

How many of the above features are associated with synthesis phase of cel cycle ?

A. Three

B. Five

C. Four

D. Six

Answer: B

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8. The two daughter cells formed during mitosis contains

A. The same amount of DNA but a set of chromosomes different from those of parental cells

B. The same amount of DNA and the same set of Chromosomes as those of the parent cell

C. Half the amount of DNA and the same set of chromosomes different from those of the parent cell

D. Double the amount of DNA and a set of chromosomes different from those of the parent cell

Answer: B

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9. Higher plants differ from animals in having

A. Spindle microtuble

B. Anastral mitosis

C. Kinetochores

D. Disappearance of nucleolus during prophase

Answer: B

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10. Which of the following phases are longest and shortest in mitosis ?

A. Metaphase, Anaphase

B. Prophase, Anaphase

C. Telophase, Anaphase

D. Prophase, Telophase

Answer: B

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11. How many generations are required by a cell of meristem to produce 128 cells ?

A. 127

B. 64

C. 32

D. 7

Answer: D

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12. Select the correct match

A. Reformation of ER and golgi complex - Telophase

B. Invisible phase of cell cycle - Metaphase

C. Polar movement of chromatids - S-phase

D. Recombination nodules formation - Zygotene

Answer: A

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13. Phragmoplast is formed by golgi complex and grows

A. Centripetally to form cell plate

B. Centrifugally to form cell plate

C. Centripetally to produce a cleavage furrow

D. Centrifugally to form a cleavage furrow

Answer: B

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14. Spireme stage of chromosomes is associated with

A. Early prophase

B. Late prophase

C. Metaphase

D. Telophase

Answer: A

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15. Which one of the following is correct for mitosis in most of the plants member ?

A. Amphiastral, anastral and eumitosis

B. Amphiastral, acentric and eumitosis

C. Anastral, acentric and eumitosis

D. Astral, centric and eumitosis

Answer: C

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16. Spindle fibres are formed of

A. Actin

B. Myosin

C. Alpha & beta tubulin

D. Flagellin

Answer: C

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17. Cytokinesis in a plant cell is achieved by the formation of cell plate instead of a cleavage furrow, which is formed in

A. Centripetal manner

B. Centrifugal manner

C. Both centripetal and centrifugal manner

D. Equational manner

Answer: B

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18. Select an incorrect statement w.r.t. metaphase

A. Spindle fibres are attached to small discshaped structures at the surface of centromeres called kinetochores

B. The plane of alignment of the homologous pair of chromosomes at metaphase is referred to as the metaphasic plate

C. Chromosome appears to be made up of two sister chromatids

D. The size of chromosome that take place during this phase

Answer: B

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19. All the essential stages that take place during meiosis, except

A. Two successive divisions without any DNA replication occuring between them

B. Formation of chiasmata and crossing over

C. Segregation of homologous chromosomes

D. Number of chromosomes in daughter cells after meiosis II is reduced to balf but the amount of DNA remains the same

Answer: D

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20. In the meiotic cell division, 56 daughter cells are produced by two successive divisions in which

A. First division is equational, second is reductional

B. First division is reductiona, and second is equational

C. Both divisions are reductional

D. Both divisions are equational

Answer: B

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21. If the egg of an organism has 10 Pg of DNA in its nucleus, how much DNA would a diploid cell of same organism have in G2-phase of Meiosis

A. 10 pg

B. 5 pg

C. 20 pg

D. 40 pg

Answer: D

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22. To produce 102 pollen grains, how many meiotic divisions are required ?

A. 25

B. 25.5

C. 26

D. 27

Answer: C

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23. Find out the wrong statement

A. Each metaphasic plate in heterotypic division of meiosis contains half the number of diploid set of chromosomes.

B. Interkinesis is generally short lived

C. Synaptonemal complex and nuclear membrane completely disappear in diplotene

D. Synaptonemal complex and nuclear membrane completely disappear in diplotene

Answer: C

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24. What will be the content of DNA in a somatic cell at G_2 if its meiotic products have 20 picogram of DNA ?

