

Outline for the Mitosis unit:

- Day 1: Anticipatory Activity Day/Acceptable Tech Use Review (50-90 minutes)/ Exit Ticket
- Day 2: Modelling Day/ Mitosis Bingo/Exit Ticket (50 minutes)
- Day 3: Mitosis Slides Lab (50 minutes)
- Day 4: Mini Lab on Cancer & Review Day (50-90 minutes)
- Day 5: Mitosis Unit Final Assessment (50-90)

# Cell Division: Anticipatory Activity (Day 1)

*Lesson Plan for Grade 10, Biology*

*Prepared by Ms. Carufel 12/7/2020*

Estimated Time: 50-90 minutes

## MATERIALS NEEDED:

- Chromebook to access the internet
- Assigned Reading: pages 134-138 in Biology by Stephen Nowicki
- Video for activity: [https://www.youtube.com/watch?v=8uzHTKdv\\_Sw](https://www.youtube.com/watch?v=8uzHTKdv_Sw)
- A partner to read and discuss with
- A notebook and pencil
- Colored pencils, markers, crayons
- Classroom Notes for Discussion:  
[http://spraguehs.com/staff/wanak\\_jeremy/notes/Mitosis%20notes.pdf](http://spraguehs.com/staff/wanak_jeremy/notes/Mitosis%20notes.pdf)
- Guided Notes: (Guided notes include pertinent vocabulary and definitions)  
[https://docs.google.com/document/d/1IzR\\_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing](https://docs.google.com/document/d/1IzR_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing)

## STANDARDS

- ❑ Performance Standard HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

To be shown at the beginning of class time:

**Responsible Use Technology Activity (To be done on Anticipatory Activity Day)**

Acceptable Use Youtube Video: <https://www.youtube.com/watch?v=OKUjg0y9dRM>

Kahoot game:

<https://create.kahoot.it/share/responsible-use-kahoot/4729764b-0ed1-4d72-b377-45402724b210>

## OBJECTIVES

- ❑ At the end of this lesson, students should be able to demonstrate beginning comprehension of the phases of the cell cycle and mitosis.
- ❑ Students should not be expected to have full comprehension of the material, as this is an anticipatory activity and their work will only be used for pre-assessment purposes.
- ❑ Prior knowledge of mitosis is not required to complete the learning activity and can be gained through reading the assigned text (Chapter 5 in “Biology by Stephen Nowicki” in upcoming lessons. Full comprehension is anticipated by completion of lesson #4.

## LEARNING ACTIVITIES:

- ❑ Students should read the assigned text from the web-page and the book the night before the lesson so that they are comfortable with the reading selection and vocabulary within it. After watching a short video, students will talk with their partner about what they think about the topic, ideally making notes for themselves along the way using the note outline.
- ❑ Students should make notes on the video and powerpoint and discuss what aspects of each are catching their attention with their partner to keep them actively engaged on the topic and discussion.
- ❑ Students will be invited to engage in discussion with the educator to discuss any areas of question and to look at important visuals as a class.

- ❑ As a class, we will watch this video about Mitosis from Youtube!  
[https://www.youtube.com/watch?v=8uzHTKdv\\_Sw](https://www.youtube.com/watch?v=8uzHTKdv_Sw) (Nice, animated 9 minute video.)

We will discuss the video after we are finished as a class:

1. What is mitosis?
2. What does it help our cells to achieve?
3. How long does it take to go through the process of mitosis?
4. During which stage of the cell cycle is the DNA copied?
5. Which stages of the cell cycle generally require about the same amount of time in all human cells?

### 1st Mini Assessment Exit Ticket

-Then they will log on to their Chromebooks, and do this fill in the blank worksheet to test their comprehension of the video, it will not be graded but will help them decide where they need to learn more for the next lesson. They will raise their hand when complete and I will check it over to see where they are at with their comprehension.

[https://education.jlab.org/reading/mitosis\\_01.html](https://education.jlab.org/reading/mitosis_01.html)

## ASSESSMENT

- ❑ As an educator, I will know my students have achieved the starting phases of comprehension by discussing mitosis with them, answering their questions, and having them take notes with the note outline for the reading. If my students can successfully read the information, participate actively in discussion and write their own poem, I will know they have begun to understand the standard and understood how mitosis works. The poem aspect and bingo will assist them in becoming familiar with vocabulary terms. Reading aloud with a partner, and creating a learning device of their own, and frontloading some vocabulary they will see in the upcoming lessons, are learning strategies that will be employed. This assessment is directly correlated to the standard. I will assess the performance of diverse learners by discussing the information with them, to ensure I am available to answer their questions and enhance comprehension with discussion and revision.

