Introduction
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TSL 518  
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7.19.11  

Intro to Instructional Unit for TSL 518  

Title: Cells  

Grade Level: 7\textsuperscript{th} Grade  

Target Group: Mainstream class with integrated ELL students  

Reading Materials:  

Source of Original Lessons: Existing lesson plans created by mainstream teacher  
   according to unit guidelines (see attached)  

Modifications: The following will be three lessons that have been significantly revised  
   from the original lesson plans.  

Learning Goals:  

- I want my students to know that all cells have information needed to control the activities of cells, to make new cells and new organisms.  
- I want my students to know how certain cells reproduce, through the process of mitosis.  
- I want my students to know the stages of cell cycle.  
- I want my students to know the importance of chromosomes in the cell cycle.
LESSON PLANS: Lesson 1
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<th>Domain/Topic</th>
<th>Level 5 Bridging</th>
<th>Level 4 Expanding Fluency</th>
<th>Level 3 Speech Emergent</th>
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<tbody>
<tr>
<td>Writing: Define the 3 Stages of the Cell Cycle</td>
<td>Students will define the 3 stages of the cell cycle in one paragraph using appropriate scientific vocabulary to explain each stage</td>
<td>Students will define the 3 stages of the cell cycle in 3 sentences using science vocabulary to explain each stage</td>
<td>Students will define the 3 stages of the cell cycle in short phrases using language prompts provided by the teacher</td>
<td>Students will define the 3 stages of the cell cycle using their own words to describe the stage and one word descriptors provided by the teacher</td>
<td>Students will define the 3 stages of the cell cycle using one word descriptors provided by the teacher and match this word to a picture in the text to correspond</td>
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<tr>
<td>Speaking: Describe how plants/animals grow by relating growth to the stages of the cell cycle in an oral</td>
<td>Students will describe how plants/animals grow by relating to the stages of the cell cycle in an oral</td>
<td>Students will describe how plants/animals grow by relating to key terms in the stages of the cell cycle</td>
<td>Students will describe how plants/animals grow by relating to the cell cycle stages with a</td>
<td>Students will describe how plants/animals grow by relating to the cell cycle stages in a group</td>
<td>Students will describe how plants/animals grow by matching the three stages of the cell cycle with</td>
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<td>plants/animals grow in terms of the Cell Cycle</td>
<td>presentation in class cycle with a partner in an oral presentation</td>
<td>partner using sentence starters provided by the teacher orally</td>
<td>using a word bank and report out orally as a group</td>
<td>pictures showing cell growth in a group, standing up and saying the word and holding up the corresponding picture</td>
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<tr>
<td>Function</td>
<td>Situation</td>
<td>Expressions/Formula</td>
<td>Words/Phrases</td>
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<tr>
<td>Define</td>
<td>3 stages of the Cell Cycle</td>
<td>The _______ stage of the cell cycle is _________.</td>
<td>-First &lt;br&gt;-Second &lt;br&gt;-Final &lt;br&gt;-Interphase &lt;br&gt;-Prophase &lt;br&gt;-Cytokinesis &lt;br&gt;-Grows to its full size &lt;br&gt;-Make a copy of its DNA &lt;br&gt;-Replicates Its Chromosomes &lt;br&gt;-Separates into two new identical cells</td>
<td>“The 3 stages are......” &lt;br&gt;Nouns &lt;br&gt;Verbs &lt;br&gt;Sequencing/Transition Words</td>
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<td>In the _____________ stage, a cell _________.</td>
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<tr>
<td>Describe</td>
<td>How plants/animals grow in terms of the Cell Cycle</td>
<td>The 3 stages of the Cell Cycle _______ plants and animals to _______ and _______.</td>
<td>Enables &lt;br&gt;Helps &lt;br&gt;Grow &lt;br&gt;Divide &lt;br&gt;Stage</td>
<td>Nouns &lt;br&gt;Verbs</td>
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<tr>
<td></td>
<td></td>
<td>Each _______ helps the cell _______ and _________.</td>
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</tbody>
</table>
Lesson Plans:
Prior to these three days of plans, the students will know the structure and function of an animal cell. The students will know that cells are the basic building blocks of life and carry out all cell processes. Students will know what DNA is and that DNA is housed in the chromatin/chromosomes of the cell. Students will have created a jell-o mold of a cell, taken an assessment on structure and function and will be moving into learning about the cell cycle.

Cell Cycle
Lesson Plan: Day 1:

Introduction:
Teacher will begin class by asking students how do little pigs become big pigs? Or, how does a little flower become a large, fat, round pumpkin? Teacher will draw these two concepts of the board. In a whole class discussion, students should brainstorm that this must have something to do with cells and the way cells grow and divide. Level 1-2 ELLs will be provided a hand out with a picture of a small pig and a large pig and a flower and a pumpkin with text entitled “Cells Help Things Grow Bigger”, page 8.

Procedure/Instruction:

1. Teacher will provide students with a hand out with a diagram of the outline of the cell cycle with the stages labeled and explain to students that they will be filling in these ovals as they learn more about the cell cycle. Level 1 ELLs will be handed a diagram that is completely filled in (see page 9) and Level 3 ELLs will be handed a diagram that is partially filled in (see page 10). Level 5 ELLs will be expected to fill in more information on their diagram (see page 11).

2. Teacher will explain how a single cell can grow and divide, forming two new cells through three main stages: Interphase, Mitosis and Cytokinesis. Teacher will compare this cycle to other cycles the students have studied, and like the water cycle and rock cycle, there is no beginning and no end and these stages must be occur in order.

