

MEIOSIS AND MITOSIS ANSWERS

1. A gene is a biological unit of genetic information which is located in a definite position or locus on a filamentous or rod-shaped chromosome contained in the nucleus.
2. As an organism grows or repairs damaged tissue, new cells are being produced by mitosis. When gametes are being formed, the process is termed meiosis.
3. There are 4 phases of mitosis:
 - * Prophase - The chromosomes that replicated during the previous resting phase of Interphase become more visible. Centrioles divide. The nucleolus disappears. The nuclear membrane begins to disappear.
 - * Metaphase - The chromatids which are connected at the centromere line up at the equator of the cell, after the nuclear membrane has disappeared. The spindle attached between centromeres and centrioles is formed.
 - * Anaphase - Centromeres joining homologous chromatids break and chromatids move towards the poles of the cell.
 - * Telophase - Chromatids cluster at each pole. A nuclear membrane forms in each cell, which then splits into two 'daughter' cells each with the same number of chromosomes.
4. In mitosis of plant cells, there are no centrioles, and both a cell membrane and a cell wall (called a cell plate) grows between the two daughter cells.
5. Similarities between mitosis and meiosis - Both are forms of cell division, which are frequently occurring in an organism's body.
Differences between mitosis and meiosis - Mitosis occurs in body cells and forms two daughter cells, each containing the same number of chromosomes as the parent cell. Meiosis is the formation of gametes, and involves two cell divisions producing four daughter cells with half the number of chromosomes of the parent cell.
6. Spermatogenesis is the formation of 4 similar-sized male gametes (e.g. sperm, pollen). Oogenesis is the formation of 4 different-sized cells with differing quantities of cytoplasm. One of the 4 cells with most of the cytoplasm and one of the 4 nuclei is the female ovum, whereas the remaining 3 cells with their 3 nuclei form 3 polar bodies which do not take part in fertilisation.
7. (a) 400 (b) 100
8. (a) haploid (b) diploid (c) 23 chromosomes a human gamete, and 46 chromosomes in a human zygote.
9. (a) Linked genes are those on the same chromosome.
9. (b) During meiosis, when parts of homologous chromosomes break and rejoin, there is a different combination of genes in the offspring than was in the parent. This is called crossing over and recombination. When genes are closer together on a chromosome, they are more likely to be inherited together.