

Twizzler Mitosis

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The Mitosis Process

A cell follows the same general pattern of birth, growth, and aging as an entire organism. The body maintains healthy tissue by constantly replacing dying cells with new ones.

The genetic information of the cell necessary to make new proteins, structures and eventually new cells is contained (encoded) in molecules of DNA. Each molecule of DNA must be duplicated before the cell divides, so that there will be equal amounts to pass on to each of the two daughter cells.

During most of a cell's life, DNA attached to protein is contained in long thread-like material in the nucleus called **chromatin**. These strands are too small to be seen by most microscopes. During cell division however the DNA condenses into **chromosomes** which can be seen.

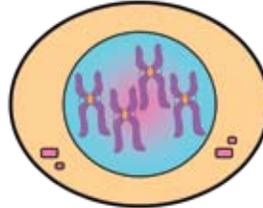
There are five main stages to a cell life cycle. Most of the time, a cell is in the stage called Interphase, where the cell can grow and copy its DNA. This occurs prior to mitosis.

Interphase - During this stage, prior to the start of mitosis, the DNA in the cell, called the **parent cell**, makes an exact duplication of itself.

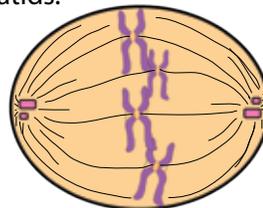
Once the DNA is duplicated, the cell can go through a process called **mitosis**. This is the way a cell sorts and divides its genetic information in the nucleus.

The four stages of mitosis are prophase, metaphase, anaphase, and telophase.

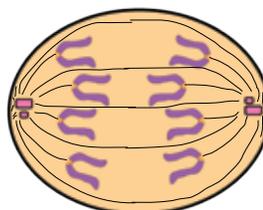
Prophase - During this stage, the cell prepares to divide by dissolving the membrane around the nucleus and the chromatin condenses into chromosomes.



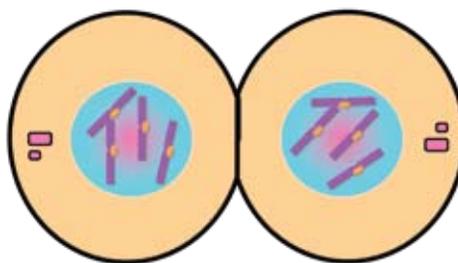
Metaphase - During this stage, spindle fibers form along the sides of the cell. **Spindle fibers** help separate the sister chromatids.



Anaphase - During this stage the spindle fibers pull the sister chromatids apart and towards the side of the cell.



Telophase - During this stage, the chromosomes reach the sides of the cell and cell begins to divide. The membrane of a nucleus forms around each set of chromosomes, creating a new nucleus for each daughter cell.



MOST*

VOCABULARY

Anaphase
Chromatin
Chromosomes
Daughter Cell
Interphase
Metaphase
Mitosis
Parent Cell
Prophase
Sister Chromatids
Spindle Fibers
Telophase

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New York State Standards

High School

Living Science

Standard 4:

Key Idea 2.1d, 2.1f, 2.1g, 2.1h, 2.1k
Key Idea 2.2d, 2.2e
Key Idea 3.1d

Activity: Twizzler Mitosis

MATERIALS NEEDED

Shoelace licorice

Marshmallows

Parent and daughter cell handouts

Students should be able to:

Describe how cells sort out the genetic material of the cell during the process of mitosis.

List the phases of mitosis.

Describe what happens in each phase of mitosis.

Draw what occurs in each phase of mitosis.

What to do:

Using your materials, you will recreate the process of mitosis by simulating the different phases you just read about.

Interphase

Lay your cell handouts on your table. Start off in the Parent Cell with one long and one short red twizzler. Replicate each chromosome by laying the other red chromosomes next to the original chromosomes.

Take a marshmallow and cut a hole in the center, then slide the two copies of DNA through the marshmallow. The two copies of DNA are called **sister chromatids** and are being held together by a **centromere**, a section of DNA. Repeat this for the other copy of DNA.

Prophase

Move your sister chromatids around the cell in preparation for cell division.

Metaphase

Take two strands of shoestring licorice and lay them down on opposite sides of the cell. Next, line up the sister chromatids end to end in the middle of the cell. Then, have one spindle fiber connect to each sister chromatid.

Anaphase

Remove the marshmallow from your twizzlers and separate the sister chromatids so that one goes to the left side of the cell and the other goes to the right side. Repeat this for your other chromosome.

Telophase

Move the chromosomes down to the cells onto the Daughter Cells handout to form two new cells called **daughter cells**.