## REFLECTION

- ❑ Reading aloud with a partner will allow the students to practice their disciplinary literacy, discuss the content and interpret visuals as a team. A poem is a fun way for them to read about the information in a way that is non-typical. Discussing the content as a class will assist my students in deepening their comprehension by allowing them to ask questions on areas they are not comprehending fully and will give them a resource (Me) with which to interpret information from text and visuals. The comprehension worksheet will allow them to evaluate their own comprehension, and start to see the vocabulary terms we will talk about throughout the lesson.

# Cell Division (Day 2)

*Lesson Plan for Grade 10, Biology*

*Prepared by Ms. Carufel 12/7/2020*

Estimated time: 50 minutes

## MATERIALS NEEDED:

- ❑ Chromebook to access the internet
- ❑ Assigned reading: <https://askbiologist.asu.edu/cell-division> (Lexile Range: 1100)
- ❑ Pages 138-144 in Biology by Stephen Nowicki
- ❑ Guided  
Notes: [https://docs.google.com/document/d/1IzR\\_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing](https://docs.google.com/document/d/1IzR_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing) (vocab included in guided notes)
- ❑ Powerpoint to accompany notes:  
[http://spraguehs.com/staff/wanak\\_jeremy/notes/Mitosis%20notes.pdf](http://spraguehs.com/staff/wanak_jeremy/notes/Mitosis%20notes.pdf)
- ❑ A partner to read and discuss with
- ❑ A notebook and pencil
- ❑ Colored pencils, markers, crayons, pipe cleaners, glue, tape, poster board.
- ❑ **Modified Activity for Special Education Students:**  
[https://docs.google.com/document/d/1Wvjje-fRTcVU5NyOV\\_0MOexj78eMr0qeHJJVnA4to0E/edit?usp=sharing](https://docs.google.com/document/d/1Wvjje-fRTcVU5NyOV_0MOexj78eMr0qeHJJVnA4to0E/edit?usp=sharing)

## STANDARDS

- ❑ Standard: Performance Standard HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

## OBJECTIVES

- ❑ After the lesson, students should be able to demonstrate comprehension of the phases of the cell cycle and mitosis as it applies to the chosen standard.
- ❑ Students should show comprehension of the cell cycle and mitosis by drawing it out and labelling each phase.
- ❑ Prior knowledge of mitosis is required to complete the learning activity and can be gained through reading the assigned text.

### Learning Targets

- ❑ After the lesson students should be able to comprehend and demonstrate:
  - Why cells in the body undergo mitosis
  - Phases of the cell cycle and mitosis by drawing or making a model of each phase.
  - Names of each phase and labels of important mechanisms occurring at each phase.

## LEARNING ACTIVITIES:

- ❑ Students should read the assigned text from the web-page with a partner, out loud. This will assist them in feeling more comfortable with reading aloud, using the strategy of “paired reading”. They will find a space in the classroom or in the hall where they can read quietly and not be distracted by other groups.

- ❑ Students should make notes on the cell-cycle from their text and discuss what aspects of each cycle are critical to each phase of cell division with their partner to keep them actively engaged on the topic and discussion.
- ❑ Students will be invited to engage in discussion with the educator to discuss any areas of question and to look at important visuals as a class through the employment of guiding questions.
- ❑ Students should demonstrate comprehension by creating their own drawing or model of the cell cycle with captions detailing important steps and mechanisms to the best of their ability. They may use pencils, pens, colored pencils, markers, or whatever they want to accurately display their cells.
- ❑ Students will play mitosis bingo to further solidify the vocabulary and have a fun activity to play as a class! Winners get a treat :)

## ASSESSMENT

- ❑ As an educator, I will know my students have achieved comprehension by discussing mitosis with them, answering their questions, and having them take notes on what they find to be the most pertinent information. If my students can successfully create a model of mitosis, including captions with important mechanisms and facts about each cycle, I will know they have mastered the standard and understood how mitosis works. Reading aloud with a partner, and creating visual diagrams are the two learning strategies that will be employed. This assessment is directly correlated to the standard. I will assess the performance of diverse learners by discussing their model with them, to ensure I am available to answer their questions and enhance comprehension with discussion and revision.

