# Mitosis: Student Activity Lesson Plan

<table>
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<th>Subject/Strand/Topic:</th>
<th>Grade(s) / Course(s):</th>
<th>Ontario Expectations:</th>
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<tr>
<td>Science – Reproduction - Mitosis</td>
<td>9 / SNC 1D, SNC 1P</td>
<td>BY1.02, BY1.01</td>
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<tr>
<th>Key Concepts:</th>
<th>mitosis, cell division, prophase, metaphase, anaphase, telophase, cell cycle</th>
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| Link: | http://education.uoit.ca/lordec/ID_LORDEC/mitosis/index.html |

<table>
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<th>Required Materials:</th>
<th>Pre-Assessment/Answer Key, Student Activity Handout, Student Activity Answer Key, Post-Assessment/Answer Key,</th>
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### Before Starting:

**Introduction (~ 10 minutes including pre-assessment)**
1. Introduce the learning object (this online activity will allow you to understand mitosis by exploring the different stages visually through both text and animation).
2. Distribute the pre-assessment quiz and allow 5 minutes to complete; collect
3. Students may work in pairs depending on computer availability and teacher discretion
4. Ensure students are in front of their computers prior to moving on

### Student Activity Handout Explanation (~ 5 minutes)
1. Distribute Activity sheet to each student
2. Provide direction on the organization and structure of the Activity sheet as needed; students will complete the activity sheet as they progress through the learning object

### Important Points to Tell Students for this Learning Object
- To navigate to the various sections of the learning object, students should click on the buttons on the left side of the screen.
- Remind students to ensure they are visiting all pages of the learning object by clicking on the arrows at the bottom of each page.

### Use of Learning Object with Student Activity Handout (~ 35 minutes)
1. Teacher should circulate throughout the activity and ensure students are on task
2. Provide students with verbal time cues according to the following guidelines:
   - Review a Cell - 3min
   - Cell Cycle – 3 min
   - Interphase – 4 min
   - Prophase – 5 min
   - Metaphase – 5 min
   - Anaphase – 5 min
   - Telophase – 5 min
   - Summary – 5min

### Consolidation (~ 10 minutes including post-assessment)
1. Distribute post-assessment quiz and allow 5 minutes to complete; collect
2. Activity sheet can be taken up as a class or collected and marked
1. What is the following structure? Write your response on the line below it. [1 mark]

2. In the diagram below, label the following structures: genes, centromere and sister chromatids. Write the word beside the corresponding arrow. [3 marks]

3. Put the following stages of mitosis in order of when they occur by writing the appropriate number under each diagram. [4 marks]
Mitosis
Student Activity Pre-Assessment

Name: ___________________________
Birthday: ________________________

Answer Key

1. What is the following structure? Write your response on the line below it. [1 mark]

Centrioles

2. In the diagram below, label the following structures: genes, centromere and sister chromatids. Write the word beside the corresponding arrow. [3 marks]

Genes
Centromere
Sister Chromatids

3. Put the following stages of mitosis in order of when they occur by writing the appropriate number under each diagram. [4 marks]

   _____2____   _____1____   _____4____   _____3_____
Mitosis
Student Activity Handout

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Teacher-Created Resources: Student Activity Handout
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Name: ___________________________
Date: __________________________

LINK: http://education.uoit.ca/ordec/lordec/mitosis/index.html
• Select Student’s Entrance on the right side of screen to begin

Instructions: Read each section (listed on the left side of the screen) of the Mitosis Learning Object. Answer the questions below as you go.

REVIEW A CELL / CELL CYCLE

1. Label the following parts of the cell that are involved in mitosis. Write the correct response beside the corresponding line. [6 marks]

2. What is the function of spindle fibers? [2 marks]

3. List the stages of the cell cycle. At each stage, briefly explain what occurs. [6 marks]

INTERPHASE

1. Does mitosis occur in all of the body’s cells? Justify your response. [2 marks]
2. Explain what the function of mitosis is. [3 marks]

________________________________________________________________________

3. The author uses the phrase play me a tune to remember the stages of mitosis. Think of another phrase that you can use to remember the stages of mitosis. [2 marks]

________________________________________________________________________

**PROPHASE**

1. Describe what happens during prophase. [4 marks]

________________________________________________________________________

2. Draw a diagram of what a cell looks like after it has undergone prophase. [4 marks]

________________________________________________________________________

**METAPHASE**

1. Describe what happens during metaphase. [3 marks]

________________________________________________________________________
2. If you were looking at cells under a microscope, how could you distinguish that the cells were in metaphase? Give 2 reasons. [2 marks]

