

Mitosis

Go to: <http://www.cellsalive.com/mitosis.htm>

Read the text on the page and view the animation. You can slow down the video by clicking step by step through the phases. Then, complete the questions below - in which stage does each occur? **HINT** - if you scroll down on the web page and read the information it may help you☺

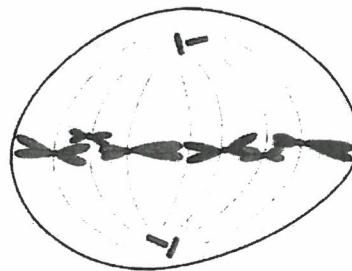
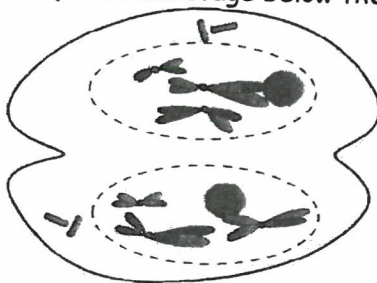
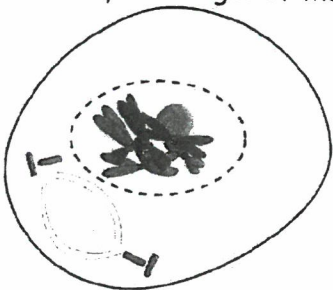
- 42. Chromatin condenses into chromosomes -
- 43. Chromosomes align in the center of cell -
- 44. Longest part of the cell cycle -
- 45. Nuclear envelope breaks down -
- 46. Cell is cleaved into 2 new daughter cells -
- 47. Daughter chromosomes arrive at the poles -

Watch video carefully.

The colored chromosomes represent chromatids. There are 2 of each color because they are exact copies.

- 48. How many chromosomes are visible at the beginning of mitosis (prophase)?
- 49. How many are in each daughter cell at the end of mitosis (telophase)?
- 50. The little green "T" shaped things on the cell are (**HINT** only in animal cells; help in cell division) -
- 51. What happens to the centrioles during mitosis?

Identify the stages of these cells (write the stage below the picture):



52. _____ 53. _____ 54. _____

Another Mitosis Animation

Click on each phase again and sketch the ones listed below (use different colors to identify the different chromosomes☺)

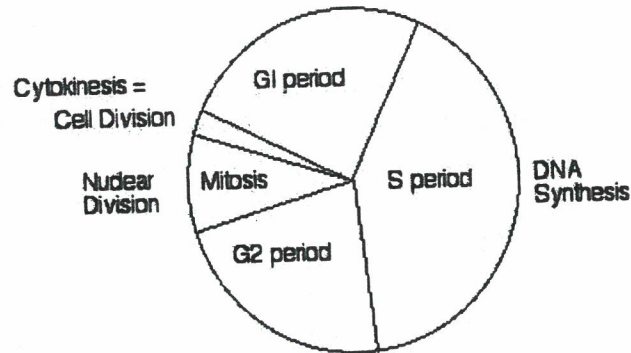
55. Prophase

56. Metaphase

57. Telophase

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MITOSIS - NUCLEAR DIVISION



Mitosis is the process in which a eukaryotic cell separates its already duplicated chromosomes (copied during the S phase) into two sets of chromosomes so there will be two identical nuclei. It is generally followed by cytokinesis which divides the cytoplasm and cell membrane. *Color the Cytokinesis stage yellow.* The result is two identical daughter cells (both have an identical set of chromosomes). The mitotic (M) phase and cytokinesis together are called cell division. The parent cell (original) divides into two new daughter cells, each with the same genetic information (chromosomes) as the parent cell. In multi-cellular organisms, the somatic cells (body cells) undergo mitosis, while germ cells — cells destined to become sperm in males or ova (eggs) in females — divide by a related process called meiosis. Mitosis does NOT occur in prokaryotic cells that do NOT have a nucleus. Prokaryotic cells (bacteria), which lack a nucleus, divide by a process called binary fission.

1. When are chromosomes duplicated --- before or during mitosis? _____
2. What process follows mitosis? _____
3. The nucleus is divided during _____, while cytoplasm of the cell is divided during _____.
4. How do the two new cells compare with each other? _____
5. The two new cells are called _____ cells.
6. Does mitosis occur in prokaryotes? Explain why or why not.
7. What process is used by bacteria to divide and reproduce?
8. Body cells are called _____ cells, while reproductive cells are known as _____ cells.
9. What process do reproductive cells go through to divide? _____

The process of mitosis (division of the nucleus) is divided into four stages (Prophase, Metaphase, Anaphase, and Telophase). Immediately following nuclear division (mitosis), the cytoplasm must also divide (cytokinesis). Animal cells divide the cytoplasm by constricting the cell membrane in the middle to form a cleavage furrow. Plant cells form a cell plate in the center to divide the cytoplasm. At Interphase, there is only one cell, but after cytokinesis there are two identical cells.

10. Name the 4 mitotic stages.
11. How does cytokinesis occur in an animal cell?
12. How does cytokinesis occur in a plant cell?

During interphase, the genetic material is called **chromatin** and can NOT be clearly seen because it isn't tightly coiled. When **prophase begins**, the DNA molecules are shortened and condensed by coiling, to form visible **chromosomes**. **Enzymes** during prophase break down the **nuclear membrane and nucleolus** so they are no longer visible. Spindle fibers also form in prophase which will attach to the chromosomes. At **metaphase**, the spindle fibers attach themselves to the **centromeres** of the chromosomes and align the chromosomes in the **middle** of the cell. **Anaphase** is the next stage. The spindle fibers shorten and the centromere splits **apart**, separating the two sister chromatids. During **telophase**, the chromosomes pairs (chromatids) are pulled to opposite poles of the cell. The **nuclear envelope and nucleolus reform** before the **chromosomes uncoil**. The **spindle fibers disappear**.

13. Genetic material is called _____ during interphase and **IS / IS NOT** clearly visible.
14. What makes the chromosomes become visible during prophase?
15. What is used to help break down the nuclear membrane?
16. What is broken down during prophase?
17. What forms during prophase to **LATER** attach and move chromosomes?
18. Doubled chromosomes are held together by the _____.
19. Where do chromosomes line up during metaphase?
20. During what stage are sister chromatids separated and moved apart to opposite ends of the cell?
21. Name 4 things that happen during telophase.
 - a.
 - b.
 - c.
 - d.

Go to: http://www.biology.arizona.edu/cell_bio/activities/cell_cycle/cell_cycle.html

1. Read the introduction, then click "next" button at the bottom of the page.
2. Read the information and take a close look at the pictures. Click "next" at the bottom of the page.
3. A page will appear with the table you have below. Click "next".
4. A small picture of a cell in one of the phases below will appear. Click on the phase that the cell is in. If you are incorrect, try again. If correct the next picture will appear. The web site will keep track of the totals for you and at the end you will record your data. You will have 36 cells to classify.
5. When you are finished, count how many cells are in each phase & record your data in the chart below.

	Interphase	Prophase	Metaphase	Anaphase	Telophase	Total
Number of Cells						36
Percent of Cells (to calculate: number of cells in each phase divided by 36 (total # of cells) X 100						100 %

Name each numbered stage in the plant cell cycle diagram (interphase, prophase, metaphase, anaphase, or telophase):

- | | | |
|----|-----|-----|
| 1. | 7. | 13. |
| 2. | 8. | 14. |
| 3. | 9. | 15. |
| 4. | 10. | 16. |
| 5. | 11. | 17. |
| 6. | 12. | 18. |

Plant Cells in Mitosis