<b><u>Mitosis Model Rubric</u></b>	<b>Present</b>	<b>Labelled</b>	<b>Accurate and Neat</b>
Number of Chromosomes (4) labeled and in each stage of the process			
<b>Interphase:</b> Represent DNA as uncondensed material			
<b>Prophase:</b> DNA condenses into visible chromosomes; centrioles begin to move to poles; Nuclear membrane disappears.			
<b>Metaphase:</b> Chromosomes line up on the equator of the cell, centrioles are at poles and labelled.			
<b>Anaphase:</b> Sister chromatids begin to move to opposite poles.			
<b>Telophase:</b> Nuclear membrane reappears, cell membrane begins to pinch or constrict at center.			
<b>Cytokinesis:</b> Cytoplasm divides, 2 individual cells shown.			

Above is the rubric I will use to determine the correctness of their drawn model.

## **L**EARNING ACTIVITIES-- Guiding Questions

“ Why do cells need to be able to divide and go through cell division?”

(Hopefully here we are getting learners to think about the cells in their own bodies needing to be replaced, like when you heal from a sunburn, a cut, or when your fingernails grow, applying this thinking to their own anatomy and experiences.)

“What do you think would happen if our cells could not undergo cell division?”

(Hopefully with this question, learners are thinking of the ramifications of our cells not undergoing a key function and what that could mean for our health.)

“How is cell division controlled and what could be the outcomes if it is not?”

(Hopefully this question leads to a bigger discussion about genes and the mechanisms surrounding cell division that can go wrong in organisms that can lead into the next lesson.)

“How do prophase and telophase differ?”

## REFLECTION

- ❑ Hopefully this lesson is fun and engaging for my students. Reading aloud with a partner will allow the students to practice their disciplinary literacy, discuss the content and interpret visuals as a team. Guiding questions and their resulting discussion will get the students talking about the content as a class. This will assist my students in deepening their comprehension by allowing them to ask questions on areas they are not comprehending fully and will give them a resource (Me) with which to interpret information from text and visuals. Drawing and coloring of a model will engage their creativity and get them thinking on the mechanisms and parts of a cell that are required for mitosis to occur.
- ❑ After completing the model, we will play Mitosis Bingo as a class. This will be a good time for students to start to get used to the terms used in this chapter and start to link them to either mitosis or meiosis.
- I will put the terms in a bucket and draw them out randomly, read the definitions and the students can mark them off on their mitosis bingo card with any color highlighter of their choosing.
- Whoever gets a bingo, gets a treat!



## MITOSIS BINGO

Chromosome	Cell Cycle	Mitosis	Synthesis	Checkpoint
Prophase	Histone	<b>Free Space</b>	Telomere	Anaphase
Metaphase	Cytokinesis	Chromatin	Telophase	Chromatid
Centromere	Cell	Daughter Cell	Replication	Cytoplasm

### 2nd Mini-Assessment Exit Ticket

Students will take an exit ticket mini quiz before leaving the room for the day. This mini quiz is for both student and teacher to understand where they are as far as comprehending this day's information. This quiz will be found on student's Google Classroom.

[https://docs.google.com/forms/d/e/1FAIpQLSe88SeSb7r9mmv1hyo19S1-U5ctjzy2rKAG\\_x4d\\_vxYxqK2LxQ/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSe88SeSb7r9mmv1hyo19S1-U5ctjzy2rKAG_x4d_vxYxqK2LxQ/viewform?usp=sf_link)