3. Teacher will introduce the term Mitosis as process of cell division and discuss Mitosis using direct instruction and give all students a graphic organizer to show that it is comprised of four phases within itself (Prophase, Metaphase, Anaphase and Telophase), entitled “Graphic Organizer” page 12.

4. In addition to the graphic organizer, level 1-2 ELLs will be handed a rewrite of the text (see pages 24-27), level 3 ELLs will be provided a highlighted version of the text, (see pages 19-22). Level 5 ELLs will be given an original version of the text on pages 13-17. Teacher will ask students to reference these versions of the text to observe pictures of these phases and what looks different about the cell in each stage.

Assessment:
Teacher will ask students in pairs to define the three stages of the cell cycle in their notes, and to brainstorm why these stages must occur in order. Teacher will walk around to listen to pairs and to ask questions. Level 1 and 2 ELLs will be given both sentence starters and pictures to help define each stage (see pages 28 and 29). Additionally, as an exit question, students will be asked to make a written comparison of the large pig and the small pig or the flower and the pumpkin in terms of number of cells and/or the way cells grow and divide. Level 1 and 2 ELLs will be given page 30 as an exit question, levels 3 and 4 will be given page 31 and level 5 will be given page 32.

**Homework:**

Teacher will assign new vocabulary for the week, to be completed by Friday. These words can be found posted on the word wall, including: **Cell Cycle, Interphase, Replication, Mitosis, Chromosome and Cytokinesis.** Students will write these words in their three column chart vocabulary journals (Word/Definition/Picture or Connection).
Cells help things grow bigger.

Bigger things have more cells.
THE CELL CYCLE: LEVEL 1

INTERPHASE
Stage 1: The Cell grows and makes a copy of its DNA

Stage 2: MITOSIS PROPHASE
chromosomes form

Stage 2: MITOSIS METAPHASE
chromosomes line up across the cell

Stage 2: MITOSIS ANAPHASE
chromosomes split and move to opposite ends of cell

Stage 3: CYTOKINESIS
Cell splits into two identical daughter cells

Name ___________________________ Date ______________________
THE CELL CYCLE: LEVEL 3

INTERPHASE
Stage 1:

Stage 3: CYTOKINESIS

Stage 2: MITOSIS

Stage 2: MITOSIS TELEPHASE

Stage 2: MITOSIS ANAPHASE

Stage 2: MITOSIS METAPHASE
THE CELL CYCLE: LEVEL 5

INTERPHASE

Stage 3:

Stage 2:

Stage 2:

Stage 2:

Stage 2:
The Cell Cycle has 3 stages:

1. Interphase-Beginning
2. Mitosis-Middle
3. Cytokinesis-End

**INTERPHASE**
- CELL GROWS
- MAKES A COPY OF ITS DNA

**MITOSIS**
- Chromosomes form,
- Line up, split apart, and prepare
- To divide
- 4 PHASES:
  - PROPHASE
  - METAPHASE
  - ANAPHASE
  - TELOPHASE

**CYTOKINESIS**
- TWO NEW CELLS FORM
ORIGINAL TEXT
Stage 1: Interphase
How do little pigs get to be big pigs? Their cells grow and divide, over and over. The regular sequence of growth and division that cells undergo is known as the cell cycle. During the cell cycle, a cell grows, prepares for division, and divides into two new cells, which are called “daughter cells.” Each of the daughter cells then begins the cell cycle again. You can see details of the cell cycle in the diagrams on pages 58 and 59. Notice that the cell cycle is divided into three main stages: interphase, mitosis, and cytokinesis.

The first stage of the cell cycle is called interphase. Interphase is the period before cell division. During interphase, the cell grows, makes a copy of its DNA, and prepares to divide into two cells.

Growing During the first part of interphase, the cell grows to its full size and produces structures it needs. For example, the cell makes new ribosomes and produces enzymes. Copies are made of both mitochondria and chloroplasts.

Copying DNA In the next part of interphase, the cell makes an exact copy of the DNA in its nucleus in a process called replication. Recall that DNA is found in the chromatin in the nucleus. DNA holds all the information that the cell needs to carry out its functions. Replication of DNA is very important, since each daughter cell must have a complete set of DNA to survive. At the end of DNA replication, the cell contains two identical sets of DNA. You will learn the details of DNA replication later in this section.

Preparing for Division Once the DNA has replicated, preparation for cell division begins. The cell produces structures that it will use to divide into two new cells. At the end of interphase, the cell is ready to divide.
Stage 2: Mitosis

Once interphase is complete, the second stage of the cell cycle begins. **Mitosis** (my TOH sis) is the stage during which the cell's nucleus divides into two new nuclei. **During mitosis, one copy of the DNA is distributed into each of the two daughter cells.**

Scientists divide mitosis into four parts, or phases: prophase, metaphase, anaphase, and telophase. During prophase, the threadlike chromatin in the nucleus condenses to form double-rod structures called **chromosomes**. Each chromosome has two rods because the cell's DNA has replicated, and each rod in a chromosome is an exact copy of the other. Each identical rod in a chromosome is called a chromatid. Notice in Figure 11 that the two chromatids are held together by a structure called a centromere.

As the cell progresses through metaphase, anaphase, and telophase, the chromatids separate from each other and move to opposite ends of the cell. Then two nuclei form around the chromatids at the two ends of the cell.

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**Figure 10**

**Bigger Pig, More Cells**
The mother pig has more cells in her body than her small piglets.

**Figure 11**

**Chromosomes**
During mitosis, the chromatin condenses to form chromosomes. Each chromosome consists of two identical strands, or chromatids. **Applying Concepts During which phase of mitosis do the chromosomes form?**
The Cell Cycle

Cells undergo an orderly sequence of events as they grow and divide. The sequence shown here is a typical cell cycle in an animal cell.

