

## MITOSIS: CELL DIVISION

Mitosis is a type of cellular reproduction where one cell divides in order to make two new cells. Each new cell is a clone (a copy) of the original cell. Cells go through Mitosis in order to replace dying cells or missing cells. For example: you scrap your arm. Now there are missing cells. Other cells with go through mitosis in order to make new cells to replace the ones you scraped off!

In order to understand Mitosis, there just a few terms that can easily get mixed up! So, let's look at those first:

1. **Chromatin** = when DNA (the genetic material that is in the nucleus) is doing its job, it looks like a bowl of spaghetti. The DNA strands are all jumbled together. We call DNA in this stage CHROMATIN.
2. **Chromatid** = in order to divide our DNA into two equal sets, our cells need to untangle it and get it all organized. So, your DNA will untangle and line up. It would be like you taking your bowl of spaghetti and pulling out each noodle. We call these organized pieces of DNA CHROMATIDS.
3. **Chromosomes**- Since we copied our DNA strands, each strand (now called a Chromatid) has an identical twin (called sister chromatids). So, the matching pieces pair up. When they attach (think of an X), we call them CHROMOSOMES. It would be like you taking two noodles that were the same length and making an X with them.
4. **Centromeres**- the protein that holds the two sister chromatids together in order to form a chromosome.

A cell's lifetime (which is called THE CELL CYCLE) is divided into two parts: Interphase and Mitosis!

1. Interphase: This is the period of the cell's life when it is just doing its own thing. So, if it is a brain cell, it is doing brain cell stuff. If it is a stomach cell, it is doing stomach cell stuff.
2. Mitosis: This is when the cell is actually going through the process of cell division.
  - a. Mitosis has four phases: Prophase, Metaphase, Anaphase, and Telophase

WEBSITE NEEDED FOR ACTIVITY: [www.biology.arizona.edu](http://www.biology.arizona.edu)

1. Click on the Biology Project
2. In upper left hand corner, click on Onion Root Tips
3. Will need notebook paper and a sheet of graph paper

Using the website, fill the blanks for your notes!

### INTERPHASE:

1. In order to prepare for mitosis, **DNA** duplicates. This is to make sure that each new cell gets a complete set of Chromosomes.
2. The cell also grows in size in order to prepare for cell division.

#### PROPHASE:

1. **Chromatin** in the nucleus begins to condense and becomes visible in the nucleus as **Chromatids**.
2. The **nuclear membrane** dissolves (this is so the Chromosomes can start moving around)
3. **Microtubules** (called spindle fibers) attach at the kinetochores and the **Chromosomes** begin moving

#### METAPHASE:

1. **Spindle fibers** align the chromosomes along the middle of the **cell**
2. This helps to ensure that when the chromosomes are separated, each new nucleus will receive one copy of each chromosome.

#### ANAPHASE:

1. The paired **chromatids** separate at the kinetochores and move to opposite sides of the cell.
2. The cell now has 1 complete set of Chromatids at each end.

#### TELOPHASE:

1. Now the cell will form a nuclear membrane around each set of DNA.
2. The cell will then divide into two matching cells in a process call cytokinesis.

### **Determining time spent in different phases of the cell cycle**

#### **The assignment**

In this activity, you will be presented with cells from the tip of an onion root. You will classify each cell based on what phase it is in. At the end you will count up the cells found in each phase and use those numbers to predict how much time a dividing cell spends in each phase. You can base your calculation on a total cell cycle of 24 hours.

Copy the table from the web site onto a piece of paper. You can enter data in this table as you go along, or at the end of the activity.

Once you have completed the activity, take your data and use it to construct a bar graph.