# Cell Division- Mitosis Onion Root Slides Lab (Day 3)

*Lesson Plan for Grade 10, Biology  
Prepared by Ms. Carufel 12/7/2020*

Estimated time: 50 minutes

## MATERIALS NEEDED:

- Chromebook to access the internet
- Assigned reading:  
[https://bio.libretexts.org/Courses/University\\_of\\_California\\_Davis/BIS\\_2A%3A\\_Introductory\\_Biology\\_\(Easlon\)/Readings/24.2%3A\\_Cell\\_division%3A\\_Mitosis](https://bio.libretexts.org/Courses/University_of_California_Davis/BIS_2A%3A_Introductory_Biology_(Easlon)/Readings/24.2%3A_Cell_division%3A_Mitosis) (Lexile Range: 900-1200)
- Pages 138-143 in Holt McDougal Biology by Stephen Nowicki
- Guided Notes:  
[https://docs.google.com/document/d/1IzR\\_tBmJQ7ktlvzN4PWOUbnQouXBq1WykP\\_TCcMzQcQk/edit?usp=sharing](https://docs.google.com/document/d/1IzR_tBmJQ7ktlvzN4PWOUbnQouXBq1WykP_TCcMzQcQk/edit?usp=sharing)
- A partner to read, discuss, and evaluate slides with
- A notebook and pencil
- Colored pencils, markers, crayons
- Light Microscope
- Prepared Onion Root Slides
- Lab Procedure:  
<https://www.gwisd.us/vimages/shared/vnews/stories/4ebbe99bda63a/Onion%20Cell%20Mitosis%20Lab%20Instructions.pdf>
- Lab  
Worksheet:[https://docs.google.com/document/d/1IbcTIF\\_jBD6hBG4uQnTqEcjraZpV\\_ODtorp2wNnXTIKg/edit?usp=sharing](https://docs.google.com/document/d/1IbcTIF_jBD6hBG4uQnTqEcjraZpV_ODtorp2wNnXTIKg/edit?usp=sharing)
- Modified Lab Worksheet for Students with Learning Disabilities:

<https://docs.google.com/document/d/1LoNTSbIpwWfjh2VGDbBXdxMvUzhfe69OP77ZkWZYrTk/edit?usp=sharing>

## STANDARDS

- ❑ Standard: Performance Standard HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

## OBJECTIVES

- ❑ After the lesson, students should be able to demonstrate comprehension of the phases of the cell cycle and mitosis as it applies to the chosen standard.
- ❑ Students should show comprehension of the cell cycle by identifying the phases of the cell cycle in onion root tips observed through their light microscope and documenting their findings on their worksheet.

## LEARNING ACTIVITIES:

- ❑ The students will be examining prepared onion root slides under the light microscope for the day's lab. They will be counting the number of cells, the phase those cells are in, and what percentage of the slides cells are in what phase. The students will be drawing and labeling each cell phase and drawing important structures within each cell phase as they see them.

## ASSESSMENT

- ❑ As an educator, I will know my students have achieved comprehension by discussing mitosis with them, answering their questions, and having them take notes on what they find to be the most pertinent information. If my students can successfully identify cells in each phase of the cycle, draw their findings, and analyze them I will know they have reached comprehension of the phases of the cell cycle. I will assess the performance of diverse learners by discussing their worksheets with them, to ensure I am available to answer their questions and enhance comprehension with discussion and revision.

## REFLECTION

- ❑ Hopefully this lesson is fun and engaging for my students. Giving them a chance to understand the lesson in the way that is best for their learning style is the ultimate goal. I personally love looking through the microscope and think that this experience can make a connection that just looking at pictures or making a model cannot do as deeply.

# Cancer Mini Lab & Unit Review (Day 4)

*Lesson Plan for Grade 10, Biology  
Prepared by Ms. Carufel 12/7/2020*

Estimated time: 50-90 minutes

## Materials Needed:

- ❑ Chromebook to access the internet
- ❑ Assigned reading: Pages 144-147 in Holt McDougal Biology by Stephen Nowicki
- ❑ Class Notes for Discussion:  
[http://spraguehs.com/staff/wanak\\_jeremy/notes/Mitosis%20notes.pdf](http://spraguehs.com/staff/wanak_jeremy/notes/Mitosis%20notes.pdf)
- ❑ Guided Notes:  
[https://docs.google.com/document/d/1IzR\\_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing](https://docs.google.com/document/d/1IzR_tBmJQ7ktlvzN4PWOUbnQouXBq1WykPTCcMzQcQk/edit?usp=sharing)
- ❑ A partner to read and discuss with
- ❑ A notebook and pencil
- ❑ Colored pencils, markers, crayons
- ❑ Light Microscope
- ❑ Prepared Cancer slides

- ❑ Prepared cell slides

## STANDARDS

- ❑ Performance Standard HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

## OBJECTIVES

- ❑ The students should achieve comprehension of the cell cycle by this lesson. They should be able to identify mitosis phases and describe what occurs in each phase of the cell cycle.
- ❑ The students should have an understanding of what causes cancer and what cancer is by the end of this lesson.