Comparing and Contrasting: Compare the location of the chromosomes during metaphase and anaphase.

1. **Interphase**
   - The cell grows to its mature size, makes a copy of its DNA, and prepares to divide into two cells.
   - Two cylindrical structures called centrioles are also copied.

2. **Cytokinesis**
   - The cell membrane pinches in around the middle of the cell. The cell splits in two. Each daughter cell ends up with an identical set of chromosomes and about half the organelles.

3A. **Mitotic Prophase**
   - Chromatin in the nucleus condenses to form chromosomes.
   - The pairs of centrioles move to opposite sides of the nucleus. Spindle fibers form a bridge between the ends of the cell. The nuclear envelope breaks down.

3B. **Mitotic Metaphase**
   - The chromosomes line up across the center of the cell. Each chromosome attaches to a spindle fiber at its centromere.

3C. **Mitotic Anaphase**
   - The centromeres split. The two chromatids separate. One chromatid is drawn by its spindle fiber to one end of the cell. The other chromatid moves to the opposite end. The cell stretches out as the opposite ends are pushed apart.
Length of the Cell Cycle
How long does it take for a cell to go through one cell cycle? It all depends on the cell. A human liver cell, for example, completes one cell cycle in about 22 hours, as shown in the graph. Study the graph and then answer the following questions.

1. Reading Graphs What do the three curved arrows outside the circle represent?
2. Reading Graphs In what stage of the cell cycle is the wedge representing growth?
3. Interpreting Data In human liver cells, how long does it take DNA replication to occur?
4. Drawing Conclusions In human liver cells, what stage in the cell cycle takes the longest time?

Stage 3: Cytokinesis
The final stage of the cell cycle, which is called cytokinesis (sy toh kih NEE sis), completes the process of cell division. During cytokinesis, the cytoplasm divides. The organelles are distributed into each of the two new cells. Cytokinesis usually starts at about the same time as telophase. When cytokinesis is complete, two new cells, or daughter cells, have formed. Each daughter cell has the same number of chromosomes as the original parent cell. At the end of cytokinesis, each cell enters interphase, and the cycle begins again.

Cytokinesis in Animal Cells During cytokinesis in animal cells, the cell membrane squeezes together around the middle of the cell. The cytoplasm pinches into two cells. Each daughter cell gets about half of the organelles.

Cytokinesis in Plant Cells Cytokinesis is somewhat different in plant cells. A plant cell's rigid cell wall cannot squeeze together in the same way that a cell membrane can. Instead, a structure called a cell plate forms across the middle of the cell. The cell plate gradually develops into new cell membranes between the two daughter cells. New cell walls then form around the cell membranes.

Reading Checkpoint During what phase of mitosis does cytokinesis begin?
LEVEL 3 and 4 ELL TEXT MODIFICATIONS
Stage 1: Interphase

How do little pigs get to be big pigs? Their cells grow and divide, over and over. The regular sequence of growth and division that cells undergo is known as the cell cycle. During the cell cycle, a cell grows, prepares for division, and divides into two new cells, which are called "daughter cells." Each of the daughter cells then begins the cell cycle again. You can see details of the cell cycle in the diagrams on pages 58 and 59. Notice that the cell cycle is divided into three main stages: interphase, mitosis, and cytokinesis.

The first stage of the cell cycle is called interphase. Interphase is the period before cell division. During interphase, the cell grows, makes a copy of its DNA, and prepares to divide into two cells.

Growing During the first part of interphase, the cell grows to its full size and produces structures it needs. For example, the cell makes new ribosomes and produces enzymes. Copies are made of both mitochondria and chloroplasts.

Copying DNA In the next part of interphase, the cell makes an exact copy of the DNA in its nucleus in a process called replication: Recall that DNA is found in the chromatin in the nucleus. DNA holds all the information that the cell needs to carry out its functions. Replication of DNA is very important, since each daughter cell must have a complete set of DNA to survive. At the end of DNA replication, the cell contains two identical sets of DNA. You will learn the details of DNA replication later in this section.

Preparing for Division Once the DNA has replicated, preparation for cell division begins. The cell produces structures that it will use to divide into two new cells. At the end of interphase, the cell is ready to divide.
Stage 2: Mitosis

Once interphase is complete, the second stage of the cell cycle begins. Mitosis (my TOH sis) is the stage during which the cell's nucleus divides into two new nuclei. During mitosis, one copy of the DNA is distributed into each of the two daughter cells.

Scientists divide mitosis into four parts, or phases: prophase, metaphase, anaphase, and telophase. During prophase, the threadlike chromatin in the nucleus condenses to form double-rod structures called chromosomes. Each chromosome has two rods because the cell's DNA has replicated, and each rod in a chromosome is an exact copy of the other. Each identical rod in a chromosome is called a chromatid. Notice in Figure 11 that the two chromatids are held together by a structure called a centromere.

As the cell progresses through metaphase, anaphase, and telophase, the chromatids separate from each other and move to opposite ends of the cell. Then two nuclei form around the chromatids at the two ends of the cell.

**Figure 10**
Bigger Pig, More Cells
The mother pig has more cells in her body than her small piglets.

**Figure 11**
Chromosomes
During mitosis, the chromatin condenses to form chromosomes. Each chromosome consists of two identical strands, or chromatids. Applying Concepts During which phase of mitosis do the chromosomes form?
The Cell Cycle

Cells undergo an orderly sequence of events as they grow and divide. The sequence shown here is a typical cell cycle in an animal cell.

**1. Interphase**
The cell grows to its mature size, makes a copy of its DNA, and prepares to divide into two cells. Two cylindrical structures called centrioles are also copied.

