

Biology -
Ch. 10 - Cell Division

Section 1 and 2 - Limits to Cell Growth and Cell Division

- I. The _____ a cell becomes, the more demands the cell places on its _____. In addition, the cell has more trouble moving enough _____ and _____ across the cell membrane.
- II. The rate at which food, oxygen, water and wastes are _____ and _____ of the cell is dependent on the _____ of the cell. The rate at which food, oxygen, and water are _____ and waste is _____ depends on the cell's _____.
- III. As the length of a cell increases, its volume increases _____ than the surface area. The decrease in the cell's ratio of surface area to volume makes it more _____ for the cell to move needed materials in and waste products out _____ enough for the cell to _____.
- IV. Before it becomes too large, a growing cell _____ forming two "_____" cells. The process by which a cell divides into two new daughter cells is called _____. Before cell division occurs, the _____ (makes a copy) of its _____ thus solving the problem of increasing size.
- V. In eukaryotes, cell division occurs in _____ major stages. The first stage, division of the cell _____, is called _____. The second stage, division of the cell _____, is called _____.
- VI. _____ information is passed from one generation to the next on chromosomes. _____ cell division, each chromosome is _____ or copied. Chromosomes are not normally _____ in cells except _____ cell division. Until then, the genetic information in the nucleus is in the form of _____.
- VII. When chromosomes become visible, each chromosome consists of two identical "sister" _____. The V sides of the chromosome are the _____ and the _____ of the DNA. Each pair of chromatids is attached in the middle at an area called the _____.
- VIII. When the cell divides, the chromatids are pulled apart by _____ formed by the _____. Each new cell gets _____ chromatid. The result is two new "daughter" cells, each have _____.

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a _____ of the _____ same chromatids that the
" _____ " cell had before division. So, a human cell with
_____ chromosomes, after cell division is _____ cells with _____
chromosomes.

IX. Cell Cycle – The _____ is the series of events that
cells go through as they _____ and _____.
_____ is the period of _____ that occurs
_____ cell divisions.

X. During the cell cycle:

A. a cell _____

B. _____ for division

C. Divides to form _____ daughter cells, each of which begins the cycle
_____.

XI. The cell cycle consists of four phases:

- _____ (first Gap phase)
- _____ (Synthesis)
- _____ (second Gap phase)
- _____ (division of the cell nucleus, also called
_____)

XII. Events of the Cell Cycle: Interphase: During G₁ the cell increases in
_____ and synthesis (makes) new _____ and
_____.

XIII. During the S phase, chromosomes are _____ and DNA
_____ takes place. Once a cell enters the S phase, it usually
_____ the rest of the cell cycle.

XIV. In the G₂ phase, organelles and molecules for cell division are _____.
Once G₂ is complete, the cell is ready to start the _____ phase – Mitosis.

XV. Biologists divide the events of mitosis into four phases:

- _____
- _____
- _____
- _____

XVI. **Prophase:** Prophase is the _____ and _____ phase of
mitosis. The centrioles _____ and take up positions on the
_____ sides of the nucleus.

- XVII. The centrioles lie in a region _____. The centrosome helps to organize the _____, a fanlike _____ structure that helps separate the chromosomes.
- XVIII. Chromatin _____ into chromosomes. The centrioles separate and a _____ begins to form. The nuclear envelope _____.
- XIX. **Metaphase:** The _____ phase of mitosis is metaphase. The chromosomes line up across the _____ or _____ of the cell. _____ connect the centromere of each chromosome to the poles of the spindle.
- XX. **Anaphase:** Anaphase is the _____ phase of mitosis. The sister chromatids _____ or _____ into individual chromosomes. The chromosomes continue to move until they have separated into _____ groups.
- XXI. **Telophase:** Telophase is the _____ and _____ phase of mitosis (_____ of what happens in _____). Chromosomes gather at _____ ends of the cell and lose their distinct shape.
- XXII. A new nuclear envelope _____ around each cluster.
- XXIII. **Cytokinesis:** Cytokinesis is the splitting of the cell, or _____, into two identical daughter cells. During cytokinesis, the cytoplasm _____ in half. Each daughter cell has an _____ set of duplicate chromosomes.
- XXIV. In plants, a structure known as the _____ forms midway between the divided nuclei.
- XXV. The cell plate gradually develops into a separating membrane. A _____ then begins to appear in the cell plate.

Section 10.3 – Regulating the Cell Cycle

- I. Experiments show that _____ cells will _____ until they come in _____ with other cells. When cells come in contact with other cells, they respond by _____. Cells at the edges of an _____ are stimulated to _____ rapidly. When the healing process nears completion, the rate of cell division _____ down. This demonstrates that controls on cell growth and division can be turned _____ and _____.

