

## Chapter 2 Vocabulary Terms

**Cell Cycle**- the regular cycle of growth and division that cells undergo

**Interphase**- stage of cell cycle that occurs before cell division where the cell grows and DNA is replicated.

**Gamete**- a reproductive or sex cell that contains the haploid set of chromosomes.

**Haploid**- a cell in an organism that has one copy of each chromosome; reproductive cells are said to be haploid

**Diploid** – an organism with two sets of chromosomes, one copy from the mother and one from the father. Normal body cells are said to be diploid.

**Meiosis**- the process that occurs in the formation of sex cells by which the number of chromosomes is reduced by half.

**Mitosis**- the stage of the cell cycle during which the cell's nucleus divides into two new nuclei, and one copy of the DNA is distributed into each daughter cell.

**Chromosome**- a condensed rod of chromatin (DNA) that carries genetic information.

**Cytokinesis**- final stage of the cell cycle where each cell receives cytoplasm and organelles.

**Cancer**- a disease in which some body cells divide uncontrollably and damage tissues or body parts around it.

**Mutation**- a change in a gene or chromosome that can possibly lead to cancer.

**Tumor**- a mass of abnormal cells caused by cancer.

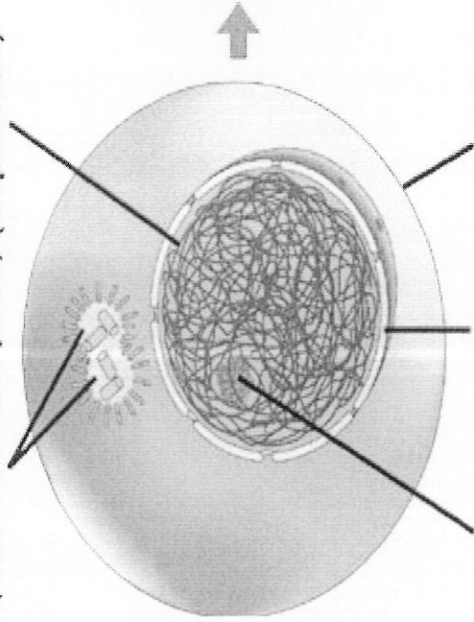
**Chemotherapy**- the use of drugs to treat a disease such as cancer.

**Benign**- a tumor that will not spread locally or to other parts of the body.

**Malignant**- a tumor that will invade surrounding tissue and spread to other parts of the body.

**G<sub>2</sub> OF INTERPHASE**

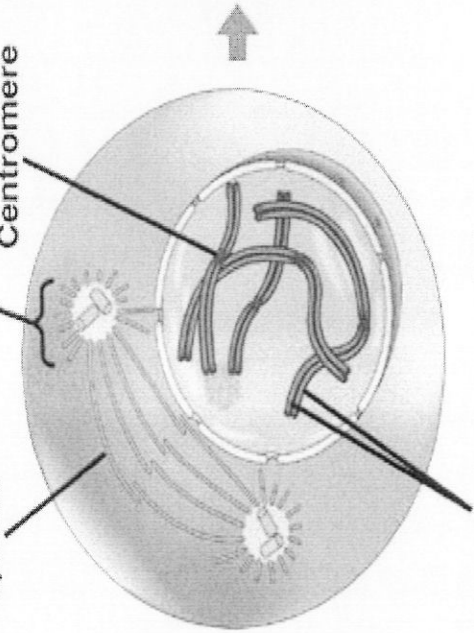
Centrosomes (with centriole pairs) (duplicated)  
Chromatin



Nucleolus  
Nuclear envelope  
Plasma membrane

**PROPHASE**

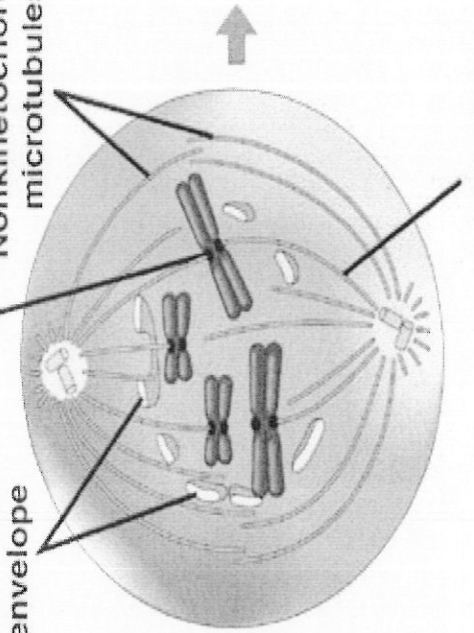
Early mitotic spindle  
Aster  
Centromere