**2. Cytokinesis**
The cell membrane pinches in around the middle of the cell. The cell splits in two. Each daughter cell ends up with an identical set of chromosomes and about half the organelles.

**2A. Mitotic Prophase**
Chromatin in the nucleus condenses to form chromosomes. The pairs of centrioles move to opposite sides of the nucleus. Spindle fibers form a bridge between the ends of the cell. The nuclear envelope breaks down.

**2B. Mitotic Metaphase**
The chromosomes line up across the center of the cell. Each chromosome attaches to a spindle fiber at its centromere.

**2C. Mitotic Anaphase**
The centromeres split. The two chromatids separate. One chromatid is drawn by its spindle fiber to one end of the cell. The other chromatid moves to the opposite end. The cell stretches out as the opposite ends are pushed apart.
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During what phase of mitosis does cytokinesis begin?
LEVEL 1 and 2 ELL TEXT MODIFICATIONS
Stage 1: Interphase

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Preparing for Division Once the DNA has replicated, preparation for cell division begins. The cell produces structures that it will use to divide into two new cells. At the end of interphase, the cell is ready to divide.

What is replication?
Stage 2: Mitosis

Once interphase is complete, the second stage of the cell cycle begins. Mitosis (my TOH sis) is the stage during which the cell's nucleus divides into two new nuclei. During mitosis, one copy of the DNA is distributed into each of the two daughter cells.

Scientists divide mitosis into four parts, or phases: prophase, metaphase, anaphase, and telophase. During prophase, the threadlike chromatin in the nucleus condenses to form double-rod structures called chromosomes. Each chromosome has two rods because the cell's DNA has replicated, and each rod in a chromosome is an exact copy of the other. Each identical rod in a chromosome is called a chromatid. Notice in Figure 11 that the two chromatids are held together by a structure called a centromere.

As the cell progresses through metaphase, anaphase, and telophase, the chromatids separate from each other and move to opposite ends of the cell. Then two nuclei form around the chromatids at the two ends of the cell.
**Stage 1:**
Interphase: Cell grows and makes a copy of its DNA.

**Stage 2:**
Mitosis: Prophase
Chromosomes form.

**Stage 3:**
Cytokinesis: Two identical daughter cells are formed.

**Stage 2:**
Mitosis: Metaphase
Chromosomes line up.

**Stage 2:**
Mitosis: Anaphase
Chromosomes split apart to opposite sides.

**Stage 2:**
Mitosis: Telophase
Chromosomes stretch
Two new nuclei form.
Stage 3: Cytokinesis

The final stage of the cell cycle, which is called cytokinesis (sy toh kih NEE sis), completes the process of cell division. During cytokinesis, the cytoplasm divides. The organelles are distributed into each of the two new cells. Cytokinesis usually starts at about the same time as telophase. When cytokinesis is complete, two new cells, or daughter cells, have formed. Each daughter cell has the same number of chromosomes as the original parent cell. At the end of cytokinesis, each cell enters interphase, and the cycle begins again.

IN CYTOKINESIS
TWO NEW CELLS FORM

THEN THOSE 2 CELLS START THE CYCLE AGAIN.
Sentence Starters for Levels One and Two:

1. The first stage of the cell cycle is ____________________________.

2. The second stage of the cell cycle is ____________________________.

3. The third stage of the cell cycle is ____________________________.
Pictures/Visuals for Levels One and Two:

STAGE 1: INTERPHASE

STAGE 2: MITOSIS: PROPHASE

STAGE 2: MITOSIS: METAPHASE

STAGE 2: MITOSIS: ANAPHASE

STAGE 2: MITOSIS: TELOPHASE

STAGE 3: CYTOKINESIS
EXIT QUESTION: LEVEL 1 and 2

1. The Big Pig has ___________ cells than the little pig.
   
   CIRCLE: MORE    LESS

2. The pumpkin has ___________ cells than the flower.
   
   CIRCLE: MORE    LESS
EXIT QUESTION: LEVEL 3 and 4

1. The Big Pig has ___________ cells than the little pig.
   CIRCLE: MORE      LESS

2. The pumpkin has ___________ cells than the flower.
   CIRCLE: MORE      LESS

3. There are 3 stages of the cell cycle.
   The 3 stages of the cell cycle are ____________ ,
   ____________ , and ____________ .
EXIT QUESTION: LEVEL 5

1. Explain how a small pig becomes a big pig in terms of the cell cycle.

[Blank lines for answer]
Narrative/Description of Modifications: Lesson One

Lesson one of this instructional unit picks up where students have already been introduced to cell structure and function and have passed assessments on these concepts. Students know that cells are the basic unit of all living things and that all things have cells. Here, students are now being introduced to the process of cell division within the cell cycle.

In lesson one, it is important to use more sheltered instructional strategies with differing levels of English Language Learners in one classroom to make content, text and talk more comprehensible. These strategies include using a graphic organizer to arrange the stages of the cell cycle and highlight key vocabulary, using three different levels of concept maps for the stages of the cell cycle to outline important points of each stage, rewriting the text itself to make reading more comprehensible and to summarize key points, and using different levels of exit questions as assessment tools.

By using the graphic organizer, key points of the cell cycle are laid out in order, and there is an arrow-like visual to represent the fact that this is cyclical, and like a circle, has no beginning and no end. This graphic organizer also highlights key vocabulary that is new to the student, and matches the word wall vocabulary posted in class. The three stages are listed here, also with the sequencing words of beginning, middle and end, to show that although the cycle continues, it must continue in a certain order.

The concept maps are again a good visual to help make content more comprehensible, in this case the stages of the cell cycle. For the lower level ELLs, the concept map is completely filled in with pertinent information. The level 3 ELLs have a partially filled out concept map and the level 5 ELLs have to write in much of the information as they read and comprehend the stages. All students will be encouraged here to draw the cell or anything they find contrastive to the other stages.