- II. The cell cycle is regulated by a specific _____. The amount of this protein in the cell _____ and _____ in time with the cell cycle. Scientists called this protein _____ because it seemed to regulate the cell cycle. Cyclins regulate the _____ of the cell cycle in eukaryotic cells.
- III. Cyclins were discovered during a similar experiment to the one pictured. A sample of _____ is removed from a cell in _____. The sample is injected into a _____ cell in _____ of interphase. As a result, the second cell _____ mitosis.
- IV. Proteins that respond to events _____ the cell are called _____ regulators. Internal regulators allow the cell cycle to proceed _____ when certain processes _____ inside the cell.
- V. Proteins that respond to events _____ the cell are called _____ regulators. External regulators direct cells to _____ or _____ the cell cycle.
- VI. _____ is a disorder in which some of the body's own cells _____ to control growth.
- VII. Cancer cells _____ respond to the _____ that regulate the _____ of most cells.
- VIII. Cancer cells divide _____ and form masses of cells called _____ that can damage the surrounding tissues. Cancer cells may _____ from tumors and _____ throughout the body, disrupting normal activities and causing serious medical problems or even death. The various forms of cancer have many causes, including _____, _____, and even _____ infection. All cancers have one thing in common: The _____ over the cell cycle has broken down.

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Chapter 11, Introduction to Genetics (continued)

Section 11-4 Meiosis (pages 275-278)

This section explains how gametes form in the process of meiosis. It also explains how meiosis is different from mitosis.

Introduction (page 275)

1. List the two things that Mendel's principles of genetics required in order to be true.

a. _____

b. _____

Chromosome Number (page 275)

2. What does it mean when two sets of chromosomes are homologous?

3. Circle the letter of each way to describe a diploid cell.

a. 2N

b. Contains two sets of homologous chromosomes

c. Contains a single set of homologous chromosomes

d. A gamete

4. Circle the letter of the number of chromosomes in a haploid *Drosophila* cell.

a. 8

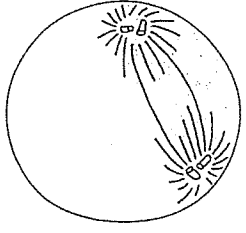
b. 4

c. 2

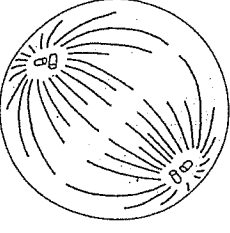
d. 0

Phases of Meiosis (pages 276-277)

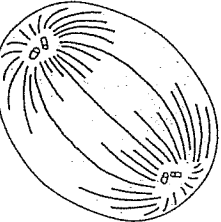
5. Draw the chromosomes in the diagrams below to show the correct phase of meiosis.



Prophase I



Metaphase I



Anaphase I

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6. Why is meiosis described as a process of reduction division?

7. What are the two distinct stages of meiosis?

a. _____

b. _____

8. Is the following sentence true or false? The diploid cell that enters meiosis becomes 4 haploid cells at the end of meiosis.

9. How does a tetrad form in prophase I of meiosis?

10. Circle the number of chromatids in a tetrad.

a. 8

b. 6

c. 4

d. 2

11. What results from the process of crossing-over during prophase I?

12. Circle the letter of each sentence that is true about meiosis.

a. During meiosis I, homologous chromosomes separate.

b. The two daughter cells produced by meiosis I still have the two complete sets of chromosomes as a diploid cell does.

c. During anaphase II, the paired chromatids separate.

d. After meiosis II, the four daughter cells contain the diploid number of chromosomes.

Gamete Formation (page 278)

Match the products of meiosis with the descriptions.

Description

13. Haploid gametes produced in males

14. Haploid gametes produced in females

15. Cells produced in females that do not participate in reproduction

Product of Meiosis

a. eggs

b. sperm

c. polar bodies

Comparing Mitosis and Meiosis (page 278)

16. Circle the letter of each sentence that is true about mitosis and meiosis.

a. Mitosis produces four genetically different haploid cells.

b. Meiosis produces two genetically identical diploid cells.

c. Mitosis begins with a diploid cell.

d. Meiosis begins with a diploid cell.

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Section 11.4- Meiosis

- I. For Mendel's principles of genetics to be true, two conditions have to be met:
(1) Each organism must inherit a _____ copy of every _____ from each of its "parents". (2) _____ are formed by a process that separates the two sets of genes so that each gamete ends up with just _____.
- II. All organisms have different numbers of _____. A body cell in an adult fruit fly has _____ chromosomes: _____ from the fruit fly's _____ parent and _____ from its _____ parent.

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