"It's a Small World: Cells and DNA"

Lesson 7 Division

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Cell Division

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:

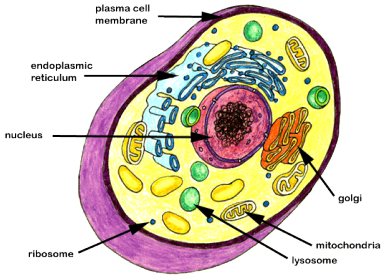
- ✓ I can make observations, inferences and draw conclusions from data
- ✓ I can demonstrate the ability to work as a member of a team
- ✓ I can demonstrate an ability to collect and organize data

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

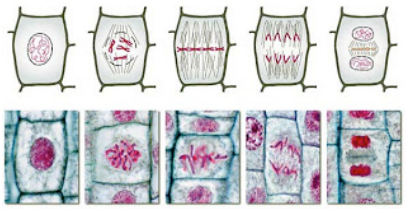


Need to look at some of the previous presentations from Huei-Chen For consistency.

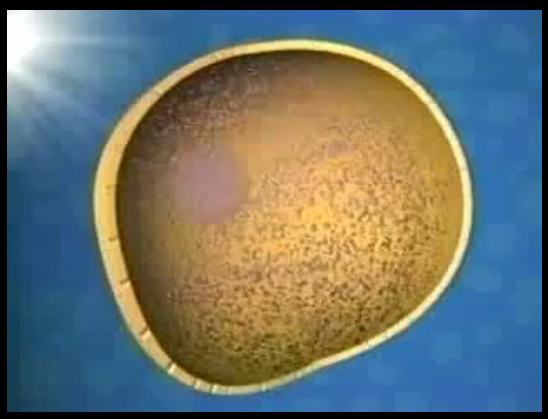
Mitosis

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.

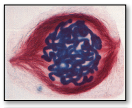


Mitosis Video



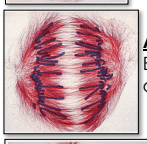
Plant cells in various stages of mitosis

Mitosis: P-M-A-T

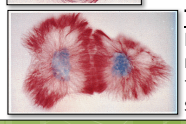


Prophase
The DNA molecules of the chromosomes condense. The outer boundary of the cell is the faint circle just inside the box.

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.

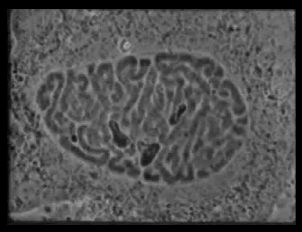


Telophase
Here, the spindle fibers disappear, the nuclear membrane appears and the cell divides into two daughter cells. Notice the indentation starting on the outer cell wall.

All magnified ~2,700 times

http://faculty.stcc.edu/nash/mitosis_nd_dna.htm

Cell division



Mitosis Functions

Why do we need "Mitosis"?

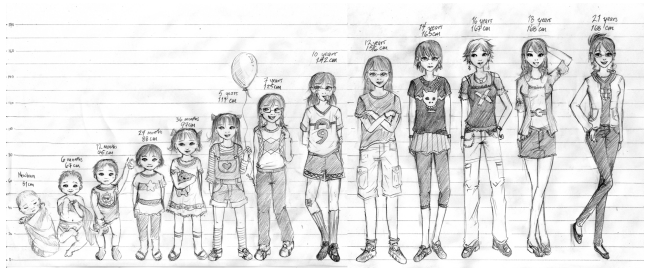
1. Cell replacement
   - Scratch
   - Cut on skin
2. Growth
3. Asexual reproduction
   - Budding

Mitosis Functions

Cell Replacement

Mitosis Functions

Growth



http://bybygun.files.wordpress.com/2011/05/the-growth-of-girl.png

Mitosis Functions

Asexual Reproduction

Plants
Cutting
Grafting
Budding

Planarian (Flat worms)
Regeneration

http://mdb.biophys.kyoto-u.ac.jp/ine/e_research/e_planarian/e_pla_stem.html
http://www.phoolbari.com/e-articles/2008/propagation.html

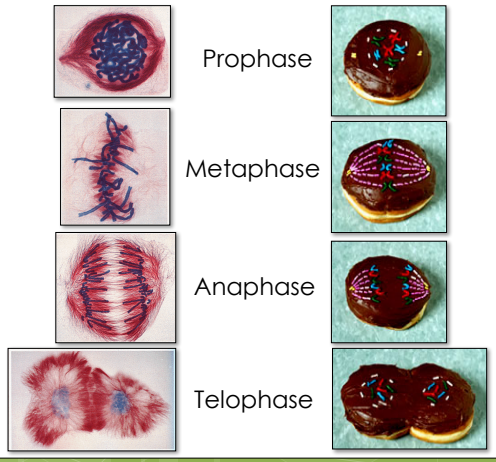
Activity #1

Building "Mitosis Crackers"

- Materials:

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

Mitosis Crackers



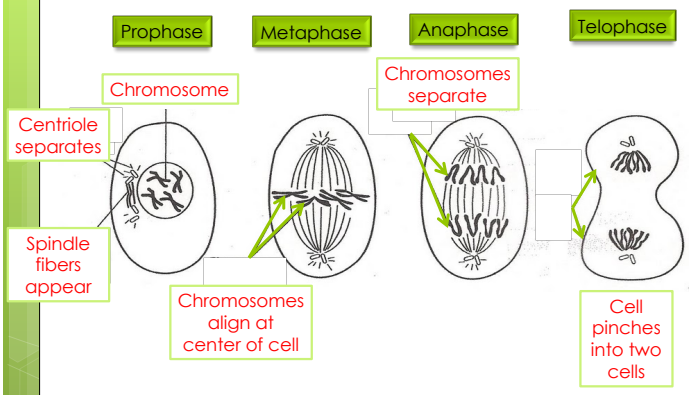
Example

Sea Urchin – cell division

Meiosis

Activity #2

Teach Back



Teach Back

Mitosis

- What moves the chromatids during mitosis? Spindle
- What anchors the spindle? Centrioles
- How many daughter cells are created from mitosis and cytokinesis? 2
- During what phase does cytokinesis begin? Telophase
- If a human cell has 46 chromosomes, how many chromosomes will be in each daughter cell? 46
- If a dog cell has 72 chromosomes, how many daughter cells will be created during a single cell cycle? 2

  .....Each of these daughter cells will have how many chromosomes? 72
- The nuclear membrane dissolves during what phase? Prophase
- What structure holds the individual chromatids together? Centromere