There are three versions of the text provided for differing levels of ELLs. The level 5 ELLs will be provided the original text, while level 3 will be given a highlighted version. Lastly, level 1 ELLs have a text rewrite that summarizes the main points of each page and omits certain graphics that may be confusing or detract the reader from these main ideas. Science texts tend to be dense reading, so highlighting the key points for beginner ELLs helps make the text more comprehensible.
Using an exit question to check for understanding is typical practice. However, varying not what is asked, but how it is asked for the differing levels in the class is essential. All students will receive an exit slip or ticket and by making modifications, all students have ample opportunity to answer correctly. For the beginner ELLs, the exit slip has a sentence starter and a sentence ending, and they must fill in the appropriate word. For the level 3 ELLs, they must add additional information on their own but still have partial phrases/descriptors. For level 5 ELLs, the exit question is not modified. All three exit questions ask the ELL to utilize comprehension skills involving the cell cycle and higher order thinking skills.

Additionally in lesson one, students are working in pairs and groups often and although this is a typical effective instructional strategies, ELLs also have the chance to negotiate meaning in these groups and work on co-constructing knowledge with their peers.
LESSON PLANS: Lesson 2
### Content Objectives:

Students will be able to:

1. Define the phases of Mitosis
2. Describe how chromosomes change in each phase of Mitosis

### Language Objectives:

Students will be able to:

1. Make written descriptions of the phases of Mitosis
2. Orally discuss the changes of the chromosomes in each phase of Mitosis

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<tr>
<td>Writing: Define the phases of Mitosis</td>
<td>Students will define the phases of Mitosis using a paragraph describing each phase with scientific vocabulary.</td>
<td>Students will define the phases of Mitosis using one sentence for each phase to describe what is happening using clear science vocabulary.</td>
<td>Students will define the phases of mitosis by using short phrases to describe what is happening in each phase, with language prompts provided by the teacher.</td>
<td>Students will define the names of the phases of Mitosis in their notebook and write a one or two word description to correspond, using their picture/visual handout provided by the teacher.</td>
<td>Students will define the names of the phases of Mitosis in their notebook, using their picture/visual handout provided by the teacher.</td>
</tr>
<tr>
<td>Speaking: Describe how chromosomes change in</td>
<td>Students will describe how chromosomes change in each stage of Mitosis by highlighting the chromosomes in</td>
<td>Students will describe how chromosomes change in each stage of Mitosis by highlighting the chromosomes in</td>
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<tr>
<td>each phase of Mitosis</td>
<td>each stage and discussing how they are changing shapes or moving away from the center of the cell and why they think this is occurring.</td>
<td>each stage and discussing how they are changing shapes or moving away from the center of the cell.</td>
<td>reading from a handout with sentence starters provided by the teacher.</td>
<td>each phase on their text rewrite and saying the names of the phases.</td>
<td>each phase on their text rewrite.</td>
</tr>
<tr>
<td>Function</td>
<td>Situation</td>
<td>Expressions/Formula</td>
<td>Words/Phrases</td>
<td>Grammar</td>
<td></td>
</tr>
<tr>
<td>----------</td>
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<td></td>
</tr>
<tr>
<td>Define</td>
<td>The phases of Mitosis</td>
<td>There are four phases of Mitosis. The ___________ stage of Mitosis is ______________.</td>
<td>-First -Second -Third -Fourth -Prophase -Metaphase -Anaphase -Telophase</td>
<td>“The 4 phases are.....”</td>
<td>Nouns</td>
</tr>
<tr>
<td>Describe</td>
<td>How chromosomes change in each phase of Mitosis</td>
<td>Chromosomes have DNA. In each phase of Mitosis the chromosomes ___________.</td>
<td>-change -stay the same</td>
<td>Nouns</td>
<td>Verbs</td>
</tr>
</tbody>
</table>
Cell Cycle
Lesson Plan: Day 2

**Introduction:** Students will begin class with a Do-Now question, “What is the cell cycle?” (Answer: The cell cycle is the sequence of growth and division that cells go through to ultimately divide into two new cells). Students will be asked to answer this question in their science notebook. For ELLs at the first, second and third levels, they will be asked to draw what they know about the cell cycle. Teacher will orally discuss the answer to the question, then also draw a short diagram of the cell cycle for students to check their work. Levels 1 and 2 ELLs should reference their picture/visuals sheet on page 29.

**Procedure/Instruction:** Teacher will ask students to read and discuss the stages of mitosis and look at the corresponding drawings of each stage in the text. For level 5 ELLs, they will be using the original text, see page 16. Level 3 and 4 will use a highlighted text (see page 21) and levels 1 and 2 will use a text rewrite (see page 26) and additional visual aid hand outs entitled “Level 1 ELL Visual Aid For Phases of Mitosis”, and “Level 2 Visual Aid for the Phases of Mitosis” (see pages 41 and 42). In groups of three, teacher will ask students to note the differences between the stages and most importantly note where the chromosomes are in each stage. Lower level ELLs will be strategically placed in between two non-ELLs, teacher should decide this supportive grouping ahead of time, then form the groups. Groups will be given highlighters, to highlight the shapes and/or changes of the chromosomes in each stage on their version of the text. It would be beneficial here for students to discuss how the shape of the chromosome changes, its distance from the center of the cell and how it splits apart. Teacher should walk around the room and pose questions to the groups at work.