A. 40 pg

B. 20 pg

C. 80 pg

D. 160 pg

Answer: C

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25. All chromosomes of a cell are directed towards one side and are attached to the nuclear membrane, can be observed in

A. Leptotene

B. Zygotene

C. Pachytene

D. Diplotene

Answer: A

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26. Diplotene phase of meiosis is also charactertised by

a. Desynapsis

b.Complete terminalisation of chiasmata

c.Dictyotene stage

d. Complete disappearance of nuclear membrane and nucleoli

e. Complete development of astral rays and aster

f. Longest phase of prophase-I

A. a, b, c, and e

B. b, d, e, and f

C. a, c, and f

D. b, d, and f

Answer: C

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27. Recombination nodules which mediate for chromosome recombination occur during

A. Zygotene

B. Meiosis

C. Pachytene stage

D. Diplotene stage

Answer: C

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28. In oocytes, which of the following phase can lst for months or years, since it is at this stage the chromosomes decondense and engage in RNA synthesis ?

A. Diakinesis

B. Telophase-I

C. Diplotene

D. Intrameiotic interphase

Answer: C

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29. When synapsis is complete all along the chromosomes, the cell is said to have entered a stage called

A. Zygotene

B. Pachytene

C. Diplotene

D. Diakinesis

Answer: B

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30. The beginning of which stage of prophase is marked by complete terminalisation of chiasmata and inhibition of RNA synthesis ?

A. Pachytene

B. Diplotene

C. Diakinesis

D. Zygotene

Answer: C

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31. What will be the amount of DNA in a pollen grain if its mother cell has 32 picogram DNA in G_2 phase ?

A. 16 pg

B. 32 pg

C. 8 pg

D. 4 pg

Answer: C

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32. The paradox of meiosis is

A. Conservation of specific chromosome number from generation to generation

B. Produces four haploid cell after meiosis II

C. It is a double division

D. Does not involve DNA replication

Answer: A

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33. Most organelles show duplication in cell cycle duirng

A. G_1- phase

B. G_0 - phase

C. S - phase

D. G_2 -phase

Answer: D

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34. Best stages to study morphology and shape of chromosome are respectively

A. Metaphase, Telophase

B. Prophase, Anaphase

C. Telophase, Anaphase

D. Metaphase, Anaphase

Answer: D

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35. Temporaily suspended stage of diplotene during meiosis -I is

A. Leptotene

B. Diakinesis

C. Dictyotene

D. Pachytene

Answer: C

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Section C Previous Year Questions

1. Which of the following option gives the correct sequence of events during mitosis

A. Condensation $\rightarrow$ nuclear Membrane disassembly $\rightarrow$ crossing over $\rightarrow$ segregation $\rightarrow$ telophase

B. Condensation $\rightarrow$ nuclear membrane disassembly $\rightarrow$ arrangement at equator $\rightarrow$ centromere division $\rightarrow$ segregation $\rightarrow$ telophase

C. Condensation $\rightarrow$ crossing over $\rightarrow$ nuclear membrane disassembly $\rightarrow$ segregation $\rightarrow$ telophase

D. Condensation $\rightarrow$ arrangement at equator $\rightarrow$ centromere division $\rightarrow$ segregation $\rightarrow$ telophase

Answer: B

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2. Anaphase promoting complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur

A. Chromosomes will not condense

B. Chromosomes will be fragmented

C. Chromosomes will not segregate

D. Recombination of chromosome arms will occur

Answer: C

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3. During cell growth, DNA synthesis takes place in

A. S Phase

B. G_1 phase

C. G_2 phase

D. M phase

Answer: A

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4. When cell has stalled DNA replication fork , which checkpoint should be predominantly activated

A. G_1 / S

B. G_2 / M

C. M

D. Both G_2 / M and M

Answer: A

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5. Mathc the stages of meisos in Column I to their characteristic features in Column II and select the correct option using the codes given below

Column-I	Column-II
Pachytene	(i) Pairing of homologous chromosomes
Metaphase I	(ii) Terminalization of chiasmata
Diakinesis	(iii) Crossing-over takes place
Zygotene	(iv) Chromosomes align at aquatorial plate

A. a(iii), b(iv), c(ii), (i)

B. a(i), b(iv), c(ii), (iii)

C. a(ii), b(iv), c(iii), (i)

D. a(iv), b(iii), c(ii), (i)

Answer: A

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6. In meiosis crossing over is initiated at