Chromosome, consisting of two sister chromatids

**PROMETAPHASE**

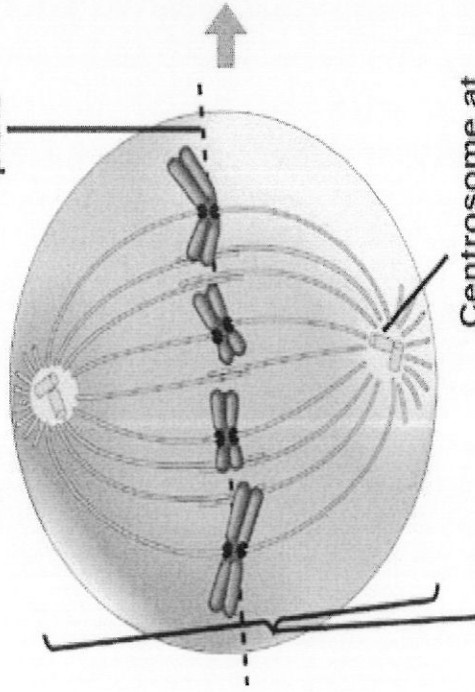
Fragments of nuclear envelope  
Kinetochores  
Nonkinetochore microtubules



Kinetochores  
microtubule

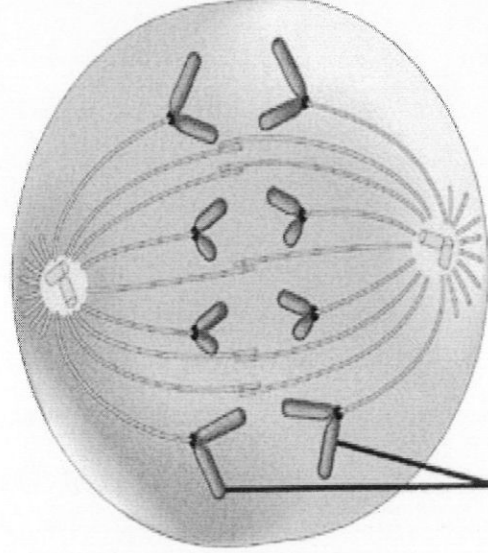
**METAPHASE**

Metaphase plate



Spindle  
Centrosome at one spindle pole

**ANAPHASE**

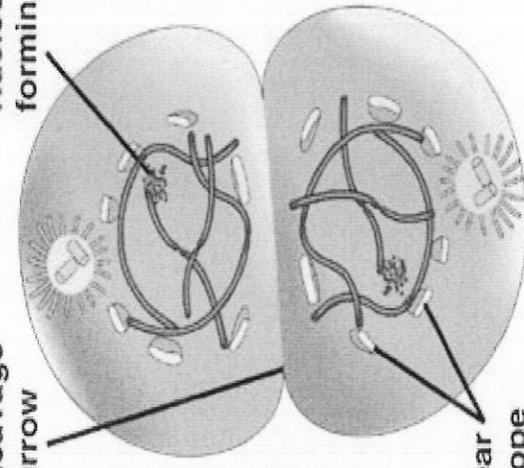


Daughter chromosomes

**TELOPHASE AND CYTOKINESIS**

Cleavage furrow

Nucleolus forming



Nuclear envelope forming

**Cell Processes and Energy** ▪ *Review and Reinforce*

# Cell Division

## Understanding Main Ideas

Fill in the blanks in the table below. Then answer the questions that follow in the spaces provided.

### Phases of Mitosis

Phase	Event
Prophase	1. _____
2. _____	Chromosomes attach to spindle fibers
Anaphase	3. _____
4. _____	New nuclear envelope forms

- Which stage of the cell cycle usually lasts longest?  
\_\_\_\_\_
- During which stage of the cell cycle does DNA replication occur?  
\_\_\_\_\_
- During which stage of the cell cycle does the cell membrane pinch the cell in two?  
\_\_\_\_\_