**Materials:**
Large White Paper
Class set of highlighters
Pre-cut chromosome sheet (Page 43)
Text and Text modifications as noted
Level 1 and 2 ELLs visuals (Page 41 and 42)

**Assessment:** In these same groups, the teacher will ask students to draw each stage on large white paper and in a few words explain what is happening in each stage. Each group member will be responsible for drawing two of the stages, but should collaborate on what to draw and write for each stage. For groups that are struggling with the drawing, teacher will hand out pre-cut chromosomes in their correct shapes that these students can use to put in their drawings after matching them to the correct stage (see page 43, entitled “Pre-Drawn Chromosomes for Cut-Out). Students should note that the cell grows to its full size and makes a copy of its DNA, then in Prophase chromosomes are formed. In Metaphase, the chromosomes line up across the cell, in anaphase they split apart as the cell stretches out. In Telophase, two new nuclei begin to form. Teacher will walk around and make sure all levels of ELLs and all students are sharing information.
**Homework:** Students will be asked to hand in their drawings and explanations for review.
Lesson 2:

Level 1 ELL Visual Aid for Phases of Mitosis:

PROPHASE

METAPHASE

ANAPHASE

TELOPHASE
Lesson 2:

Level 2 ELL Visual Aid for Phases of Mitosis:

P____________________

M____________________

A____________________

T____________________
Lesson 2

Pre-Drawn Chromosomes for Cut-Out:
Narrative/Description of Modifications: Lesson Two

With differing levels of ELLs in one classroom it is essential to prepare instructional materials, text and even questioning that align with the content and language objectives, yet are modified so that every student can meet these objectives. Considering the range of ELLs, from pre-production to bridging or more advanced, it is extremely important to make content, text and talk more comprehensible. In lesson two, some of the sheltered strategies utilized include supportive grouping, picture/visual aids, pre-cut drawings of concepts, text rewrite and language prompts.

Supportive grouping is a great tool for ELLs to help them negotiate meaning in a social way with their classmates. These groupings in particular here, have an ELL student grouped with two non-ELLs allowing them to be involved in the process and the discussion of the task. There is so much research based theory on the need to create meaning out of social context, these groupings will work as opposed to simply giving the ELLs hand outs or allowing them to sit with other ELLs.

Pictures and visual aids are also a strategy incorporated here which is also of high importance. While students are still learning the language needed to identify key concepts and vocabulary, supplementing the material with pictures can be a great tool for students to visually hone in on these concepts. Pictures can be used for matching words with visuals, or can be an aid in organizing concepts in the material, or simply an additional repetitive aid for students to learn and review the information.

In lesson two, another strategy used was that of creating a visual cut-out to be used by groups in need of drawing or creativity aid. Here, both ELLs and non-ELLs may have trouble drawing the chromosomes in the cell cycle, and/or take too much time on this task. Cut-outs can be helpful for groups who are struggling with how to design the shape of the chromosomes, and to keep students working in the correct allotted time frame of the class.

Text rewrite is an essential strategy used throughout sheltered instruction. Beginning level and middle ELLs must be able to access this material and with a high level text laden with heavy vocabulary, modifications must be made to make this text comprehensible. For level 1 and 2 ELLs, text must be rewritten to highlight the key, main
idea points that students must be exposed to. Additionally, leaving more blank white space and making text larger can add to its readability, and deleting certain graphics that may be confusing or overdone. For levels 3 and 4, text needs to be highlighted or bolded to make this input more comprehensible.

Lastly, the use of language prompts and simply giving the lower level ELLs a starting point on how to begin saying or writing their answers is a great way to help them organize their information. ELLs may be able to gather the information needed and then might just need something simple as a sentence starter to give them to correct way to say or write these ideas. Some modifications such as this seem like such a small change, but can completely aid and open doors to ELLs as they continue on their journey of learning language.
### Content Objectives:
Students will be able to:

1. Create a model of a phase of Mitosis and a written description after becoming an expert on one specific stage.

2. Present this phase to the class.

### Language Objectives:
Students will be able to:

1. Create a model of a phase of Mitosis and a written description after becoming an expert on one specific stage.

2. Orally present a phase of Mitosis after becoming an expert on one specific phase to the class.

<table>
<thead>
<tr>
<th>Domain/Topic</th>
<th>Level 5 Bridging</th>
<th>Level 4 Expanding Fluency</th>
<th>Level 3 Speech Emergent</th>
<th>Level 2 Early Production</th>
<th>Level 1 Pre-Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing: Create a model of a phase of Mitosis after becoming an expert on one specific stage</td>
<td>Students will create a model of a phase of Mitosis after becoming an expert on one specific phase showing the correct shape or position of the chromosomes in the cell with a written paragraph description of what occurs in this stage in groups.</td>
<td>Students will create a model a phase of Mitosis after becoming an expert on one specific phase showing the correct shape or position of the chromosomes in the cell with three sentences describing this stage in groups.</td>
<td>Students will create a model of a phase of Mitosis after becoming an expert on one specific phase and write a description of this stage using language prompts provided by the teacher in groups.</td>
<td>Students will create a model of a phase of Mitosis after becoming an expert on one specific stage and write a sentence about where the chromosomes are in the cell, with sentence starters provided by the teacher in groups.</td>
<td>Students will create a model of a phase of Mitosis after becoming an expert on one specific stage and writing the name of the phase on their model in groups, using the handout provided by the teacher.</td>
</tr>
<tr>
<td>Speaking:</td>
<td>Students will present the phase</td>
<td>Students will present the phase</td>
<td>Students will present the phase</td>
<td>Students will present the phase</td>
<td>Students will present the phase</td>
</tr>
<tr>
<td>Present this phase to the class</td>
<td>they have become an expert on to the class in groups, using appropriate scientific vocabulary and discussing the positions of the chromosomes and their model.</td>
<td>they have become an expert on to the class in groups, using the information they have written about their phase in those three sentences and their model.</td>
<td>they have become an expert on to the class in groups, using the written material created from the language prompts provided by the teacher and their model.</td>
<td>they have become an expert on to the class in groups, using the information on the handout provided by the teacher and their model.</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Situation</td>
<td>Expressions/Formula</td>
<td>Words/Phrases</td>
<td>Grammar</td>
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<td></td>
</tr>
<tr>
<td>Describe</td>
<td>In writing, this stage of the cell cycle</td>
<td>“My phase is…” In the __________ phase of Mitosis, the chromosomes ________________</td>
<td>-First -Second -Third -Fourth -Form -Line Up -Split Apart -Stretch to sides of cell</td>
<td>-Transitional words -Verbs</td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>Orally, this writing to the class</td>
<td>My phase is…” In the __________ phase of Mitosis, the chromosomes ________________</td>
<td>-First -Second -Third -Fourth -Form -Line Up -Split Apart -Stretch to sides of cell</td>
<td>-Transitional words -Verbs</td>
<td></td>
</tr>
</tbody>
</table>
Cell Cycle
Lesson Plan: Day 3