A. Diplotene

B. Pachytene

C. Leptotene

D. Zygotene

Answer: B

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7. Spindle fibers attach on to

A. Kinetosome of the chromosome

B. Telomere of the chromosome

C. Kinetochore of the chromosome

D. Centromere of the chromosome

Answer: C

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8. A cell at telophase stage is observed by a student in a plant brought from a field. He tells his teacher that this cell is not like other cells at telophase stage. There is no formation of cell plate and thus the cell containing more number of chromosomes as compared to other dividing cells. This would result in

A. Polyteny

B. Aneuploidy

C. Polyploidy

D. Somaclonal variation

Answer: C

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9. Which of the following is not a characteristic feature during mitosis in somatic cells ?

A. Synapsis

B. Spindle Fibres

C. Disappearance of nucleolus

D. Chromosome movement

Answer: A

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10. Arrange the following events of meiosis in correct sequence

(a) Crossing over

(b) Synapsis

(c)Terminalisation of chiasmata

(d) Disappearance of nucleolus.

A. Crossing over

B. Synapsis

C. Teminalisation of Chiasmata

D. Disappearance of nucleolus

Answer: C

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11. Select the correct option:

I

(a) Synapsis aligns homologous chromosomes

(b) Synthesis of RNA and protein

(c) Action of enzyme recombinase

(d) Centromeres do not separte but chromatids move towards opposite p

A. a(ii), b(ii), c(iv), d(v)

B. a(ii), b(i), c(iii), d(v)

C. a(ii), b(iii), c(v), d(iv)

D. a(i), b(ii), c(v), d(iv)

Answer: C

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12. During which phase(s) of cell cycle amount of DNA in a cell remains at 4C level if the initial amount is denoted an 2C

A. G_0 and G_1

B. G_1 and S

C. Only G_2

D. G_2 and M

Answer: C

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13. In 'S' phase of the cell cycle

A. Amount of DNA doubles in each cell

B. Amount of DNA remains same in each cell

C. Chromosome number is increased

D. Amount of DNA is reduced to half in each cell

Answer: A

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14. The enzyme recombinase is required in which stage of meiosis ?

A. Pachytene

B. Zygotene

C. Diplotene

D. Diakinesis

Answer: A

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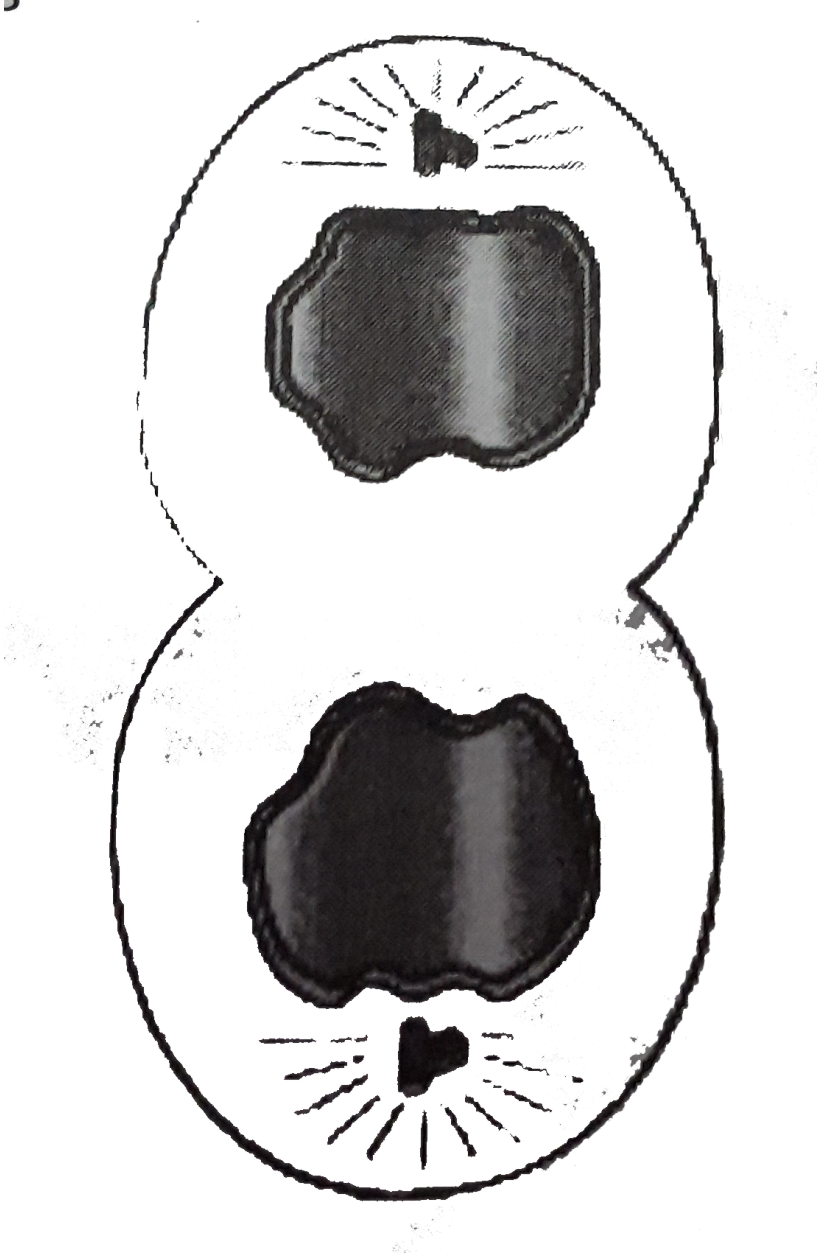
15. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its chracteristics



