

Division & Division & Division (Cell Cycle and Cancer)

By: **LeAnna Holmes** - for Blue Ridge PBS (WBRA, WMSY, WSBN)
Instructional Technology Resource Teacher. Wythe County, VA

Grade Level: 7-10

Time Allotment: Two class periods

Overview:

This activity will allow students to understand the concept of the cell cycle and cancer. Cell cycle pictures will be gathered from internet sites. Students will describe and narrate the events of the cell cycle using Photo Story 3. When projects are completed, oral presentations will allow each student to reinforce what he or she learned.

Subject Matter: Life Science and Biology

Learning Objectives:

Students will:

- List the stages of the cell cycle.
- Describe each stage of the cell cycle.
- Explain how cancer is the uncontrolled activity of the cell cycle.
- Gather cell cycle pictures from the internet for use in cell cycle story.
- Organize pictures in the correct order of the cell cycle.
- Import the pictures into the Photo Story 3 Program.
- Design a story which demonstrates the process, to include narration.

Standards:

From the Virginia Learning Standard, available on-line at
<http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>

- BIO.1 The student will plan and conduct investigations in which
- a) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results;
- BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include
- a) cell growth and division;
 - b) gamete formation;
 - c) cell specialization;
- LS.2 The student will investigate and understand that all living things are composed of cells. Key concepts include
- a) cell structure and organelles (cell membrane, cell wall, cytoplasm, vacuole, mitochondrion, endoplasmic reticulum, nucleus, and chloroplast);
 - b) similarities and differences between plant and animal cells;
 - c) development of cell theory; and
 - d) cell division (mitosis and meiosis).

Media Components:

Video:

From the United Streaming (www.unitedstreaming.com)

Mitosis and Meiosis – (0.20 – 4.14) (Both English and Spanish speaking versions are available. The video segments are: “Introduction to Mitosis” and “Interphase: The Resting Stage”.

Web Sites:

http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/cell_division.html

Materials:

- Large Screen TV or LCD Projector for viewing United Streaming Video
- Chalk Board, White Board, or Smart Board for note taking instruction
- Teacher computer with video downloaded
- One computer per group with Photo Story 3
- Pictures of the cell cycle
- Paper and pencil for each student
- Internet Access

Preparations for Teacher:

- Download United Streaming video ahead of time. Determine what sections are going to be played and have it ready to play.
- Find websites with cell cycle pictures for student use.
- Request permission to use copyright pictures for educational instruction.
- Make sure each computer has Photo Story 3 software installed.
- Collect head phones and microphones and hook to appropriate ports on computer.
- Reserve computer lab for student use.

Introductory Activity:

Ask: “How many of you know someone who has had cancer?” Students give a show of hands. **Say:** “Let’s make a list of all the types of cancers you can name.” Put the list on board. **Ask:** “Do you know what causes cancer and why it is so difficult to treat? Let’s look at a short video about this.”

A video clip called Mitosis & Meiosis (0:20 – 4:13) from United Streaming will introduce the activity. Give a list of the following questions to the students:

- How many cells are replaced in the human each second of each day? (50 million)
- The duplication and division of the nucleus of the cell and its chromosomes is called _____ (Mitosis)
- Name the four stages of mitosis. (Prophase, Metaphase, Anaphase, Telophase)
- What % of the cell cycle does mitosis occur? (6 %)
- The period of cell growth is called _____.(Interphase)
- What type of cell rarely reproduces? (Nerve)
- Cells that never rest are called _____ (cancer)

