Chapter 12 Cell cycle

The Key Roles of Cell Division

- 1. Explain how cell division functions in reproduction, growth, and repair.
- 2. Describe the structural organization of a prokaryotic and a eukaryotic genome.
- 3. Describe the major events of cell division that enable the genome of one cell to be passed on to two daughter cells.
- 4. Describe how chromosome number changes throughout the human life cycle.

The Mitotic Cell Cycle

- 5. List the phases of the cell cycle and describe the sequence of events that occurs during each phase.
- 6. List the phases of mitosis and describe the events characteristic of each phase.
- 7. Recognize the phases of mitosis from diagrams and micrographs.
- 8. Draw or describe the spindle apparatus, including centrosomes, kinetochore microtubules, nonkinetochore microtubules, asters, and centrioles (in animal cells).
- 9. Describe what characteristic changes occur in the spindle apparatus during each phase of mitosis.
- 10. Explain the current models for poleward chromosomal movement and elongation of the cell's polar axis.
- 11. Compare cytokinesis in animals and in plants.
- 12. Describe the process of binary fission in bacteria and explain how eukaryotic mitosis may have evolved from binary fission.

Regulation of the Cell Cycle

- 13. Describe the roles of checkpoints, cyclin, Cdk, and MPF in the cell cycle control system.
- 14. Describe the internal and external factors that influence the cell cycle control system.
- 15. Explain how the abnormal cell division of cancerous cells escapes normal cell cycle controls.
- 16. Distinguish among benign, malignant, and metastatic tumors.

The Basis of Heredity

- 1. Explain in general terms how traits are transmitted from parents to offspring.
- 2. Distinguish between asexual and sexual reproduction.

The Role of Meiosis in Sexual Life Cycles

- 3. Distinguish between the following pairs of terms:
 - a. somatic cell and gamete
 - b. autosome and sex chromosome
- 4. Explain how haploid and diploid cells differ from each other.
 - State which cells in the human body are diploid and which are haploid.
- 5. Explain why fertilization and meiosis must alternate in all sexual life cycles.
- 6. Distinguish among the three life-cycle patterns characteristic of eukaryotes, and name one organism that displays each pattern.
- 7. List the phases of meiosis I and meiosis II and describe the events characteristic of each phase.
- 8. Recognize the phases of meiosis from diagrams or micrographs.
- 9. Describe the process of synapsis during prophase I and explain how genetic recombination occurs.
- 10. Describe three events that occur during meiosis I but not during mitosis.

Origins of Genetic Variation

- 11. Explain how independent assortment, crossing over, and random fertilization contribute to genetic variation in sexually reproducing organisms.
- 12. Explain why heritable variation is crucial to Darwin 's theory of evolution by natural selection