A. Late Anaphase = Chromosomes move away from equatorial plate, golgi complex not present.

B. Cytokinesis = Cell plate formed, mitochondria distributed between two daughter cells.

C. Telophase = Endoplasmic reticulum and nucleolus not reformed yet.

D. Telophase = Nuclear envelop reforms, golgi complex reforms.

Answer: D

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16. The complex formed by a pair of synapsed homologous chromosomes is called

A. Kinetochore

B. Bivalent

C. Axoneme

D. Equadorial plate

Answer: B

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17. Meiosis takes place in

A. Conidia

B. Gemmule

C. Megaspore

D. Meiocycle

Answer: D

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18. During gamete formation, the enzyme recombinate participates during

A. Prophase-I

B. Prophase-II

C. Metaphase-I

D. Anaphase - II

Answer: A

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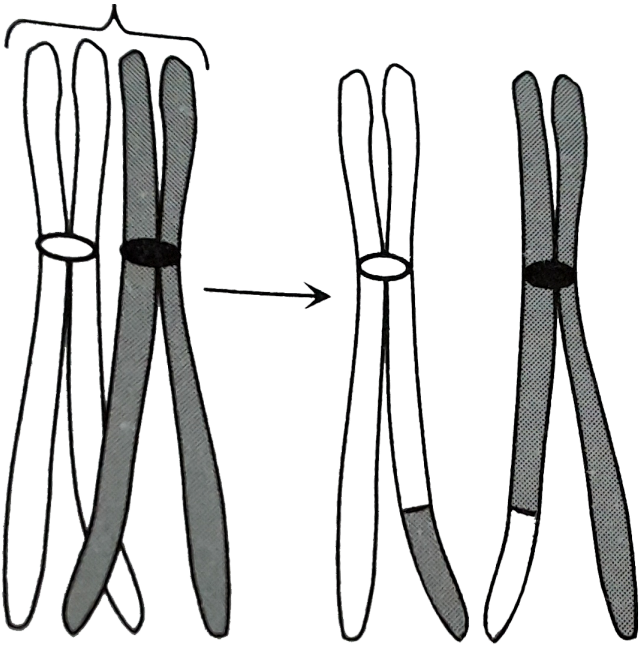
19. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage



A. Prophase of Mitosis

B. Both prophase and Metaphase of mitosis

C. Prophase I during meiosis

D. Prophase II during meiosis

Answer: C

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20. Identify the meiotic sage in which the homologous chromosomes separate while the sister chromatids remain associated at their centrometres. Or In which stage of meiosis homologous chromosomes are segregated