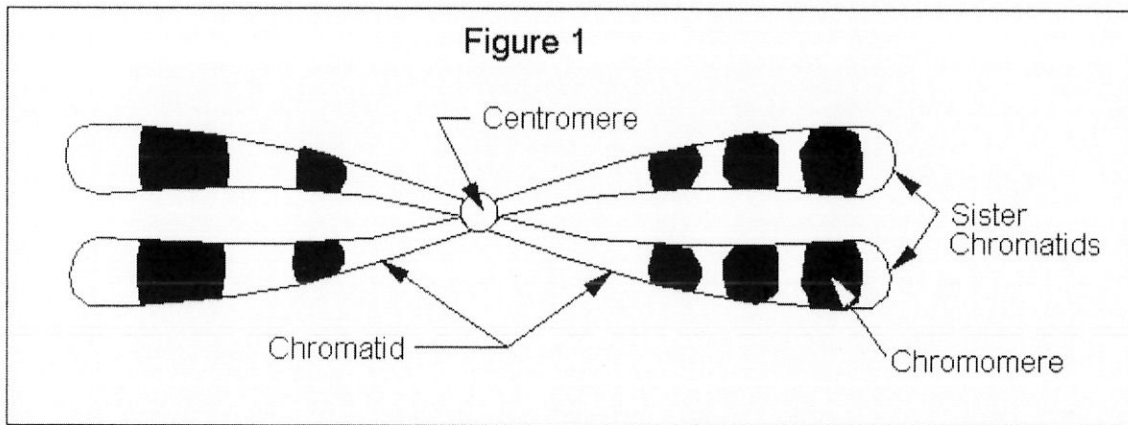
## Building Vocabulary

Match each term with its definition by writing the correct letter in the blank.

- |   |                |
|---|----------------|
| _____ 8. Regular sequence of growth and division that cells undergo       | a. interphase  |
| _____ 9. First stage of the cell cycle                                    | b. mitosis     |
| _____ 10. Process in which DNA is copied                                  | c. cell cycle  |
| _____ 11. Stage of the cell cycle during which the cell's nucleus divides | d. cytokinesis |
| _____ 12. Doubled rod of condensed chromatin                              | e. replication |
| _____ 13. Final stage of the cell cycle                                   | f. chromosome  |

Cell Processes and Energy

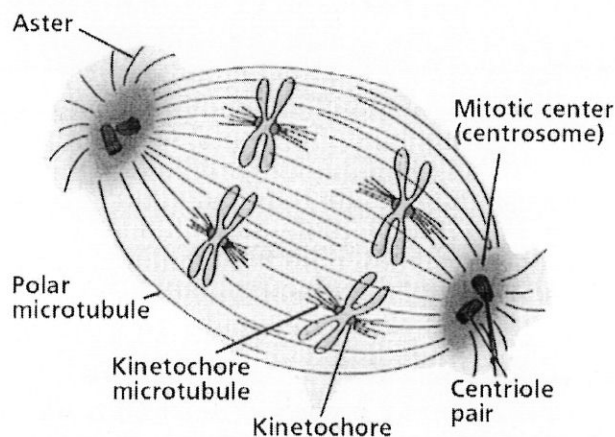
# Anatomy of a Chromosome



**Centromere-** a pinched in region somewhere along the length of the chromosome called the centromere. The centromere is a region to which the **spindle fibers** attach to the chromosome and it is in a characteristic position that is constant for different types of chromosomes. The centromere also contains a small ring of protein called a **kinetochore** which is important in the movement of chromosomes during mitosis and meiosis.

**Chromatid-** the copied pair of chromosomes found in the processes of mitosis and meiosis.

**Telomere-** The ends of the chromosome in eukaryotes are called telomeres. This region is important because during DNA replication, the telomere does not always get duplicated properly and the chromosome shortens slightly. The telomere contains many repeating sections of DNA rather than regions of DNA that code for specific genes.



**Centriole-** cell organelle that spindle fibers attach to during cell division. They act as an “anchor” to pull the chromosomes apart from its chromatid pair.

**Spindle Fiber-** protein filaments that connect from the centromere of a chromatid pair to the centriole at the poles of the cell. They assist in separating chromatids during cell division.



Name: \_\_\_\_\_ Period: \_\_\_\_\_

## CELL CYCLE

**Centromere** – the specialized region of the chromosome where two sister chromatids are most closely attached.

**Chromosome** – a structure carrying genetic material, found in the nucleus of eukaryotic cells. Each chromosome consists of a large amount of condensed DNA

**Cytokinesis** – the final stage of the cell cycle that involves the division of the cytoplasm to form two separate daughter cells

**Interphase**- the stage of the cell cycle that takes place before cell division occurs. It involves cell growth and DNA replication

**Mitosis** – a process of nuclear division in eukaryotic cells where one copy of DNA is distributed to each daughter cell.

