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# Mitosis

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CMST SCOLLARCITY “**First tool**” Lesson software

Name: Beverly Lawson

Grade level(s)/Subject taught: : 8th grade Biology~ Special Education

Concept: Mitosis

Objectives: (Remember...*How will the modeling tool help the student better learn the objective?*)

**Overview:** After a brief explanation of the purpose of the lesson, and a brief overview of mitosis stages students will examine the process of mitosis carefully by observing the teacher created model on Agentsheets. Remind students to pay close attention because they will need to answer questions 1-5 with those observations. The goal of this lesson is for students to have applicable understanding as to why a cell divides through watching and observing the changing of the cells. Students will also be able to describe to their classmates each process that occurs in each step of cell division and recreate a poster board model. In addition, the Agentsheets worksheet “Mitosis” is a simple representation by which cells divides. Cells divides into two steps: the nucleus of the cell divides first, and then the cytoplasm divided to form two daughter cells.

**Directions:** Run the AgentSheets worksheet “Mitosis” once at about 1/3 speed until all of the change. Carefully observe the worksheet while it is running because you will need to answer questions 1-5 with those observations independently. In addition groups will be required to recreate one of the stages of Mitosis on chart paper and demonstrate for the whole class this step. Additional activities have been provided to reinforce this concept and help students to achievement. Additionally Homework will be provided to review concepts.

Items to include in your **first tool** lesson plan:

**For the Science teacher:**

1b. Write the Science Concept learned

- ❖ To learn about the organelles and the functions of those organelles.
- ❖ To learn why cells are small.
- ❖ To learn cells must divide to be able to function properly.
- ❖ To observe Agentsheet demonstration of the 5 stages of Mitosis.
- ❖ To recreate concrete models of the 5 stages of Mitosis.
- ❖ To use all materials provided correctly.
- ❖ To discuss stages of Mitosis.

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions)
4. How will you assess the learning for the lesson?
5. How will IP, Stella, Agent Sheets, GSP, etc as per rubrics in this packet be integrated into my teaching? (i.e. you may want to discuss a problem or describe how you might use the chosen modeling package in your plan. How does the model/tool help the concept(s) to be taught)?

*Using Agentsheet, the internet, and overhead projector, I plan on having my students...  
(software / modeling package(s))*

### **Review**

I was thinking about beginning the class with a question listed on chart paper that reviews concepts learned early on Cell Organization: "A membrane surrounds the nucleus of a cell. Based on what you have learned, what do you think the job of a nuclear membrane would be? **10 minutes**

From this brainstorming session discuss their responses/ideas and write them down on chart paper. From here I would provide a demonstration using Agentsheet program and also a visual model on chart paper that list out each of the steps and providing with a diagram of the dividing cells, using the computer and the projector so that students should gain understanding of the steps of Mitosis and Meiosis. Then asking questions of the students, they would describe the stages of Mitosis seen from the demonstration.

**10 to 15 minutes**

From here, students will be broken up into groups of five. Each person in the group will be assigned a specific phase of mitosis, and they will explain each phase to their other members of their group. The groups will be required to draw the phases on the poster board provided, and the groups will present their drawings to the whole class.

**30 to 40 minutes**

After the student sharing, teacher will hand out questioner from on Learning About DNA page 23. "Mitosis and Meiosis" on questions 1-10 and 1-5 for homework to be done independently.

**20 to 30 minutes**

**Sources used:** Science Activity Book by Debbie Routh, Mark Twain Media/Carson- Dellosa Publishing Company, Inc.

**Rubric**

<b>Target</b>	<b>Acceptable</b>	<b>Unacceptable</b>
Student is capable of: display data, identify and communicate explanations in small group of peers		
Student is to respond to meaningful questions from the Agentsheets model and/or theories		
Student creates a project that requires combining and applying concepts from more than one area of technology		
Students creates and interpret model investigation/project that demonstrates the cumulative nature of science		
Student will complete independent worksheet on mitosis without help		

**Additional lessons for next day:**

Please note: *Some parts of these following lessons have been created by unknown sources and have been used in past classes on this author's has observed and taught on this subject matter.*

From here, review yesterdays concept and they will examine mitosis in the onion utilizing the microscope and then I would than lead them into a student lab by pairing them into partners "I'm made of These? Student Lab page 18: (from Learning About DNA Science Activity book)

**60 to 80 minutes**

Students will examine mitosis in an onion using a microscope. This will enable students to actually see the process of mitosis occurring. Using the mentioned internet sight will reinforce what students see under the microscope as well Agentsheet worksheet.