A. Metaphase I

B. Metaphase II

C. Anaphase I

D. Anaphase II

Answer: C

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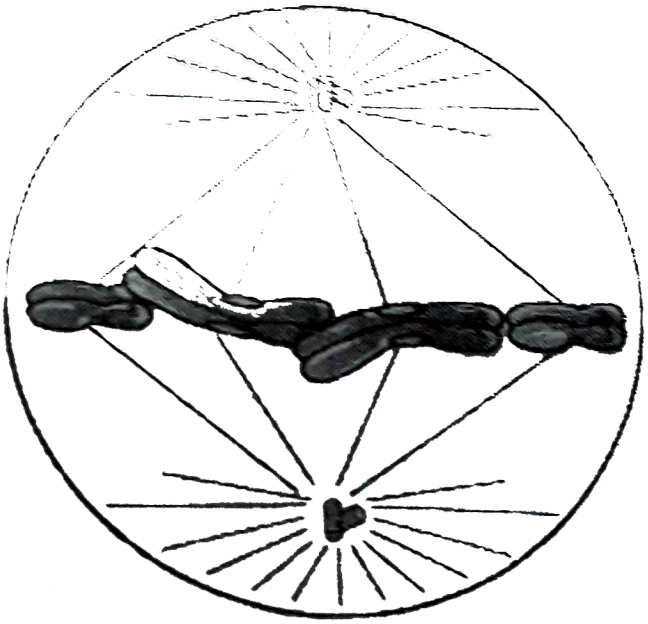
21. Select the correct option with respect to mitosis



A. Chromosomes move to the spindle equator and get aligned along equationl plate in metaphase

B. Chromatids separate but remains in the centre of the cell in anaphase

C. Chromomatids start moving towards opposite poles in telophase

D. Golgi complex and endoplasmic reticulum are still visible at the end of prophase

Answer: A

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22. At metaphase, chromosmes are attached to the spindle fibres by their

A. kinetochores

B. Centromere

C. Satellites

D. Secondary constrictions

Answer: A

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23. During mitosis ER and nucleolus begin to disappear at

A. Early prophase

B. Late prophase

C. Early metaphase

D. Late metaphase

Answer: A

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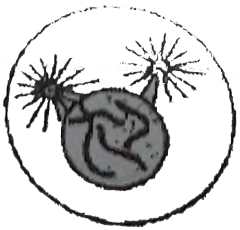
24. Which stages of cell division do the following figures A and B represent respectively

A



B

A. Prophase - Anaphase

B. Metaphase - Telophase

C. Telophase - Metaphase

D. Late Anaphase - Prophase

Answer: D

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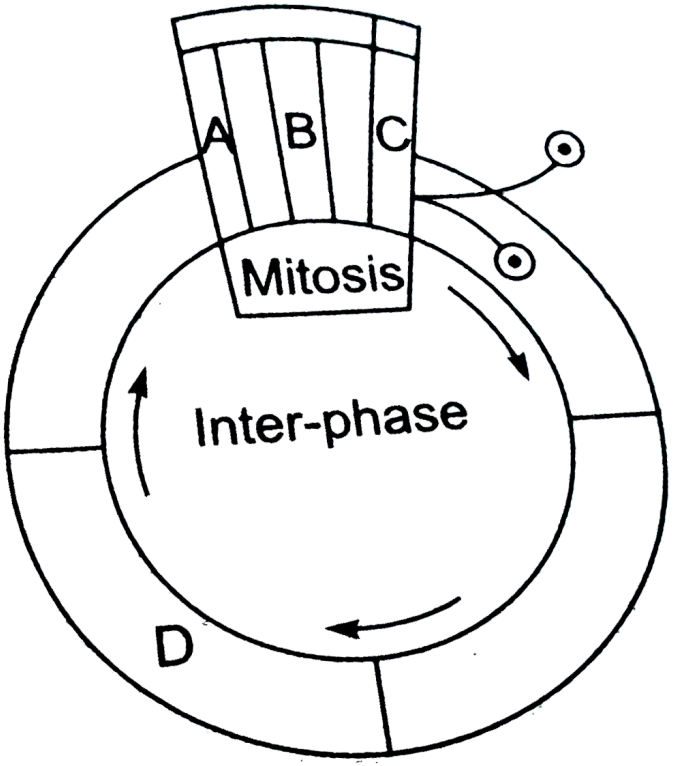
25. Given below is a schematic break-up of the phases/stages of cell cycle.

Which one of the following is the correct indication of the stage/phase in

the cell cycle?



