

Cell Cycle and Cell Division

Assertion Reason Questions

Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

1. Assertion (A): Synthesis of DNA occurs in S phase of cell cycle.

Reason (R): While the synthesis of DNA completed in the G_1 and G_2 stages of cell cycle.

Ans. (c) A is true but R is false.

Explanation: DNA synthesis is done only in the S phase of interphase, which is followed by two "gap" periods of interphase (G_1 and G_2) during which no DNA synthesis occurs. The time between the end of mitosis and the beginning of DNA synthesis is known as G_1 . S stands for DNA synthesis, while G_2 stands for the period between the completion of DNA synthesis and the beginning of mitosis. In S phase, a cell contains double the amount of DNA as compared to what is found in the diploid cell during G_1 .

2. Assertion (A): The ratio between the nucleus and the cytoplasm is disrupted as a result of cell growth.

Reason (R): Mitosis aids in the restoration of the nucleo-cytoplasmic ratio in the cell.

Ans. (a) Both A and R are true and R is the correct explanation of A.

Explanation: Mitosis is the process by which a multicellular organism grows. The cell's functions are controlled by the nucleus. During cell growth, the nucleus does not vary in size, but the cytoplasm does. The nucleo- cytoplasmic ratio is disrupted as the size of the cell increases. Through cell division, this ratio is restored to an efficient level.

3. Assertion (A): Mitosis is also known as indirect division.

Reason (R): Mitosis is the process through which a parent cell divides into two daughter cells.



Ans. (b) Both A and R are true and R is not the correct explanation of A.

Explanation: Mitosis is frequently referred to as an indirect division. It is a process for dividing nuclei into equal parts. It is a complicated procedure that involves a number of significant changes in both the nucleus and the cytoplasm. As a result, it is known as the indirect way of division.

4. Assertion (A): Daughter somatic cells formed by mitosis are genetically similar to the parental cell. do not

Reason (R): Chromosomes undergo crossing over in mitosis.

Ans. (a) Both A and R are true and R is the correct explanation of A.

Explanation: In the process of mitosis, one cell divides into two, with each receiving the same quantity of DNA as the original cell. During mitosis, homologous chromosome pairing does not take place. However, during meiosis, homologous chromosomes couple up and exchange chromosomal segments at their locations of intersection.

5. Assertion (A): Meiosis II is similar to mitosis.

Reason (R): Meiosis I cannot occur in haploid cells.

Ans. (b) Both A and R are true and R is not the correct explanation of A.

Explanation: (1) Despite the similarities between meiosis II and mitosis, meiosis II is not mitosis because it always takes place in haploid cells.

(2) DNA replication is not performed prior to meiosis II.

(3) The two chromatids of a chromosome are frequently dissimilar.

(4) The daughter cells produced following meiosis II are neither similar to the parent cell nor to each other.

