

Mitosis

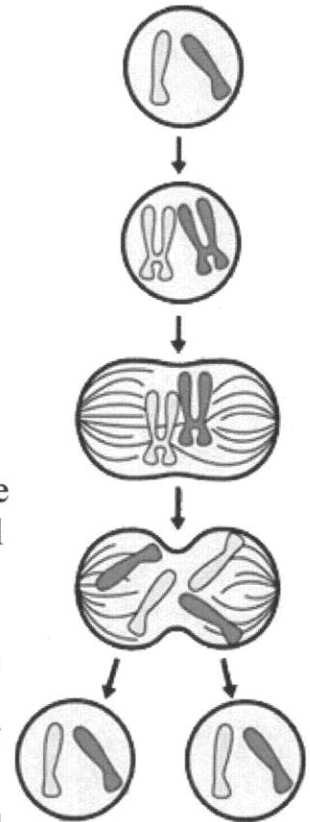
By Cindy Grigg



¹ Cells multiply by dividing. The process known as cell division allows living things to grow bigger. Cell division also helps living things replace old or injured cells. When one cell divides, two new cells take its place. The two new cells are called daughter cells.

² A human body cell contains 46 (that's two sets) chromosomes. This is called the diploid number of chromosomes. One set of 23 chromosomes came originally from your father while the other set came from your mother. These 46 chromosomes contain all the genetic information to make you, you. As you grow or your body needs repairing, your cells divide. If you think of chromosomes as a way of packaging DNA, then mitosis is a way of making sure that the chromosomes and the DNA they contain are split equally when a cell divides.

³ Before a eukaryotic cell (that's a cell with a true nucleus) divides, the genetic material in the nucleus of the cell copies itself. When the cell divides, the genetic material divides in half so that each daughter cell gets genetic material that is the same as the parent cell's genetic material. The dividing of the nuclear material is known as **mitosis**. In the last stage of cell division, the cytoplasm divides as well. That is known as cytokinesis. There are now two complete cells where there used to be one.



⁴ Cell division occurs in a predictable series of stages or phases. These steps make sure that the new daughter cells are the same as the cell from which they formed. Each stage has a name. The first stage actually takes place before cell division starts. It is called **interphase**. As a cell prepares to divide, each chromosome in the nucleus makes an exact copy of itself. This process is called replication. The two copies are called sister chromatids. If you're looking at cells under a microscope, the individual chromosomes are not visible at this stage.

⁵ During **prophase**, the nucleus prepares for cell division. The genetic material shortens and thickens. With a microscope, you can see the chromosomes. The chromosome copies are held together at their centers, called centromeres, so they look like an X. The nuclear membrane starts to break down.

⁶ During **metaphase**, the two copies of each chromosome line up in the center of the cell, called the metaphase plate. The copies of the chromosomes are attached to protein fibers which form the spindle.

⁷ During **anaphase**, the copies separate. One complete set of chromosomes is pulled by

the spindle fibers to one side of the cell. The other complete set is pulled to the other side of the cell. A new nuclear membrane forms around each set of sister chromosomes.

⁸ **Telophase** is the final stage of cell division. Two groups of chromosomes are now located at opposite ends of the cell. They begin to uncoil and can no longer be seen with a microscope. The cytoplasm pinches in at the center of the cell. The cell membrane encloses each, dividing the original cell in half. In plant cells, each daughter cell will construct a new cell wall around itself.

⁹ When cell division is complete, two new daughter cells are formed. The daughter cells are identical to the parent cell. To help you remember the stages in order, you can remember this: I picked my apples today. The first letter of each word of the phrase begins with the first letter of the phases. *I* stands for interphase (before mitosis starts), *p* stands for prophase, *m* stands for metaphase, *a* stands for anaphase, and *t* stands for telophase.

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Name _____



Date _____

Mitosis

<p>1. What happens when a cell divides?</p> <p>_____</p> <p>_____</p>	<p>2. A human body cell with a diploid number of chromosomes has _____.</p> <p><input type="radio"/> A 23 chromosomes</p> <p><input type="radio"/> B 98.6 chromosomes</p> <p><input type="radio"/> C 46 chromosomes</p>
<p>3. Mitosis is _____.</p> <p><input type="radio"/> A Dividing of cytoplasm</p> <p><input type="radio"/> B Cell division in prokaryotes</p> <p><input type="radio"/> C Dividing of the nuclear material including genetic material</p>	<p>4. Chromosomes are replicated or copied in _____.</p> <p><input type="radio"/> A Interphase</p> <p><input type="radio"/> B Metaphase</p> <p><input type="radio"/> C Anaphase</p>
<p>5. What are the four stages of mitosis?</p> <p><input type="radio"/> A Interphase, metaphase, anaphase, and telophase</p> <p><input type="radio"/> B Interphase, synthesis, prophase, metaphase</p> <p><input type="radio"/> C Prophase, metaphase, anaphase, and telophase</p>	<p>6. During metaphase, what happens to the chromosomes?</p> <p><input type="radio"/> A Each copy goes to opposite ends of the cell.</p> <p><input type="radio"/> B Both copies line up across the center of the cell.</p> <p><input type="radio"/> C They are all mixed up and hard to see.</p>
<p>7. During telophase, what happens?</p> <p><input type="radio"/> A Two groups of chromosomes go to opposite ends of the cell. The cytoplasm divides, and two new cells are formed.</p> <p><input type="radio"/> B The cell is growing and replicates or copies its chromosomes.</p> <p><input type="radio"/> C Two groups of chromosomes line up in the middle of the cell. Spindle fibers pull them apart.</p>	<p>8. When cell division is complete, what has been formed?</p> <p><input type="radio"/> A Two new sister chromatids</p> <p><input type="radio"/> B Two new sister cells with different chromosomes</p> <p><input type="radio"/> C Two new daughter cells with identical chromosomes</p>