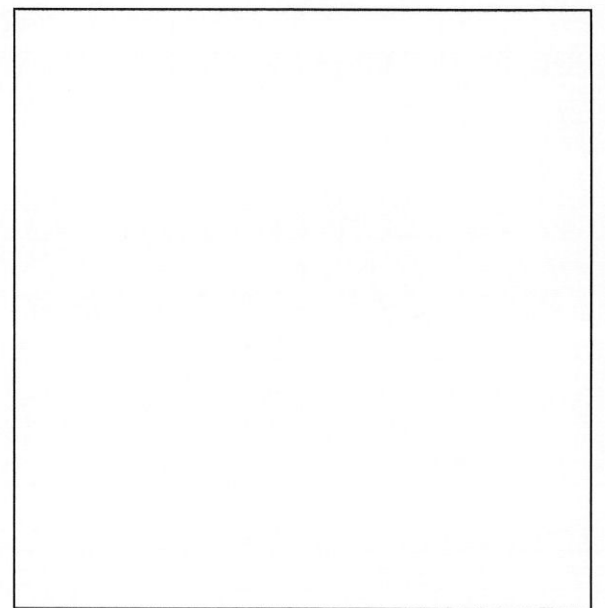
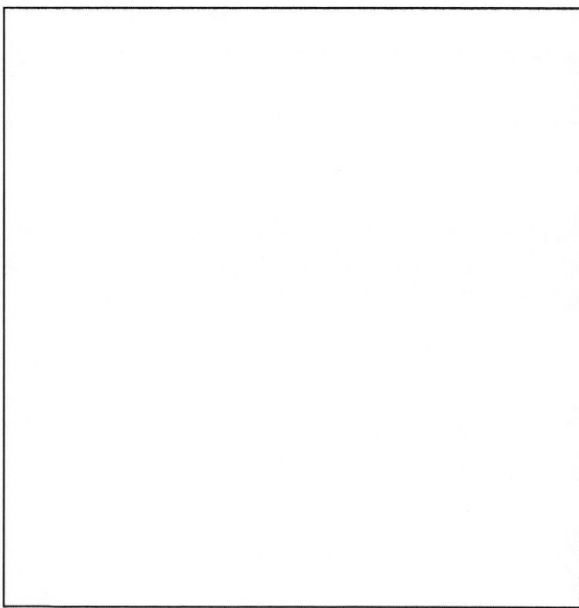
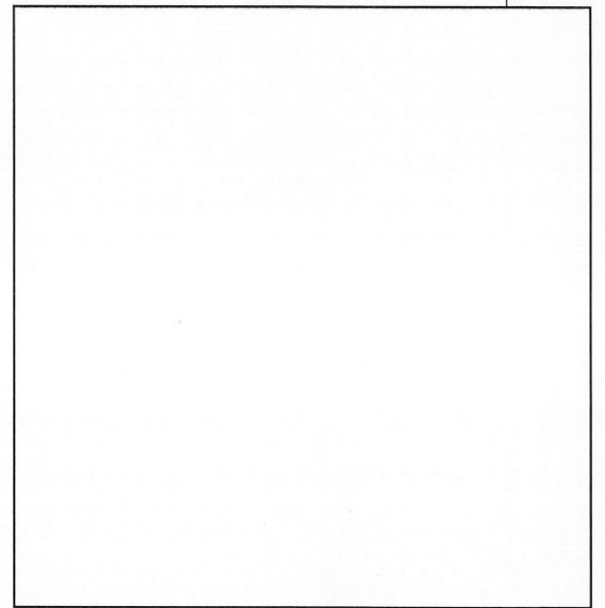
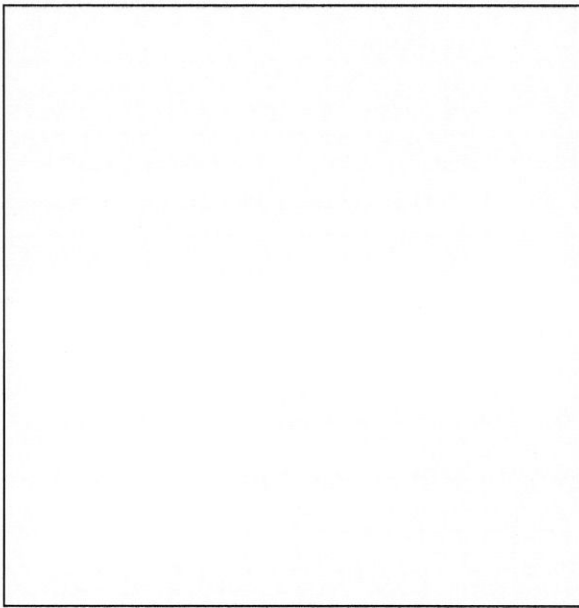
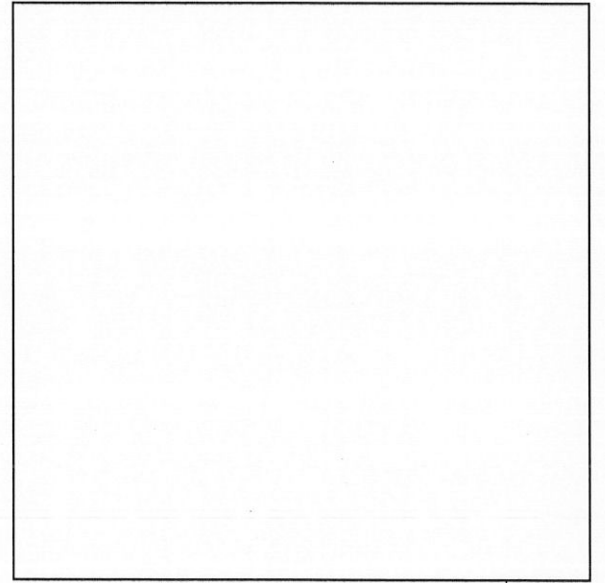
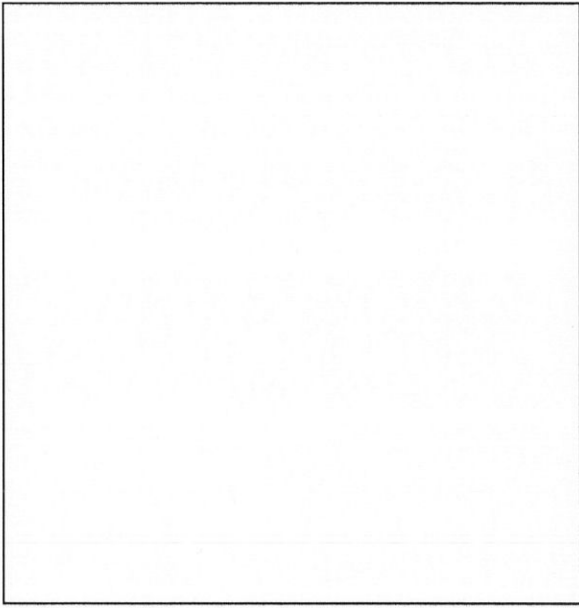
**Sister chromatids** – either of two copies of a duplicated chromosome attached to each other by proteins at the centromere and, sometimes, along the arms.