**Introduction:** Students will begin class with a Do-Now question, “During what stage of mitosis do chromosomes form? What can be found in these chromosomes?” (Answer: Prophase, DNA) For level 1 and 2 ELLs, sentence starters will be provided where students need to circle the correct answer, see page 52 and for levels 3 and 4, sentence starters will be provided with word choices, see page 53. Level 5 ELLs will be expected to answer this question in a sentence.

**Procedure/Instruction:** Students will be put into groups and be asked to model the phases of Mitosis with construction paper, pipe cleaners and glue. Teacher will hand out index cards to the groups of the one phase they will be creating and ask the students to become experts on their phase in order to present to the class at the end of the period. Teacher will model her phases that are already cut and arranged to depict the phases of Mitosis and then clip them up on the board for viewing purposes (See Blue Folder for Models). Students will be handed out a rubric to self-assess themselves on their phase when they are completed, and to know what is expected of them from this activity. (Rubric can be found on page 54, entitled “Rubric for Creation of Model/Presentation of Phase of Mitosis”). Students will be grouped according to differing ability levels and teacher will constantly walk around to the groups to assess and ask questions and offer suggestions.

**Materials:**
- Construction Paper
- Pipe Cleaners
- Glue
- Pre-made Index Cards of Phases
- Sentence Starters Handouts (pages 52 and 53)
- Handouts for Presentation (pages 55 and 56)
- Rubric (page 54)

**Assessment:** Students should discuss in their groups what is occurring in their phase and decide how best to depict this. They will be able to reference their drawings from yesterday’s class as a supportive tool. At the end of class, teacher will call up each group to teach the class about their phase of Mitosis and what is occurring there. Students will be graded on their model and their participation in the group. Level 1 and 2 ELLs will be given a hand out with sentences to fill in entitled “Helpful Sentences For Organization of Material” with word choices on page 55. Levels 3 and 4 ELLs will also be given a hand out with sentences to fill in with the help of a word bank entitled “Helpful Sentences For Organization of Material” on page 56. Teacher will use the “Rubric for Creation of Model/Presentation of Phase of Mitosis (page 54) to assess the group presentations.

**Homework:**
After these three lessons, students will continue learning about Cytokinesis, the final stage of the cell cycle in more detail and how two daughter cells actually form identically and then begin the cell cycle process again. Teacher will also introduce cancer and what happens when cells divide in an uncontrolled way or mutate. The cell cycle lessons themselves, then eventually springboard the class into genetics. Because students now know how cells grow and divide into two new cells, teacher introduces them to genetics, traits and characteristics through fertilization. This moves into Mendelian Genetics, punnett squares and determining dominant and recessive the traits of offspring.
Lesson 3

Sentence Starters

Name __________________________________ Date ______

For Level 1 and 2 ELLs

1. Chromosomes are formed in the first stage of Mitosis called ________________.

Circle: Interphase Prophase

2. DNA is found in the ________________________.

Circle: Chromosomes Prophase
Lesson 3

Sentence Starters

For Level 3 and 4 ELLs

1. Chromosomes are formed in the ____________ stage of Mitosis called ________________.

2. ________________ is found in the Chromosomes.

Word Bank

<table>
<thead>
<tr>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interphase</td>
<td>Prophase</td>
</tr>
<tr>
<td>DNA</td>
<td>Cell Wall</td>
</tr>
</tbody>
</table>
Name ___________________________ Date __________

Group Members:

Phase of Mitosis:

Rubric for Creation of Model/Presentation of Phase of Mitosis (50 points total)

__________ Group was able to identify their phase and where it occurs in the cell cycle.
(10 points)

__________ Group was able to model their phase with the correct shape and location of the chromosomes. (15 points)

__________ Group was able to discuss in one to three sentences what the chromosomes are doing in this stage. (15 points)

__________ Each group member participated in the creation of the model and discussion of the stage to the class. (10 points)

*Can also give to each group to use as self-assessment OR give each group a few copies to use as peer-assessment.
Lesson 3

Helpful Sentences for Organization of Material:
Level 1 and 2 ELLs

My phase is ___________1________________.

In ______________1______________, the chromosomes ________2________.

<table>
<thead>
<tr>
<th>COLUMN 1</th>
<th>COLUMN 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPHASE</td>
<td>FORM</td>
</tr>
<tr>
<td>METAPHASE</td>
<td>LINE UP</td>
</tr>
<tr>
<td>ANAPHASE</td>
<td>SPLIT APART</td>
</tr>
<tr>
<td>TELOPHASE</td>
<td>STRETCH TO ENDS OF CELL</td>
</tr>
</tbody>
</table>
Lesson 3

Helpful Sentences for Organization of Material:
Levels 3 and 4 ELLs

My phase is ____________________________.

