Lesson 7
Division

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Learning Objectives: By the end of the lesson, you will have learned:

✓ I can explain how mitosis (and meiosis) occur
✓ I can describe why mitosis (and meiosis) are important for life
✓ I can explain the difference between mitosis and meiosis
✓ I can predict the environmental factors that can affect mitosis

21st Century Skill Set:
✓ I can make observations, inferences and draw conclusions from data
✓ I can demonstrate the ability to work as a member of a team
✓ I can demonstrate an ability to collect and organize data

Agenda

- Review agenda and set context (5 min)
  - Introduce instructors and volunteers
- Opening ritual (10 min)
  - Have each student review what is the content of the cell and what can affect cell functions.
- Activity #1: Building “mitosis crackers” (30 min)
  - Go over phases during mitosis
  - Showing “mitosis video”
  - Introduce the material and volunteer demonstrate how to built the mitosis crackers
- Activity #2: Meiosis (30 min)
  - Go over meiosis, focusing on how it differs from mitosis
  - Meiosis Activity: Students will perform a “meiosis skit” where groups of students will play the part of chromosomes, centrosomes, molecular motors, etc.
  - Assign parts, pass out materials, and go to open area to do the activity
- Teach back (15 min)
  - Review what we have learned.
  - How can we apply what we learned today?
  - Discuss in context of what our WOW!

What have we learned from the past weeks?

- Cell membrane
- Cytoskeleton
- Nucleus/DNA

Need to look at some of the previous presentations from Huei-Chen for consistency.

Mitosis

What is Mitosis?

- A type of cell division that results in two daughter cells
- Each having the same number and kind of chromosomes as the parent nucleus.
Plant cells in various stages of mitosis

**Prophase**
The DNA molecules of the chromosomes condense. The outer boundary of the cell is the faint circle just inside the box.

**Metaphase**
The chromosomes line up in the center of the cell, separate and become a pair of identical chromosomes.

**Anaphase**
Each set of chromosomes moves toward the opposite end of the cell.

**Telophase**
Here, the spindle fibers disappear, the nuclear membrane appears and the cell divides into two daughter cells. Notice the indentation starting on the outer cell wall.

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**Mitosis Functions**

**Why do we need “Mitosis”?**

1. **Cell replacement**
   - Scratch
   - Cut on skin

2. **Growth**

3. **Asexual reproduction**
   - Budding

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**Cell Replacement**

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**Growth**

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**Asexual Reproduction**

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**Planarian (flat worms)**

Regeneration

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Building “Mitosis Crackers”

Materials:
1. Water crackers
2. Sprinkles
3. Cheese Whiz
4. Cream Cheese
5. Spatula

Activity #1
Mitosis Crackers

Activity #2

Example

Sea Urchin – cell division

Meiosis

Teach Back
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What moves the chromatids during mitosis?</td>
<td>Spindle</td>
</tr>
<tr>
<td>What anchors the spindle?</td>
<td>Centrioles</td>
</tr>
<tr>
<td>How many daughter cells are created from mitosis and cytokinesis?</td>
<td>2</td>
</tr>
<tr>
<td>During what phase does cytokinesis begin?</td>
<td>Telophase</td>
</tr>
<tr>
<td>If a human cell has 46 chromosomes, how many chromosomes will be in each daughter cell?</td>
<td>46</td>
</tr>
<tr>
<td>If a dog cell has 72 chromosomes, how many daughter cells will be created during a single cell cycle?</td>
<td>2</td>
</tr>
<tr>
<td>.....Each of these daughter cells will have how many chromosomes?</td>
<td>72</td>
</tr>
<tr>
<td>The nuclear membrane dissolves during what phase?</td>
<td>Prophase</td>
</tr>
<tr>
<td>What structure holds the individual chromatids together?</td>
<td>Centromere</td>
</tr>
</tbody>
</table>

Mitosis