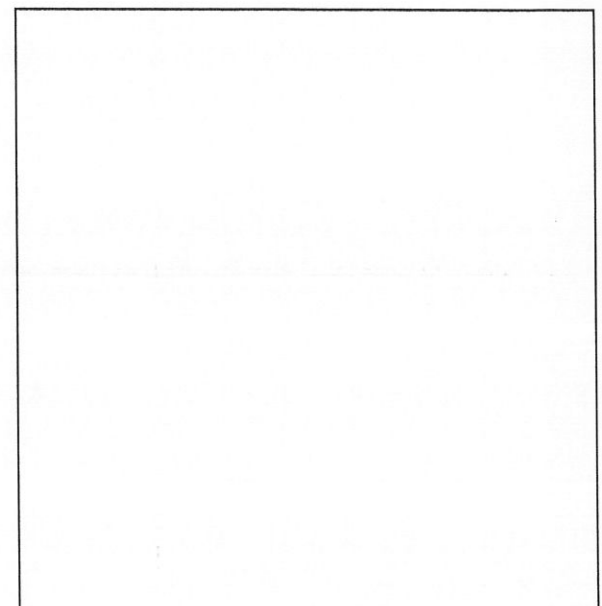
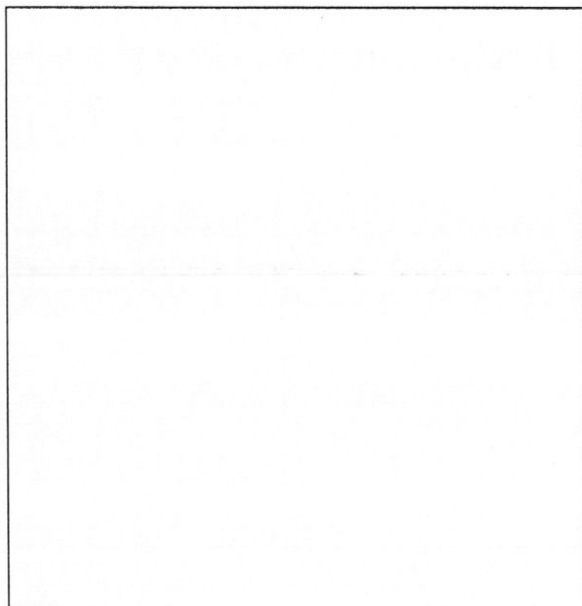
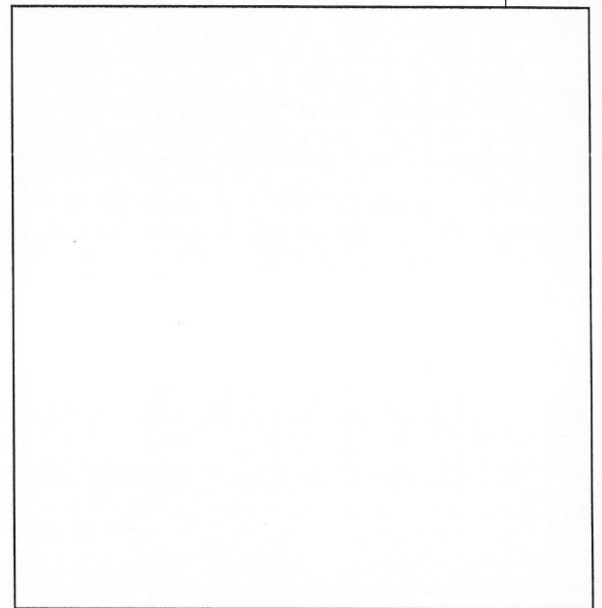
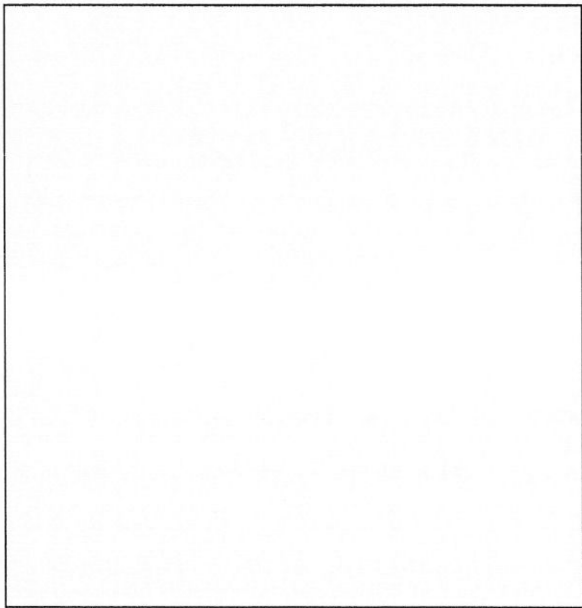
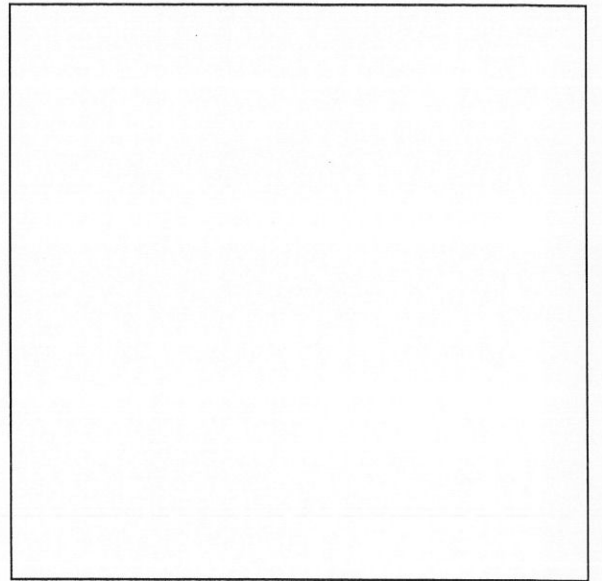
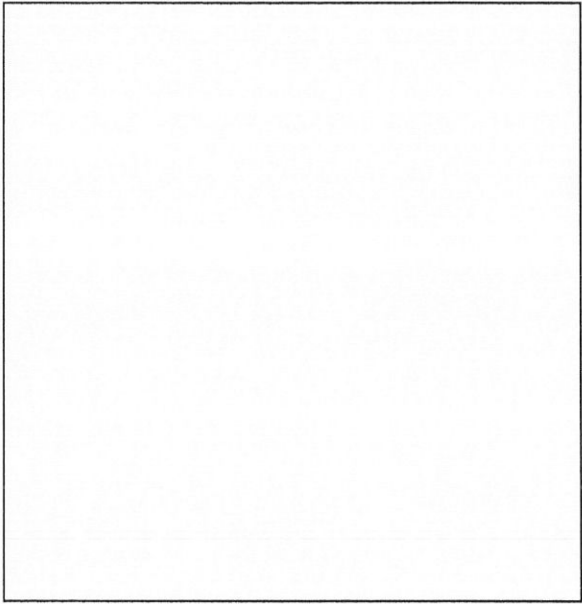
### Assignment:

