

# Biology Study Guide

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

## Mitosis

The content covered in this unit is found in Chapter 10 of *Biology* by Miller and Levine.

### Part One: Short Answer/Fill in the Blank

- What are THREE factors that limit cell size?
  - rate of diffusion
  - DNA
  - surface area to volume ratio
- As a cell's size increases, what happens to the ratio of its surface area to its volume?
 

SA to volume ratio decreases as cell size increases
- Why is the cell's surface area to volume ratio important?
 

Everything goes in/out of cell through membrane
- What is the surface area to volume ratio of a box with a height of 2cm, a length of 3 cm, and a width of 2 cm?
 

SA =  $3 \times 2 \times 4 + 2 \times 2 \times 2 = 30 \text{ cm}^2$  /  $30/2.4 = 1.25:1$

V =  $3 \times 2 \times 4 = 24 \text{ cm}^3$
- How are sexual reproduction and asexual reproduction different?
 

sexual rep. produces identical offspring  
sexual produces unique offspring
- What are chromosomes?
 

packages of organized DNA

7. During which phase of the cell cycle are chromosomes replicated?

Phase of interphase

8. What happens during the four phases of mitosis? In your answer write the phases in order AND write 1-2 sentences for EACH PHASE!

Phase 1 - prophase

Phase 2 - metaphase

Phase 3 - anaphase

Phase 4 - telophase

9. Each part of chromosomes is attached at an area called the centromere

10. The period of growth in between cell division is called interphase

11. Interphase is split into three parts, name and briefly describe them in your own words  
 G1 - cell growth  
 S - DNA synthesized/replication  
 G2 - growth/organelle replication  
 What organelle is responsible for pulling the cell apart during mitosis? spindle fibers

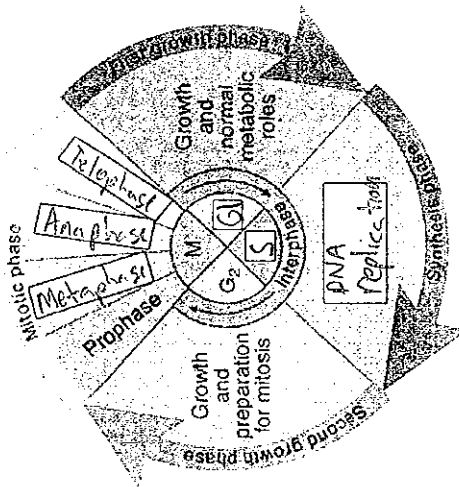
13. Where in our body does mitosis NOT occur? sex cells and nerve cells

14. What three things does mitosis help us with?  
growth, heal wounds, replace old cells

### Part Two: Matching

- The chromosomes are moved until they are near the poles of the cell **C**
- Centrioles move to opposite ends of the cell and start to make spindle fibers. **A**
- The nuclear envelope reforms around each cluster of chromosomes. **D**
- The chromosomes line up at the center and a spindle fiber attaches to their centromeres **B**
- The cell membrane pinches and splits in half, forming two new cells **F**
- The cell grows and duplicates its DNA and organelles **E**

Part Three. Identify the four phases of mitosis (next page), and the diagram of the cell cycle pictured below.



**MITOSIS WORKSHEET – HOMEWORK ASSIGNMENT**

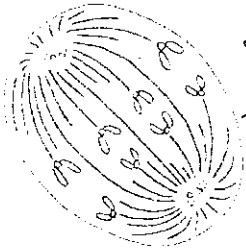
Name: Matthew

**MATCHING:** Match the phase of the cellular life cycle to the description by writing the letter next to the word in the word bank given below. Each word in the word bank will be used at least once, and some answers will be used more than once.

**WORD BANK:**

- |                |                     |                  |               |                |
|----------------|---------------------|------------------|---------------|----------------|
| A. Interphase  | B. Prophase         | C. Metaphase     | D. Anaphase   | E. Telophase   |
| F. Cytokinesis | G. Sister chromatid | H. Spindle fiber | I. Cell plate | J. Centriomere |
| K. Mitosis     |                     |                  |               |                |

- B 1. The nucleolus begins to fade from view.
- E 2. A new nuclear membrane is forming around the chromosomes.
- F 3. The cytoplasm of the cell is being divided.
- E 4. The division (cleavage furrow) appears.
- C 5. Chromosomes line up along the equator.
- B 6. The spindle is formed.
- F 7. Cell division is completed.
- E 8. The process in which the cell plate is being completed.
- A 9. Chromosomes are replicated.
- A 10. G<sub>1</sub>, S, and G<sub>2</sub> occur during this phase.
- D 11. During what phase of mitosis do centriomeres separate and the chromosomes move toward their respective poles?
- B 12. What is the phase where chromatin condenses to form chromosomes?
- J 13. What is the name of the structure that connects the two chromatids?
- G 14. The individual component of a duplicated chromosome is called?
- K & F 15. What are the two parts of cell division? HINT: You need two words for this blank.
- H 16. What structures are formed in prophase and moves the chromosomes around?
- C 17. Which phase of mitosis is the last phase in which chromatids are held together?
- A 18. Which phase of the cell cycle precedes mitosis?
- I 19. In plant cells, what forms across the center of a cell near the end of telophase?



1. anaphase



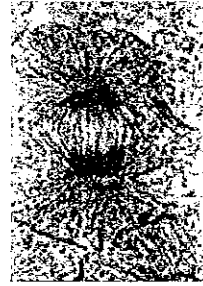
1. prophase



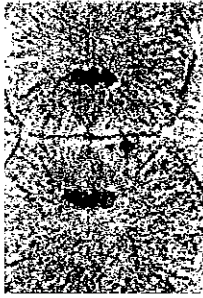
1. prophase



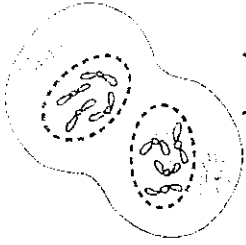
2. metaphase



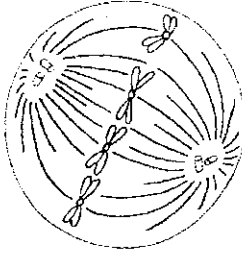
3. anaphase



4. telophase



1. telophase



1. metaphase