A. C - karyokinesis

B. D-Synthetic phase

C. A- Cytokinesis

D. B-Metaphase

Answer: B

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26. Synapsis occurs between :

A. mRNA and ribosomes

B. Spindle fibres and centromere

C. Two homologous chromosomes

D. A male and a female gamete

Answer: C

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27. In which stage of the cell cycle are histone proteins synthesised in a eukaryotic cells ?

A. During entire prophase

B. During telophase

C. During S-phase

D. During G_2 stage of prophase

Answer: C

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28. Centromere is rquired for

A. Transcription

B. Crossing over

C. Cytoplasmic cleavage

D. Movement of Chromosomes towards poles

Answer: D

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29. Comparing small and large cells, which statement is correct ?

(1) Small cells have a small surface area per cells

(2) Exchange rate of nutrients is fast with large cells

(3) Small cells have a large surface area per volume ratio

(4) Exchange rate of nutrients is slow with small cells

A. G_1 phase

B. Prophase of mitosis

C. S-phase

D. G_2 phase

Answer: C

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30. During cell growth, DNA synthesis takes place in

A. G_1 phase

B. Prophase of mitosis

C. S-phase

D. G_2 -phase

Answer: C

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31. 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 mitolic phase

D. G_2 phase followed by mitotic phase

Answer: B

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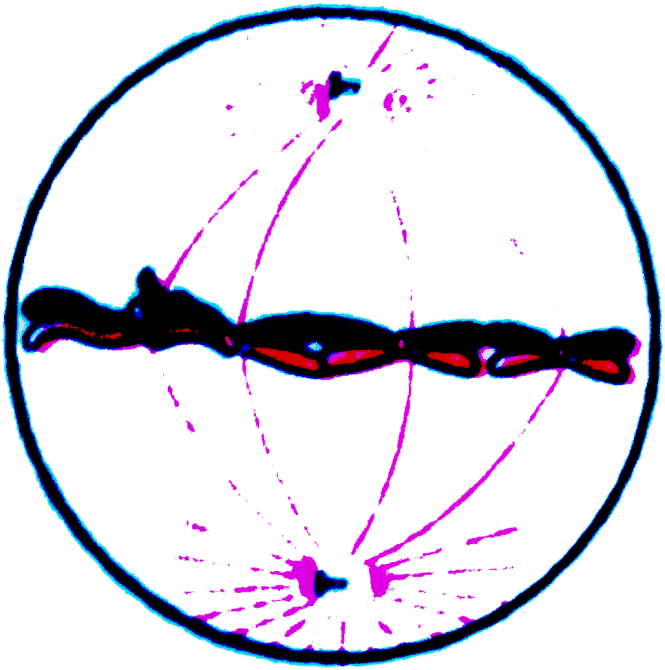
32. Identify the stage of mitosis with its characteristics



A. Late prophase - chromosomes move to spindle equator

B. Metaphase - spindle fibres attached to kinetochores, centromeres split and chromatids separate

C. Metaphase - chromosomes moved to spindle equator chromosomes made up of two sister chromatids

D. Anaphase - centromeres split and chromatids separate and start moving away

Answer: C

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33. How many chromosomes will the cell have at G_1,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

Answer: B

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34. The best stage to view structure, size and to count the number of chromosomes is

A. Prophase

B. Metaphase

C. Interphase

D. Telophase

Answer: B

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35. Each chromosome at anaphase stage of bone marrow cell in our body has

A. Two chromatids

B. Several chromatids

C. No chromatids

D. Only one chromatid

Answer: D

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36. Colchicine is an inhibitory chemical, which

A. Stops the functioning of centribole

B. Prevents attaching of centromeres with rays

C. Prevent the spindle formation in mitosis

D. Prevents the formation of equatorial plane

Answer: C

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37. During cell division in apical meristem nuclear membrane reappears in

A. Telophase

B. Cytokinesis

C. Metaphase

D. Anaphase

Answer: A

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38. How many mitotic divisions are needed for a single cell to make 128 cells

A. 28

B. 32

C. 127

D. 14

Answer: C

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39. Which of the folliwng structure will not be common to mitotic cell of a higher plant

A. Centriole

B. Spindle fibre

C. Cell plate

D. Centromere

Answer: A

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40. A bacterium divides every 35 minutes. If a culture containing 10^5 cells/ml is grown for 175 minutes. What will be the cell concentration / ml after 175 minutes

A. 35×10^5 cells

B. 32×10^5 cells

C. 175×10^5 cells

D. 85×10^5 cells

Answer: B

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41. Spindle fibres unite with which structure of chromosomes ?

