

Chapter 9: Cell Cycle and Cellular Reproduction

1. List in order, the four stages of the cell cycle and briefly summarize what is happening at each stage.
2. Explain what conditions might cause a cell to halt the cell cycle.
3. Discuss how apoptosis represents a regulatory event of the cell cycle.
4. Explain how the cell prepares the chromosomes and centrosomes prior to nuclear division.
5. Describe the major events that occur during each phase of mitosis.
6. Summarize the differences between cytokinesis in animal and plant cells, and explain why the difference is necessary.
7. List the major characteristics of cancer cells that distinguish them from normal cells. Distinguish between a malignant and benign tumor.
8. Understand the different ways the cell cycle is controlled. Identify the functions of cyclins, oncogenes, tumor-suppressor genes, and telomeres.
9. Compare and contrast the effect on the cell cycle of a) a mutation in a proto-oncogene; b) a mutation in a tumor-suppressor gene.
10. Distinguish between the structure of a prokaryotic and eukaryotic chromosome.
11. Explain how binary fission in prokaryotes differs from mitosis and cytokinesis in eukaryotes.

Chapter 10: Meiosis and Sexual Reproduction

1. Contrast haploid and diploid chromosome numbers.
2. Explain what is meant by homologous chromosomes.
3. Examine how chromosome number changes during meiosis I and meiosis II.
4. Describe the two main ways in which meiosis contributes to genetic variation.
5. Contrast the effects of asexual and sexual reproduction on genetic variation.
6. Evaluate why meiosis and sexual reproduction are important in responding to the changing environment.
7. Describe the phases of meiosis and the major events that occur during each phase. Identify the phase of meiosis where chromosome number is reduced from diploid to haploid.
8. Contrast changes in chromosome number, genetic variability, chromosome alignment, and number of daughter cells between meiosis and mitosis.
9. Compare the number of gametes produced during oogenesis and spermatogenesis in humans.
10. Explain the kinds of changes in chromosome number that can be caused by nondisjunction in meiosis.
11. Examine why sex chromosome aneuploidy is more common than autosome aneuploidy.
12. Examine how changes in chromosome structure can lead to human diseases.
13. Calculate gene to centromere distance based on crossing over data.

2003 Question 4

Death is a natural and necessary part of life cycles at all levels of organization.

- a) Discuss two examples of how cell death affects the development and functioning of a multicellular organism.
- b) Discuss one example of how substances are degraded and reused in cells.
- c) Discuss the evolutionary significance of death.

2004 Question 1

Meiosis reduces chromosome number and rearranges genetic information.

- a) Explain how the reduction and rearrangement are accomplished in meiosis.
- b) Several human disorders occur as a result of defects in the meiotic process. Identify one such chromosome abnormality; what effects does it have on the phenotype of people with the disorder? Describe how this abnormality could result from a defect in meiosis.

2006 Form B Question 1

Sexual reproduction requires that half of the chromosomes in a zygote come from one parent and the other half come from the second parent.

- a) Describe the process by which a cell's complement of chromosomes is halved in the formation of gametes.
- b) Choose one organism or group of organisms that reproduce asexually. Describe the mode of asexual reproduction in that organism and explain the advantages to the organism of asexual reproduction.
- c) Choose one organism or group of organisms that reproduce sexually. Describe the mode of sexual reproduction in that organism and explain the advantages to the organism of sexual reproduction.

2011 Form B Question 1

The cell cycle is fundamental to the reproduction of eukaryotic cells.

- a) Describe the phases of the cell cycle.
- b) Explain the role of THREE of the following in mitosis or cytokinesis
 - Kinetochores
 - Microtubules
 - Motor proteins
 - Actin filaments
- c) Describe how the cell cycle is regulated and discuss ONE consequence of abnormal regulation.

2015 Question 4

Both mitosis and meiosis are forms of cell division that produce daughter cells containing genetic information from the parent cell.

- a) Describe TWO events that are common to both mitosis and meiosis that ensure the resulting daughter cells inherit the appropriate number of chromosomes.
- b) The genetic composition of daughter cells produced by mitosis differs from that of the daughter cells produced by meiosis. Describe TWO features of the cell division processes that lead to these differences.