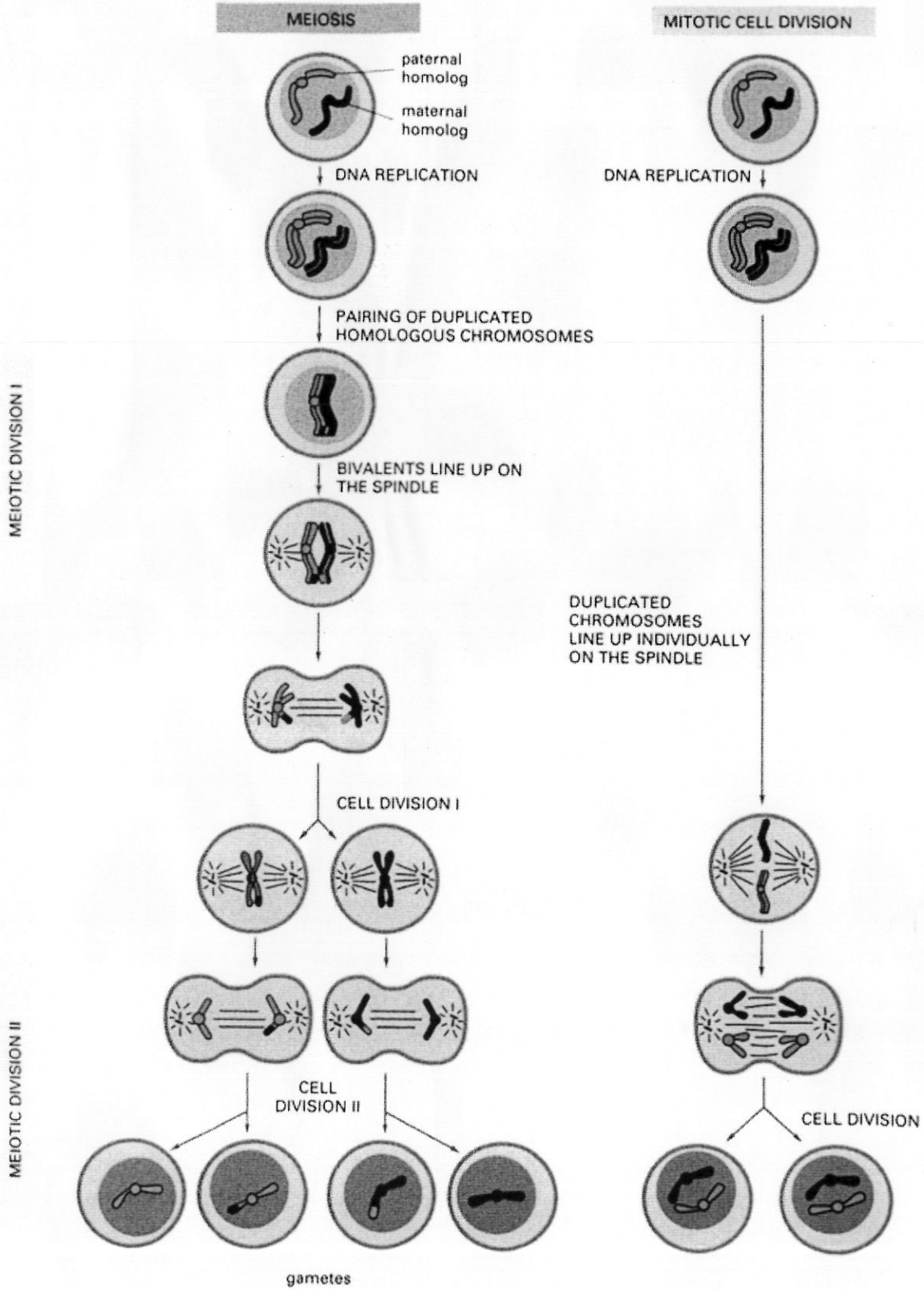
- Use the stereoscopes to observe the process of mitosis in plant and animal cells.
- Look for the terms above on the slides
- On the back of this paper, use the boxes to draw, label, and describe what happens in each step of Mitosis. (prophase, metaphase, anaphase, telophase, cytokinesis)