The video clip will be played and the students will be allowed to answer the questions when focusing in on the questions. The video will be stopped between each question for discussion time. **Say:** “Let’s watch the first part of this clip to see how many cells are replaced in a human each second of each day. Also, listen for what the duplication and division of the nucleus of the cell and its chromosome is called.” Play the clip from 0:18 to 1:54 and pause. **Ask:** “How many cells are replaced in a human each second of each day?” (answer- 50 million) **Ask:** “What is the duplication and division of the nucleus of the cell and its chromosome called?” (answer- Mitosis) If students did not get this you could **rewind** and **play** the segment again. Students should write answers on the list of questions. **Say:** “Let’s continue to watch the mitosis process. Listen for the phases of mitosis in the correct order. You may take notes on your worksheet to describe each stage. Notice what % of the cell’s growth is spent in mitosis.” Play the clip from 1:54 to 2:14, and then **pause**. **Say:** “Name the stages of mitosis in order.” **Rewind** if necessary. Write the stages on the board. Leave a space to write Interphase before the four stages of mitosis on the board. Students should fill out the answer on their list of questions. (answer - prophase, metaphase, anaphase, and telophase) **Ask:** “What % of the cell’s growth is spent in mitosis?” (answer - 6%) **Say:** “We will now find the name for cell growth. It takes approximately 19 hours in the average cell.” Play the clip from 2:14 to 2:45 and **pause**. **Ask:** “What is the period of cell growth called?” (answer - interphase) Write interphase on the board before prophase and place arrows between each phase. Connect the last stage of mitosis, telophase with interphase by a circled arrow to show that the process continues. **Say:** “We are placing these arrows to show that a cycle occurs – it is called The Cell Cycle.” Play the clip from 2:45 to 2:54 and pause. **Say:** “Notice the different cells in the onion root tip. Some cells are showing signs of mitosis while most are in the interphase stage.” Point to the different cell stages and **Ask:** “Can anyone find an example of prophase? The chromosomes will be short and thick.” Allow students to find a prophase stage. Draw a picture of prophase and allow students to copy picture with notes. **Ask:** “How about metaphase? During metaphase the chromosomes will be lined up in the middle.” Allow students to show the metaphase stage. Draw a picture of metaphase and allow students to copy picture with notes. **Say:** “Now we go to anaphase; the chromosomes are pulling apart.” Show an example of anaphase and continue to move to telophase. Draw a picture of anaphase

and allow students to copy picture with notes. **Say:** "Let's look at the final stage of mitosis where the two new nuclei are forming and we are getting two new cells." **Ask:** "Can anyone find a good example of telophase?" Allow the students to show a good example. Draw a picture of telophase and allow students to copy picture with notes. **Say:** "Notice that most of the cells are in the interphase stage." Point to the many interphase cells on the screen which is paused at 2:54. Draw a picture of interphase and allow students to copy picture with notes.

Say: "We now want to look at different types of cells. Notice which types of cells reproduce rarely and what type of cells never rest. It is often said these cells are cells out of control." Play the clip from 2:54 to 4:14. **Ask:** "What type of cells rarely divides?" (answer - nerve cells) **Ask:** "Why is this a concern?" (answer - nerve damage is usually permanent.) **Say:** "Name the cells that never rest." (answer – cancer) **Ask:** "Why is this a concern?" (cancer cells grow very rapidly if not detected early.) The video clip will be stopped and the learning activity will begin.

Learning Activities:

- Each phase of the cell cycle will be described using the [cell division website](#). Jon E. Glass was contacted via email and was asked permission to use his website for educational instruction. Once the permission was granted, a worksheet using his pictures was prepared. A worksheet will be given to each student with each stage of the cell cycle picture. **Say:** "We will look at each stage of the onion root tip." Slide cursor over each stage and allow students to see the description of each stage. **Say:** "Please take notes about each stage from the website." Class discussion will be made while students are taking notes.
- The following questions will be on the worksheet. When students are finished taking notes, the following questions will be answered by each student:
 1. What is the most common stage of the cell cycle? (*interphase*)
 2. Which stage allows the chromosomes to line up in the middle of the cell? (*metaphase*)
 3. When do the chromosomes become visible? (*prophase*)
 4. When do the chromosomes begin to pull apart? (*anaphase*)
 5. When do two new cells form? (*telophase*)
 6. How many chromosomes are in each cell after telophase? (*haploid number*)
- Each student will be instructed to find and save five good pictures of the cell cycle from the internet site provided above. **Say:** "Find five good pictures of each phase of the cell cycle from the internet site http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/cell_division/onion_review_fs.html. You will need one picture of interphase and one picture of the mitosis process: prophase, metaphase, anaphase, and telophase. Each picture will be described with the characteristic of each phase. The pictures and descriptions will be placed in a folder on the desktop. Name the folder – Cell Cycle.

Day 2

Culminating Activity:

Say: “Students, you have been working hard gathering information you need for your cell cycle presentation. I would like for you to take the information you have collected and organize it into a narrative description. Here are the directions I want you to follow:” (If necessary, you could make a copy of these steps and either post it in the room or give each student a copy of the steps.)