## LEARNING ACTIVITIES:

- ❑ The students will be expected to have done their reading the night before so that they can focus on the mini lab during class time. The guided notes will be available for them to fill in as they read through the assigned reading.
- ❑ The first 10-15 minutes will be review time for what they read the night before, we will discuss the important vocabulary and concepts presented in their reading.
- ❑ Students will examine a slide of normal cells under the microscope, drawing and describing their findings.
- ❑ Students will then examine a slide of cancerous cells under the microscope and draw and describe their findings. After they have completed this, we will discuss these questions:

“How does the structure of the normal cells compare with the structure of the cancerous cells for each of the slides?”

“Cancer cells not only appear different from normal cells, but they also divide more rapidly. Why do you think chemotherapy, a common treatment for cancer, results in the loss of hair?”

## ASSESSMENT

I will know my students have gained comprehension by discussing the content with them during discussion and by observing their notes and observations of the cancer cells in comparison to the healthy cells.

### 3rd Mini Assessment

We will play a 4 corners game at the end of class for a formative assessment. Each corner of the room will distinguish an answer A-D and I will ask the students questions about the day's topics and they can go stand in their chosen answers corner. After everyone has chosen a corner I will ask a person from each corner to explain their choice. We will discuss the correct choice after having some discussion about the other choices so that the students can see what questions they need to focus more of their attention on.

## REFLECTION

- ❑ I think that many of my students will be familiar with cancer. They probably know someone or have a family member who has had cancer in their lifetime. This is a nice connecting lab, because it requires the students to visualize the differences between what healthy cells look like, and what cancerous cells look like. This will hopefully make a connection for them, and allow them to further understand what is happening in our cells when they are cancerous.

## Review Documents For Final

(Hyperlink to review document):

[https://docs.google.com/document/d/19XjqvGecc-xXb39IIWtEG4JJE\\_JkTPbr-fU4RGPjUxI/edit?usp=sharing](https://docs.google.com/document/d/19XjqvGecc-xXb39IIWtEG4JJE_JkTPbr-fU4RGPjUxI/edit?usp=sharing)

# Mitosis Unit Exam (Day 5)

*Lesson Plan for Grade 10, Biology*  
*Prepared by Ms. Carufel 12/7/2020*

Estimated time: 50-90 minutes

-Students will need a pencil and eraser for this exam. They will be given the full class period to work on it and will turn it in when they have completed it.

Mitosis Unit Exam:

[https://docs.google.com/document/d/14v4LPVfHIuGuXWaBCkr\\_9yoaMuGOqV1n0hG5in5\\_j38/edit?usp=sharing](https://docs.google.com/document/d/14v4LPVfHIuGuXWaBCkr_9yoaMuGOqV1n0hG5in5_j38/edit?usp=sharing)

Modified Unit Exam for Special Education students:

[https://docs.google.com/document/d/1CXDFBIQQWcdjpbCzywEk6LPQ1V4IHcl7qYwF\\_CjSlol/edit?usp=sharing](https://docs.google.com/document/d/1CXDFBIQQWcdjpbCzywEk6LPQ1V4IHcl7qYwF_CjSlol/edit?usp=sharing)

References for this lesson plan:

Holt McDougal. (2010). *Holt McDougal Biology: Student Edition High School 2010* (1st ed.). Austin, Texas: HOLT MCDUGAL.

Onion Cell Mitosis Lab Instructions prepared by Mrs. Keadle of JH Science

<https://www.gwisd.us/vimages/shared/vnews/stories/4ebbe99bda63a/Onion%20Cell%20Mitosis%20Lab%20Instructions.pdf>

Wanak, J. (n.d.). Mitosis Notes. Retrieved October 15, 2020, from

[http://spraguehs.com/staff/wanak\\_jeremy/notes/Mitosis%20notes.pdf](http://spraguehs.com/staff/wanak_jeremy/notes/Mitosis%20notes.pdf)