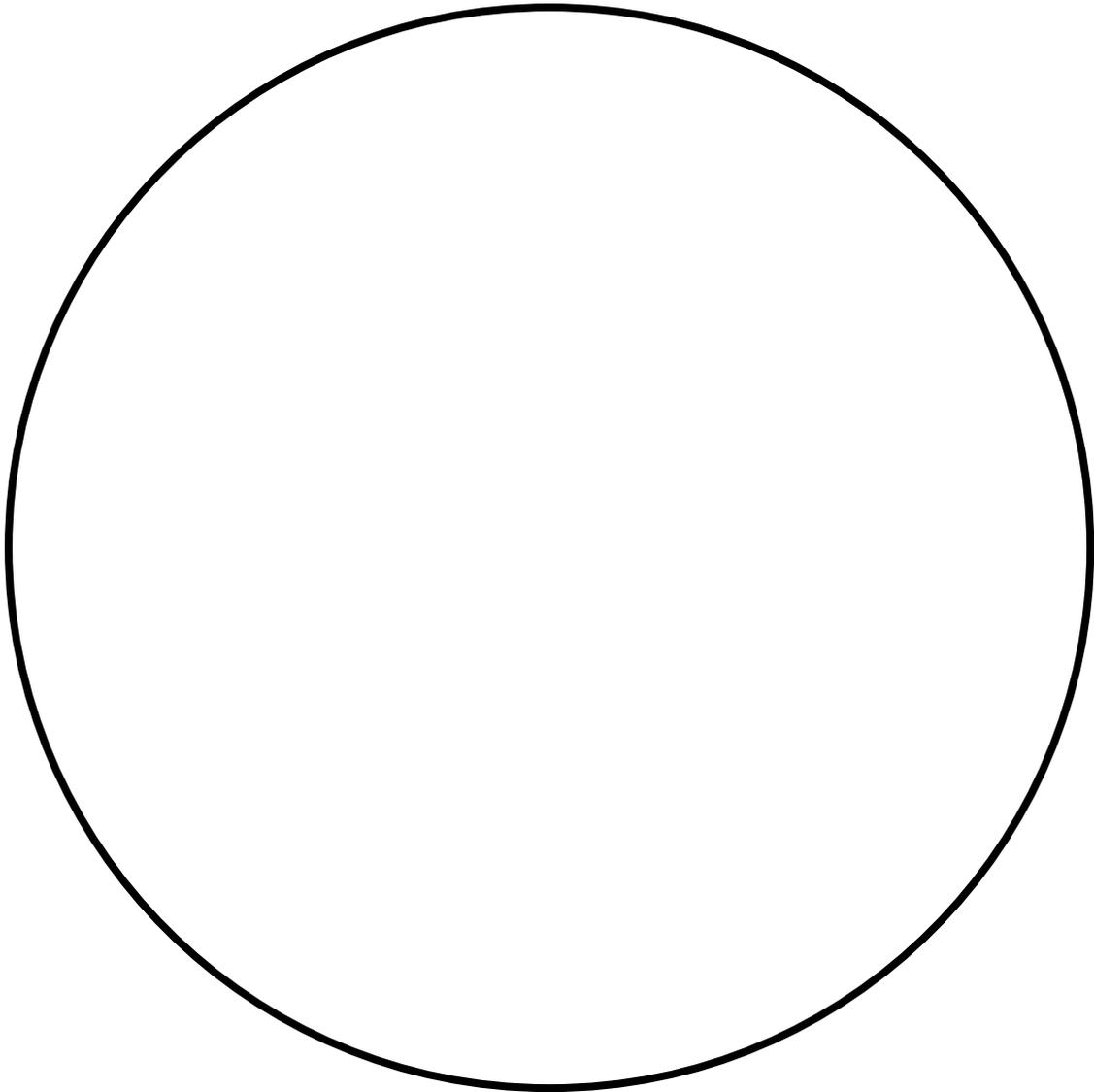
Once you complete the activity, you have walked your cell through the full process of mitosis.

Review Questions:

1. Are these daughter cells identical to each other ? _____
2. Are these cells daughter cells identical to the parent cell? _____
3. How many chromosomes does each daughter cell have? _____
4. How many chromosomes are present during prophase? _____
5. How many sister chromatids are present during anaphase? _____
- 6a. If your parent cell started out with 8 chromosomes, how many sister chromatids would be produced during interphase? _____
- 6b. How many chromosomes would the new daughter cells have? _____

Answers: 1) yes, 2) yes, 3) 2
4) 2, 5) 4, 6a) 16, 6b) 8 each.

Parent Cell Handout



Daughter Cells Handout