- Open Photo Story 3; insert the pictures of each phase.
- Title each picture with the correct phase name.
- Type the narration you would like to present in the Photo Story 3 text box.
- Record the narration for each. You may insert transitions between pictures if you desire to do so.
- Conclude your story with an explanation on why cancer is so difficult to control.
- To wrap up, you will save your project in the Cell Cycle folder on the desktop.

(Note: Monitor students and provide assistance as necessary. Collect student projects with a flash drive and allow students to present their presentation to the class. This will allow reinforcement for the students as they watch similar projects. These projects may be burned onto a CD or DVD and used later for a review.)

Instruct students to visit:

http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/cell_division.html and take the quiz offered online for extra review.

Cross-Curricular Extensions

Language Arts:

Write a fictional story about the discovery of a cure for cancer and include scientific validity.

Math:

Allow students to graph the exponential growth of cancer cells, bacteria, etc. if not controlled. This can be done with a graphing calculator or Excel Spreadsheet.

Art:

Students will draw many pictures of the cell cycle with detailed labeling. The pictures will be placed in lab books for future references.

Social Studies:

Students can look at the economic impact cancer causes on society.

Technology:

Once the pictures are collected, they can be used in PowerPoint presentations, Video productions, pictures for bulletin boards, etc.

Community Connections:

Volunteer at a local hospital or hospice for patients with cancer.
Have an oncologist or another medical practitioner visit the class to discuss cancer and cell division.

Worksheets:

Answer each of the following questions:

- How many cells are replaced in the human each second of each day? _____
- The duplication and division of the nucleus of the cell and its chromosomes is called _____
- Name the four stages of mitosis. _____

- The period of cell growth is called _____.
- What type of cell rarely reproduces? _____
- Cells that never rest are called _____

Stages of the Cell Cycle -

Interphase

Prophase

Metaphase

Anaphase

Telophase

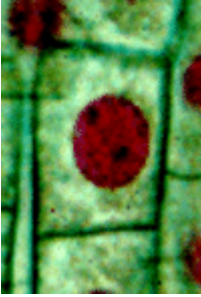
The Cell Cycle

Pictures are located at http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/cell_division/onion_review_fs.html.
Permission was granted by Jon E. Glass to use photos for educational instruction.

Name _____

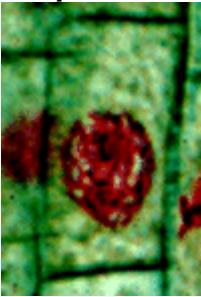
Date _____

Interphase



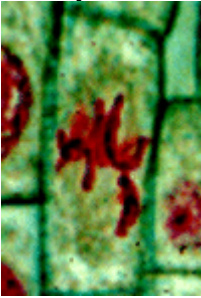
Description of Interphase:

Prophase



Description of Prophase:

Metaphase



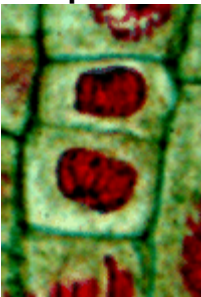
Description of Metaphase:

Anaphase



Description of Anaphase:

Telophase



Description of Telophase:

Answer each of the following:

1. What is the most common stage of the cell cycle? _____
2. Which stage allows the chromosomes to line up in the middle of the cell?

3. When do the chromosomes become visible? _____
4. When do the chromosomes begin to pull apart? _____
5. When do two new cells form? _____
6. How many chromosomes are in each cell after telophase?

Copyright Permission

Dear Mr. Glass,

>

My name is LeAnna Holmes and I am an Instructional Technology Resource Teacher in Wythe County, Virginia. I also work with Blue Ridge Public Television in Roanoke, Virginia, training teachers to incorporate technology into their classrooms.

>

I would like to use your website to design a lesson plan which allows teachers and students to make a video of the cell cycle using your photos. I will make sure you receive full credit for your site and photos if you allow me to use your site. I can send you a copy of the lesson plan if you would like to see it. I will not use your photos in the lesson plan if I do not receive your permission.

>

My lesson is pending on your permission. Please let me know if you will grant permission for use as soon as possible.

>

> Sincerely,

>

>

>

> LeAnna Holmes

You have my permission. Hope the project is successful.

Jon C. Glase