

Topic :- Cell Cycle and Cell Division

- 1 **(b)**
Mitosis was first observed by Strasburger and termed by W Flemming. During mitosis, chromosome number remain same in the daughter cells. During meiosis (reduction division), the chromosome number reduced to half in the daughter cells.
- 2 **(b)**
Telophase is the reverse stage of prophase. During this phase, the cytoplasmic viscosity decreases and the two chromosome groups reorganize themselves into nuclei. A nuclear envelope appears outside the nucleoplasm collected in the area of chromatin. Spindle fibres disappear around the poles and Golgi complex and endoplasmic reticulum are reformed
- 3 **(a)**
During S-phase, there is no increase in the chromosomes number. If the cell has diploid or $2n$ number of chromosomes at G_1 , even after S-phase the number of chromosomes remains the same, i.e., $2n$
- 4 **(b)**
The correct sequence is
Synapsis → crossing over → terminalisation → disjunction of genomes
- 5 **(b)**
The interphase takes approximate 75-95% of the entire generation time
- 6 **(d)**
The paternal and maternal chromosomes of each homologous pair segregates during anaphase-I. Although, both (maternal and paternal) chromosomes of a homologous pair have the genes for the same traits, either chromosome of a pair may carry different alleles of the same genes. Therefore, in anaphase-I, homologous chromosomes introduces genetic variability
- 7 **(a)**
A-Animals; B-Plants

- 8 **(a)**
At the onset of anaphase, each chromosome arranged at the metaphase plate is split simultaneously and the two daughter chromatids, now referred to as chromosomes of the future daughter nuclei, begin their migration towards the two opposite poles. As each chromosome moves away from the equatorial plate, the centromere of each chromosome is towards the pole and hence at the leading edge, with the arms of the chromosome trailing behind. *Thus, anaphase stage is characterised by the following key events*
1. Centromeres split and chromatids separate
 2. Chromatids move to opposite poles
- 9 **(a)**
After meiosis, the chromosomes get reduce by half, producing haploid cells. The sperm and the egg are haploid cells and when they fuse during fertilization, they produce diploid original
- 10 **(d)**
The phase between two successive M-phases is called interphase. The M-phase represents the phase when the actual cell division or mitosis occurs and the interphase represents the phase between two successive M-phases. It is significant to note that in the 24 hour average duration of cell cycle of a human cell, cell division proper lasts for only about an hour. The interphase lasts more than 95% of the duration of cell cycle
- 11 **(b)**
Meiosis start with one diploid containing copies of chromosome, one from mother and one from father. The cell divides twice, producing up to four haploid cells containing one copy of each chromosome
- 12 **(a)**
Interkinesis is the transition stage between meiosis-I and meiosis-II.
- 13 **(d)**
In zygotene of prophase-I, homologous chromosomes pair up. This process is called **synapsis**. One chromosome of the pair is from the male parent and other from the female parent.
- 14 **(b)**
In metaphase, chromosomes are shortest and show maximum condensation. Chromosomes are arranged at equatorial metaphasic plate. Structure, size and number of chromosomes are best studied at metaphase.
- 15 **(a)**
Microtubules are mainly composed of tubulin protein. These are found only in eukaryotic cellular structures like cilia, flagella, centriole, basal body, spindle fibre, etc.

- 16 **(b)**
G₁-phase is called as pre-synthetic phase or post-mitotic phase. It is the longest phase of cell cycle. In G₁-phase, a cell has two options:
3. Continues cycle and enters S-phase
 4. Stops cell cycle and enters G₀-phase for undergoing differentiation.
- 17 **(d)**
S-phase is the sub-phase between G₁-phase and G₂-phase, during which DNA synthesis or replication takes place.
In animal cells, during the S-phase, DNA replication begins in the nucleus and the centriole duplication in the cytoplasm. The amount of DNA per cell doubles in the nucleus. If the initial amount of DNA is denoted as 2C, then it increases to 4C. However, there is no increase in the chromosome number
- 18 **(b)**
Colchicine is an antimitotic drug (alkaloid) which is obtained from *Colchicum* (family-Liliaceae). It binds to one tubulin molecule and prevents its polymerization. The depolymerisation of tubulin result in disappearance of mitotic spindle blocking the cell's mitotic chromosomal division at metaphase and anaphase.
- 19 **(c)**
Non-disjunction occurs when a pair of homologous chromosomes do not separate in meiosis but migrate to the same pole of the cell, resulting in an even number of chromosomes being present in the daughter cells.
- 20 **(d)**
A-G₀; B-M

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	b	b	a	b	b	d	a	a	a	d
Q.	11	12	13	14	15	16	17	18	19	20
A.	b	a	d	b	a	b	d	b	c	d

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