



# Cell and Cell Theory

The Connection







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# COMMON CORE

## Core Standards

### NGSS

**MS-LS1-1** Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

**MS-LS1-2** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

**MS-LS1-3** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

#### CONNECTIONS:

#### Social Studies

- **WHST.6-8.7** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- **WHST.6-8.1** Write arguments focused on discipline-specific content.

#### Math

- **6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another.

#### Language Arts

- **SL.8.5** Integrate multimedia and visual displays into presentations to clarify infor-

mation, strengthen claims and evidence, and add interest.

- **RI.6.8** Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.

## **Science**

- **RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.

# VOCABULARY

|                       |                                |
|-----------------------|--------------------------------|
| Cell                  | Microfilament                  |
| Cell Membrane         | Microtubule                    |
| Cell Theory           | Mitochondrion                  |
| Eukaryote             | Nuclear Envelope               |
| Nucleus               | Nuclear Pore                   |
| Organelle             | Nucleolus                      |
| Prokaryote            | Plastid                        |
| Cell Wall             | Ribosome                       |
| Chloroplast           | Rough Endoplasmic Reticulum    |
| Chromatin             | Selectively Permeable Membrane |
| Chromosome            | Smooth Endoplasmic Reticulum   |
| Crista                | Spindle Fiber                  |
| Cytoplasm             | Thylakoid                      |
| Cytoskeleton          | Vacuole                        |
| Cytosol               |                                |
| Endoplasmic Reticulum |                                |
| Flagellum             |                                |
| Fluid Mosaic Model    |                                |
| Golgi Apparatus       |                                |
| Lysosome              |                                |

# ANSWER KEY

## Activity #1

Answers will vary based on research and analysis.

## Activity #2

Answers will vary. However, the following types of cells, should be accepted:

Muscle cells, skin cells, bone cells, stomach lining cells, etc.

## Activity #3

Answers will vary. However, proteins are attached on either side of the membrane. Integral proteins are usually found embedded within the membrane while peripheral proteins are found attached on either side of the surface of the membrane.

Proteins are able to move, to a certain degree, but they are restricted by interactions with the various molecules that can be found in the cytoplasm.

## Activity #4

The idea that mitochondria were unicellular organisms that developed a symbiotic relationship with cells for the purpose of surviving harsh environments is not new. Answers will vary based on the depth of the research that is conducted.

Answers will vary based on the drawing that the students make for the path. However, it is important for them to understand that in all mammals, the genome found in mitochondrial DNA is almost exclusively passed on from the mother.

The etymology of mitochondrion, is from the Greek mitos, meaning thread, and chondrion, meaning grain.

## Activity #5

The mind map will vary. Remember, many of these projects and questions are open ended questions and research ideas, open for interpretation and a heuristic approach.

It is not possible for life to exist without the ribosomes.

## Activity #6

1. The rRNA has a shorter distance to transfer.
2. No it cannot. Students should give reasons why.
3. ER makes proteins. The more proteins needed by the cell, the more rough ER one will be able to find. On the other hand, smooth ER is involved in the synthesis of steroids.

## Activity #7

Answers will vary. Golgi apparatus is a system of membranes similar to those found in the ER. The two systems work closely together to modify the proteins that are produced in the ER.

## Activity #8

1. Answers will vary
2. Hydrolytic enzymes digest proteins
3. Answers will vary
4. Answers will vary

## Activity #9

Microtubules come together during cell division and are known as spindle fibers. The spindle fibers attach themselves to the chromosomes. As the cell divides the chromosomes are aided in the separation. Should there be a tubulin abnormality then the chromosomes risk the chance of not dividing correctly. This in turn will result in chromosomal abnormalities.

### **Activity #10**

Answers will vary. There are no benefits of having multiple flagella. This would result in a cell that is constantly being redirected by the movement of the various flagella.

Answers will vary.

### **Activity #11**

Answers will vary. General answers follow:

1. Yes, it is a good thing. They are protected from outside sources that might cause them to develop abnormalities
2. Answers will vary. For a more hands on approach please see activity ELC-4018
3. The nucleolus is found inside the nucleus. This is where the ribosomes are synthesized and partially assembled before being shipped out to the cytosol.
4. Since the ribosomes are so crucial in the synthesis of proteins, it is incredibly important that they maintain their intactness and purity

### **Activity #12**

Answers will vary. Possible answers are as follows:

1. Provides extra protection and stability.
2. Not always. A secondary wall results in a stem that is made of wood. Some plants have a herbaceous stem. Shorter plants do not require a wood stem. Annuals do not have a secondary cell wall.

### **Activity #13**

Answers will vary.

### **Activity #14**

1. Its a good thing. Answers will vary.
2. Answers will vary. However, there are many plants that have other types of leaf coloration. The plastids are still able to photosynthesize.
3. Yes. Answers will vary

4. Answers will vary. Have the students conduct research on-line to find such graphics depicting the photosynthetic process.

### **Activity #15**

Answers will vary. However, the students should be given the freedom to be creative. For example, they can use batteries to symbolize mitochondria. They can use a smaller transparent bag full of water and coloring to symbolize vacuoles. The possibilities are endless.



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