

Summary

5 Cell and nuclear division

- 1 Growth of a multicellular organism is a result of parent cells dividing to produce genetically identical daughter cells.
- 2 During cell division the nucleus divides first, followed by division of the whole cell.
- 3 Division of a nucleus to produce two genetically identical nuclei is achieved by the process of mitosis.
- 4 Mitosis is used in growth, repair, asexual reproduction and cloning of cells during an immune response.
- 5 Although a continuous process, mitosis can be divided for convenience into four phases: prophase, metaphase, anaphase and telophase. The phase between successive nuclear and cell divisions is called interphase. Replication of DNA takes place during interphase so that the new cells will each have identical DNA.
- 6 The period from one cell division to the next is called the cell cycle. It has four stages or phases: G_1 is a growth stage, S (for synthesis) is when the DNA replicates, G_2 is a second growth stage, and nuclear and cell division. G_1 , S and G_2 are collectively known as interphase.
- 7 In a life cycle involving sexual reproduction, the gametes have one set of chromosomes, a condition known as haploid. The cell produced by fusion of the gametes, the zygote, has two sets of chromosomes, a condition known as diploid. In such a life cycle it is therefore essential that a type of nuclear division occurs which reduces the number of chromosomes from two sets to one set. This type of nuclear division is called meiosis and must take place at some point in the life cycle before fertilisation.
- 8 All the cells in the human body are diploid, apart from the gametes, which are haploid.
- 9 Cancers are a result of uncontrolled cell division.
- 10 A number of physical and chemical factors can increase the chances of cancer. Agents which are known to have caused cancer are described as carcinogenic. Examples are asbestos (chemical) and ionising radiation (physical).
- 11 Certain viruses, such as papilloma virus, can cause cancer. Genetic predisposition or inheritance of certain mutant genes may also contribute to the risk of cancer.