In ____________________________, the
cell chromosomes ________________.

WORD BANK

<table>
<thead>
<tr>
<th>PROPHASE</th>
<th>FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>METAPHASE</td>
<td>LINE UP</td>
</tr>
<tr>
<td>ANAPHASE</td>
<td>SPLIT APART</td>
</tr>
<tr>
<td>TELOPHASE</td>
<td>STRETCH TO ENDS OF CELL</td>
</tr>
</tbody>
</table>
Narrative/Description of Modifications: Lesson Three

Lesson three utilizes sheltered instructional strategies as well even though it is much more of a hands-on activity, including discussing, creating, and presenting. The use of hands-on, engaging activities is great for all students, and especially for ELLs who may not yet be able to understand all conversation or classroom language. ELLs must have certain modifications made to meet the content and language objectives of the lesson, and in lesson three, these strategies include using sentence starters, word banks, visual aids, supportive grouping, rubrics and teacher modeling.

To initiate, lesson three begins with a Do-Now question and for levels 1 and 2 ELLs, sentence starters are provided where students are expected to choose the correct answer. Levels 3 and 4 are provided with sentence structures as well as word choices from a word bank. Both of these modifications are used to make the question more comprehensible for the ELL and to narrow in on what is actually being asked of the ELL in the question. Sentence starters and word banks help the ELL answer the question, in an organized, grammatically correct format. Sentence starters are used again later in this lesson to help ELLs organize their ideas of the material to aid in their class presentation.

As in lessons one and two, visual aids and supportive grouping are also two strategies that are very important for ELLs. Visual aids are used as tools when students may not have the language to identify key concepts or main ideas but can match them or choose the correct picture to aid in this identification. Supportive grouping, which is typically done with differing levels of abilities with all students, is especially important for ELLs to socialize with their classmates and experience co-construction of meaning with their peers and be exposed to more language in a less intimidating way. Grouping ELLs with non-ELLs can create a comfortable, safe place for the ELLs to experience language, while working on identifying key concepts; meeting both language and content objectives.

Lesson three also provides students with an opportunity to self-assess or peer-assess their work with a rubric-grading guide. Although this tool is helpful in effective instruction, self-assessment and peer-assessment is also essential for ELLs to help them understand what is expected of them and of the class. Rubrics can be a quick and
effective assessment tool for teacher use, but also help students be more aware of what they need to do to be successful.

Lastly, in lesson three, the use of teacher modeling is a strategy used for ELLs to help give them a visual of what is expected at the outcome of the activity. Here the teacher will present her model of the phases of Mitosis in her own creative way, to model the activity and the end result. ELLs may need to see this visual to help them wrap their thoughts around the activity, instead of just hearing the directive or reading it.
Lesson 3
Example of Phases of Mitosis (Teacher Model)
In your group, become experts on the **Prophase** phase of Mitosis to present to the class. What happens here? What are the chromosomes doing? Why?
In your group, become an expert of the **Metaphase** phase of Mitosis, to present to the class. What happens here? **What are the chromosomes doing?** **Why?** Create a model of metaphase.
In your group, become an expert on the **Anaphase** phase of Mitosis, to present to the class. What happens here? **What are the chromosomes doing**? **Why?** Create a model of **Anaphase**.
In your group, become an expert of the **Telophase** phase of Mitosis, to present to the class. What happens here? What are the chromosomes doing + why? Create a model of Telophase.
Checklists
Unit: Cell Cycle

Grammar and Functions Checklist

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<th>Grammar</th>
<th>Lesson</th>
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<tr>
<td>Phrases</td>
<td>1, 2</td>
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<td>Transitional Words</td>
<td>1, 2, 3</td>
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<td>Verbs</td>
<td>1, 2, 3</td>
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<table>
<thead>
<tr>
<th>Functions</th>
<th>Lesson</th>
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<tbody>
<tr>
<td>Compare</td>
<td>1, 2, 3</td>
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<td>Create</td>
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<td>Define</td>
<td>1, 2</td>
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<td>Describe</td>
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<td>Draw</td>
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<td>Explain</td>
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<td>List</td>
<td>1</td>
</tr>
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<td>Match</td>
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<td>Observe</td>
<td>1, 2</td>
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<td>Present</td>
<td>3</td>
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</table>
FLA 518: Sheltered ELL Strategies Checklist

Write the page numbers and any other identifying features to identify those parts of your lessons that employ the following strategies.

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<th>SHELTERED STRATEGIES</th>
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<td>I.E. Create Opps. To Negotiate Meaning/ Check Understanding</td>
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<td>II.A. Intentional Use of Graphic Organizers</td>
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<tr>
<td>III. Make Talk Comprehensible</td>
<td></td>
<td></td>
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<tr>
<td>III.A. Pace Teacher’s Speech</td>
<td></td>
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<td>III.B. Use of Listening Guides</td>
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<td>III.C. Use of Word Walls</td>
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<td>39</td>
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<tr>
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<td>V. Engage at Appropriate Language Proficiency Levels</td>
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<tr>
<td>V.A. Use questions appropriate for language proficiency levels in conversations, activities, and assessments</td>
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<td>VI. Give Students Voice</td>
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<td>VI.A. Challenge students to produce extended talk</td>
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<td>VI.B. Model Language for Oral and Written Production</td>
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<td>VI.C. Use Group/Pr. Work to Elicit Student Talk; Students as Researchers</td>
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</tbody>
</table>