3. Draw a diagram of what a cell looks like after it has undergone metaphase. [4 marks]

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ANAPHASE

1. Describe what happens during anaphase. [2 marks]

2. How are the chromosomes able to move to each side of the cell? [2 marks]

3. Draw a diagram of what a cell looks like after it has undergone anaphase. [4 marks]
Mitosis
Student Activity Handout

Name: ___________________________
Date: __________________________

TELOPHASE

1. Describe what happens during telophase. [4 marks]

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. What is cytokinesis? [1 mark]

________________________________________________________________________

3. Draw a diagram of what a cell looks like after it has undergone telophase. [4 marks]
Mitosis
Student Activity Handout Answer Key

Name: Answer Key for Teacher

LINK: http://education.uoit.ca/lordec/ID_LORDEC/mitosis/index.html
  • Select Student's Entrance on the right side of screen to begin

Instructions: Read each section (listed on the left side of the screen) of the Mitosis Learning Object. Answer the questions below as you go.

**REVIEW A CELL / CELL CYCLE**

1. Label the following parts of the cell that are involved in mitosis. Write the correct response beside the corresponding line. [6 marks]

   ![Cell diagram]
   - Centriole
   - Spindle Fiber
   - Sister Chromatid
   - Centromere
   - Chromosome
   - Nuclear Membrane

2. What is the function of spindle fibers? [2 marks]

   Spindle fibers attach to and guide chromosomes during mitosis.

3. List the stages of the cell cycle. At each stage, briefly explain what occurs. [6 marks]

   - **G1 Phase:** Cell doing everyday job
   - **S Phase:** DNA is replicated
   - **G2 Phase:** Cell prepares for mitosis

**INTERPHASE**

1. Does mitosis occur in all of the body’s cells? Justify your response. [2 marks]

   No it does not. It does not occur in reproductive cells.
2. Explain what the function of mitosis is. [3 marks]

Mitosis is the process by which the body’s cells divide. It replaces dead or damaged cells and allows our bodies to grow.

3. The author uses the phrase play me a tune to remember the stages of mitosis. Think of another phrase that you can use to remember the stages of mitosis. [2 marks]

Answers will vary.

**PROPHASE**

1. Describe what happens during prophase. [4 marks]

During prophase, the chromatin condenses into tight chromosomes. The centrioles begin moving towards the opposite ends of the cell and spindle fibers begin to form. The nuclear membrane begins to dissolve so chromosomes can leave the nucleus.

2. Draw a diagram of what a cell looks like after it has undergone prophase. [4 marks]

![Diagram of a cell after prophase]

**METAPHASE**

1. Describe what happens during metaphase. [3 marks]

During metaphase, the chromosomes line up along the equatorial plate of the cell. A spindle fiber from each side attaches to a sister chromatid, to equally divide the chromosomes. The spindle fibers guide the chromosomes to the centre of the cell.
2. If you were looking at cells under a microscope, how could you distinguish that the cells were in metaphase? Give 2 reasons. [2 marks]

The chromosomes would be lined up along the equatorial plate of the cell and the chromosomes appear to be very visible and clear.

3. Draw a diagram of what a cell looks like after it has undergone metaphase. [4 marks]

![Metaphase Diagram]

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**ANAPHASE**

1. Describe what happens during anaphase. [2 marks]

During anaphase, the centromere splits apart and the sister chromatids (now called chromosomes) are pulled by spindle fibers to either end of the cell.

2. How are the chromosomes able to move to each side of the cell? [2 marks]

The spindle fibers shorten, pulling the chromosomes with them.

3. Draw a diagram of what a cell looks like after it has undergone anaphase. [4 marks]

![Anaphase Diagram]
TELOPHASE

1. Describe what happens during telophase. [4 marks]

During telophase, the chromosomes, at either end of the cell begin to unwind into chromatin. The spindle fibers dissolve, and a nuclear membrane forms around the chromatin. The cytoplasm begins to divide (cytokinesis) and the cell membrane pinches off forming two identical cells, each with a full set of chromosomes.

2. What is cytokinesis? [1 mark]

Cytokinesis is when the cytoplasm begins to divide.

3. Draw a diagram of what a cell looks like after it has undergone telophase. [4 marks]
1. What is the following structure? Write your response on the line below it. [1 mark]

2. In the diagram below, label the following structures: genes, centromere and sister chromatids. Write the word beside the corresponding arrow. [3 marks]

3. Put the following stages of mitosis in order of when they occur by writing the appropriate number under each diagram. [4 marks]
1. What is the following structure? Write your response on the line below it. [1 mark]

![Diagram of centrioles]

Centrioles

2. In the diagram below, label the following structures: genes, centromere and sister chromatids. Write the word beside the corresponding arrow. [3 marks]

![Diagram of chromosomes labeled]

3. Put the following stages of mitosis in order of when they occur by writing the appropriate number under each diagram. [4 marks]

![Diagram of mitosis stages]

__2__  __1__  __4__  __3__