### Questions:

- 1.) How many chromosomes are in the normal cells of humans?
- 2.) Why must DNA be replicated before cell division occurs?
- 3.) What would happen if the chromatids did not split during Mitosis?
- 4.) List two differences between plant and animal cells that you observed in the stereoscopes.
  - 1.)
  - 2.)









# Meiosis

1.) Identify what cells go through this process.

2.) Explain why meiosis must occur in these cells.

3.) Compare and contrast the results of meiosis with mitosis.

<u>Mitosis</u>	<u>Meiosis</u>

4.) Explain how meiosis creates genetic variation among offspring.

1.)

2.)

3.)

# Mitosis vs. Meiosis Comparison

## Mitosis

- 1.) How many cell divisions occur in Mitosis?
- 2.) How many cells are produced during Mitosis?
- 3.) The cells produced during Mitosis are \_\_\_\_\_ to one another. The two cells produced have \_\_\_\_\_ number of chromosomes as the original cell.
- 4.) When chromosomes are replicated they form \_\_\_\_\_ which look like an X.
- 5.) List the steps of Mitosis (spelling does count)
  - 1.)
  - 2.)
  - 3.)
  - 4.)
  - 5.)
  - 6.)
- 6.) Describe the process by which chromatids are pulled apart during Anaphase.