After the lab and demonstration the students will also be able take a practice quiz over the internet created by

[BIOLOGY 102 LABORATORY REVIEW](http://www.und.nodak.edu/dept/jcarmich/102lab/102lab.html) of UNIVERSITY OF NORTH DAKOTA located at website: [www.und.nodak.edu/dept/jcarmich/102lab/102lab.html](http://www.und.nodak.edu/dept/jcarmich/102lab/102lab.html)

### **30 to 40 minutes**

*Additional Activities from lesson demonstrated at Science workshop RCSD, 1999*

Finally, students will walk through mitosis utilizing string. This will lead into the next concept being meiosis

**PURPOSE:** The purpose of this lab is to help students gain an understanding of the changes that occur in the nuclear area of a cell during cell division (Mitosis).

**MATERIALS:** 4 long pieces of green yarn

6 pieces of pipe cleaner (different lengths in sets of 2)

2 pieces each of red, white, and blue yarn cut at different lengths

**PROCEDURE:** Go through the steps of mitosis with the students, and then have them follow you through the steps with their yarn and pipe cleaners.

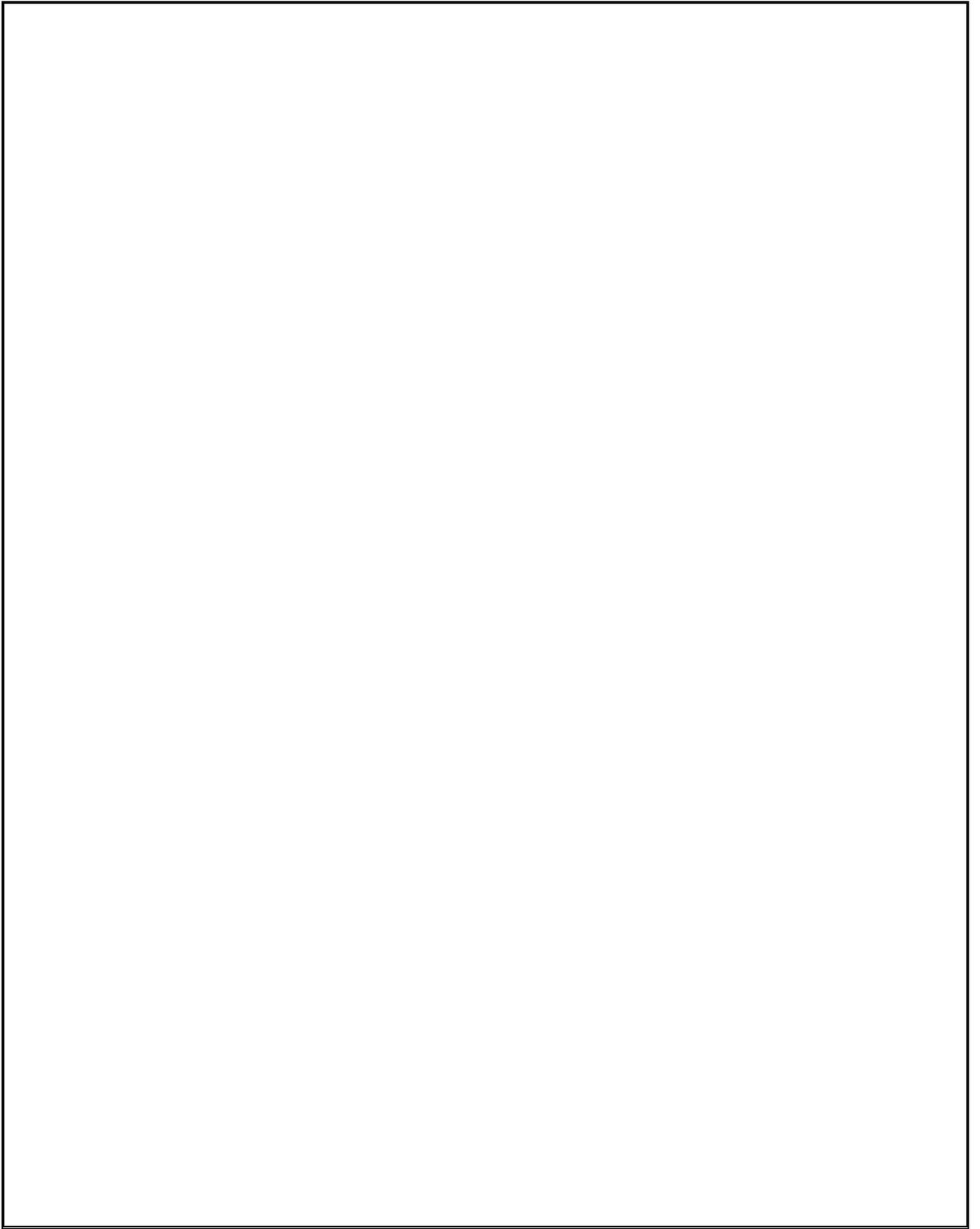
For example walking them through these steps:

- A. Have the students place one piece of red, white, and blue yarn on their desk or work area, and put all other pieces of the lab to the side or in their laps. Have them pick the pieces of yarn up and drop them on the desk so that they are curled up and overlapping. Tell the students that the cell has gotten too big and it needs to divide. All the information that the cell needs to stay alive is held in the yarn on their desk. **Ask** "How can the cell be sure that both of the new cells get all of the information needed to stay alive?"
- B. The cell duplicates its genetic material (during the S of the cell cycle). Tell the students to take the other piece of red, white, and blue yarn and drop them on top of the yarn already on their desk. Now there is enough genetic information for both cells, but it needs to be separated. **Ask** "How is this going to happen?"
- C. First the cell gets its genetic material into a more manageable state. Tell the students to take their yarn and wrap each piece around a pipe cleaner. Wrap the shortest color of yarn around the shortest pipe cleaner, and so on. The pipe cleaners represent the protein core of the chromatic. **Ask** "Now what?"
- D. The nuclear membrane disappears and the cell lays down spindle fibers. Tell the students to lay the four long pieces of green yarn across their desk horizontally and then pull the ends on either side together (it will end up

looking somewhat like a football). This is the cell's "guide" for making sure each new cell has the correct amount of genetic material. **Ask** "How does the cell use this guide?"

- E. Have the students take their chromatids and match up the ones that are similar (in length and color). Twist the two pipe cleaners somewhere along their length so that the two pieces stay together (represents the Centromere). Then have the students lay each pair of sister chromatids (now called chromosomes) on its spindle fiber. The chromosomes are now attached, but still scattered throughout the cell. **Ask** "How does the cell get them where they need to go?"
- F. Tell the students to move the entire chromosome to the center of the cell along the spindle fibers, until they all line up. This is called the metaphase plate. Now how does the cell separate the sister chromatids?
- G. Have the students untwist the pairs of chromatids, but leave them in the middle of the cell. When they are all untwisted, have them start to move one of each color yarn to the opposite sides of the cell. The genetic material is not usable when it is in chromosome form (it is "unreadable" by the cell). The cell needs the information stored in the cells. **Ask** "What happens next?"
- H. Have the students unravel the chromatids and remove the pipe cleaners. Then have them take away the green yarn spindle fibers. When the yarn is unraveled and clumped together, a new nuclear membrane forms around each set of genetic material. This part of cell division is now complete. (The division of cellular constituents takes place separately in a process called cytokinesis).

**40 to 60 minutes**



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