A. Chromocentre

B. Chromomere

C. Kinetochore

D. Centriole

Answer: C

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42. Best material for studying mitosis in laboratory is

A. Anther

B. Root tip

C. Leaf tip

D. Ovary

Answer: B

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43. If a diploid cell is treated with colchicine, then it becomes

A. Triploid

B. Tetraploid

C. Diploid

D. Monoploid

Answer: B

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44. If you are provided with root-tips of onion in your class and are asked to cont the chromosmes, which of the following stages can your most convenintly look into.

A. Metaphase

B. Telophase

C. Anaphase

D. Prophase

Answer: A

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45. Which one of the following precedes re-formation of the nuclear envelope during M phase of the cell cycle.

A. Decondensation from chromosomes, and reassembly of the nuclear lamina

B. Transcription from chromosomes, and reassembly of the nuclear lamina

C. Formation of th contractile ring, and formation of the phragmoplast

D. Formation of the contractile ring, and transcription from chromosomes

Answer: C

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46. In an angiosperm, how many microscope mother cells are required to produce 100 pollen grains ?

A. 75

B. 100

C. 25

D. 50

Answer: C

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47. If there are 4 pollen mother cells in anthers, what will be the number of pollen grains ?

A. 16

B. 12

C. 8

D. 4

Answer: A

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48. An angiospermic leaf carries 16 chromosomes ,The number of chromosomes in its endosperm will be :

A. 12

B. 8

C. 16

D. 24

Answer: B

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49. The term "meiosis" was given by

A. A. Flemming

B. Farmer and moore

C. Johansen

D. Knoll and Ruska

Answer: B

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50. What will be DNA amount in Meiotic II products if DNA is 20 picogram in meiocyte at G_2 stage ?

A. 5 pg

B. 10 pg

C. 20 pg

D. 40 pg

Answer: A

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51. In ferns, meiosis takes place at the time of

A. Spore formation

B. Spore germination

C. Gamete formation

D. Antheridia and archegonia formation

Answer: A

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52. Mitotic spindle is mainly composed of __ proteins.

A. Actin

B. Myosin

C. Tubulin

D. Myoglobin

Answer: C

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53. Crossing over that results in genetic recombination in higher organisms occurs between

A. Sister chromatids of a bivalent

B. Non-sister chromatids of a bivalent

C. Two daughter nuclei

D. Two different bivalents

Answer: B

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Section D Assertion Reason Type Questions

1. Assertion: Endomitosis does not cause karyokinesis or cytokinesis.

Reason : In endomitosis, mitosis occurs within nucleus.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: A

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2. Assertion: Synaptonemal complex develops between two synapsed homologous chromosomes.

Rasson : Mitosis cannot be completed without the synaptonemal complex.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: C

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3. Assertion:During anaphase-II, the chromatids of a cromosome separate.

Reason: Centromere of a mitotic chromosome divides during anaphase.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: B

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4. A : Dictyotene stage occurs in female only.

R : Gametogenesis rests for a long period at diplotene stage in female.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: A

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5. A : Each chromosome of bivalent attaches with two spindles in metaphase.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: D

View Text Solution

6. A : G_2 -phase pre-mitotic phase.

R : Chromosomes undergo condensation in this phase.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: C

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7. A : Anaphase-I is actual phase of reduction in number of chromosomes.

R : Homologous chromosomes move to the opposite poles with both their chromatids.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: A

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8. A : Golgi bodies and ER disappear in early prophase

R : Their reorganisation stage is anaphase.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: D

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9. A : The complete disintegration of the nuclear envelope marks the start of metaphase.

R : Chromosomes are distinct with two chromatids at this stage.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: B

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10. A : Chiasmata couting stage is diplotene.

R : Dissolution of the synaptonemal complex occurs except at the sites of cross overs.

A. IF both Assertion & Reason are true and the reason followed is the correct explanation of the assertion then mark (1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2).

C. If Assertion is true statement but Reason is false, then mark (3).

D. If both Assertion and Reason are false statement then mark (4).

Answer: A

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