## Meiosis

- 8.) How is metaphase 1 in meiosis different from metaphase in mitosis?
- 9.) How many cell divisions occur in meiosis?

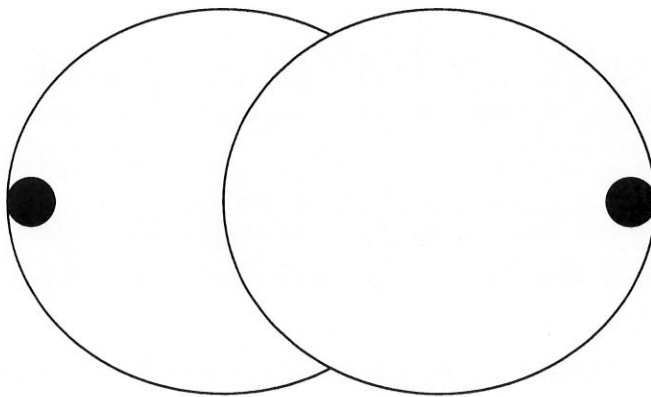
10.) How many cells are produced as a result of meiosis?

11.) The cells produced during meiosis are \_\_\_\_\_  
from one another. Each new cell has \_\_\_\_\_ the  
number of chromosomes as the original cell?

12.) Where does meiosis occur? (In what cells?)

13.) Explain why meiosis must occur.

14.) Label the following diagram with the appropriate structure.



15.) In what stage of mitosis is the cell above currently in?

## Mitosis vs. Meiosis

*Use the diagram from your DNA packet or internet source to answer the questions below. Describe mitosis in the left column and meiosis on the right.*

- 1.) How many cells are produced during each process?
- 2.) In what type of cells does each process occur?
- 3.) Use haploid or diploid to describe the cells produced from each process.
- 4.) List a difference that exists between the anaphase stages of Mitosis and Meiosis.
- 5.) Compare the cells produced from Mitosis and Meiosis. (The cells produced in Mitosis are \_\_\_\_\_.)

## Cancer (pages 64–67)

### What Is Cancer? (pages 65–66)

**Key Concept:** Cancer begins when mutations disrupt the normal cell cycle, causing cells to divide in an uncontrolled way.

- **Cancer** is a disease in which cells grow and divide without control. This uncontrolled growth of cells damages normal body parts.
- Cancer can occur in almost any part of the body.
- Cancer usually starts when something damages part of the DNA. The damage causes a change in the DNA called a **mutation**. A mutation sometimes causes a cell to work in an abnormal way.
- Usually cells go through the cell cycle and divide in a controlled way. When the normal controls are missing, cells can grow too large or divide too often.
- As more and more abnormal cells divide and grow, a tumor forms. A **tumor** is a mass of abnormal cells.

Answer the following questions. Use your textbook and the ideas above.

1. Draw a line from each term to its meaning.

<b>Term</b>	<b>Meaning</b>
cancer	a. A change in DNA
mutation	b. A disease in which cells divide without control
tumor	c. A mass of abnormal cells

2. Is the following sentence true or false? Cancer usually begins when a mutation changes the normal cell cycle.

\_\_\_\_\_



Cell Processes and Energy • Adapted Reading and Study

## Treating and Preventing Cancer (pages 66–67)

**Key Concept:** There are three common ways to treat cancer: surgery, radiation, and drugs that destroy the cancer cells.

- To treat cancer, doctors usually start by removing cancer cells in surgery.
- If the cancer has spread, doctors use radiation to help kill cancer cells. Radiation is beams of high-energy waves that destroy fast-growing cells.
- Doctors also use chemotherapy to treat cancer that has spread. **Chemotherapy** is the use of drugs to treat a disease. These drugs either kill cancer cells or slow their growth.
- Ways to prevent cancer include avoid smoking, eat a healthy diet, and protect your skin from the sun.

Answer the following questions. Use your textbook and the ideas above.

3. Read each word in the box. In each sentence below, fill in the correct word.

chemotherapy	radiation	surgery
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- a. The use of drugs to treat a disease is \_\_\_\_\_.
- b. Beams of high-energy waves that kill cancer cells is \_\_\_\_\_.
4. Circle the letter of the best way to prevent cancer.
- a. avoid smoking
  - b. expose your skin to bright sunlight
  - c. eat a lot of fatty foods

## Section 2- 4 Cancer

- 1.) What is cancer?
  
- 2.) What causes cancer?
  
- 3.) What are some things that you know of that can cause mutations?
  
- 4.) What is a tumor?
  
- 5.) There are two types of tumors:
  - A.)
  
  - B.)
  
- 6.) What are the 3 most common ways to treat cancer?
  - A.)
  
  - B.)
  
  - C.)
  
- 7.) What are some ways that you can prevent cancer?
  
- 8.) How many types of cancer are there? How are they named?