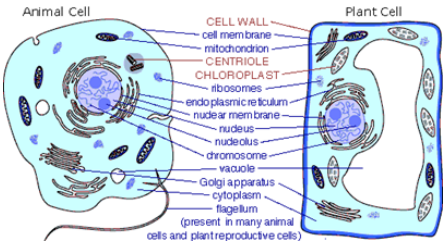
At-Home Exploration: The Function of Organelles

INTRODUCTION:



Cells are complex systems that contain various specialized substructures known as *organelles*. These organelles are "specialized" because each of them perform a different function that each contributes to keeping the cell in balance, or *homeostasis.* In other words, think of them as workers along an assembly line, each responsible for a single task to build the product of homeostasis. Without these various organelles, cells would not be able to carry out important chemical processes such as providing genetic information, producing energy, or assembling proteins.

Your home is also a system, whose operation also depends on various specialized components. In this exploration, you will relate the functions of organelles to the functions of household structures/items around you. For instance, lysosomes and peroxisomes in *eukaryotic* cells act like garbage disposals. Just as a disposal breaks down unwanted food and waste, lysosomes and peroxisomes contain digestive *enzymes* that break down toxic materials to get rid of.

LEARNING STANDARDS: Cells, Organelles, Prokaryotes/Eukaryotes, Animal/Plant Cells

PURPOSE: To relate the functions of organelles to the function of household structures/items.

ACTIVITY:

1. **Research** the function of each of the organelles listed in the table below.

   Use these websites to assist with research:
   - ➔ http://www.biology4kids.com/files/cell_main.html
   - ➔ https://www.pathwayz.org/Tree/Plain/ORGANELLES
   - ➔ https://www.exploringnature.org/db/view/Cell-Organelles
   - ➔ https://www.khanacademy.org/test-prep/mcat/cells/eukaryotic-cells/a/organelles-article

2. **Compare** EACH organelle to a household structure/item that shares a similar function and take individual photos of those structures/items.

   Each photo must include a slip of paper with your first and last name on it.
   *See the lysosome/peroxisome example picture below.

3. **Justify** how EACH household structure/item shares similar functions to the organelle it represents.

   Each justification must include:
   - ➔ A summary of the true function of the organelle in cells
   - ➔ A description explaining how the household structure/item relates to the organelle
     *See the lysosome/peroxisome example justification below.

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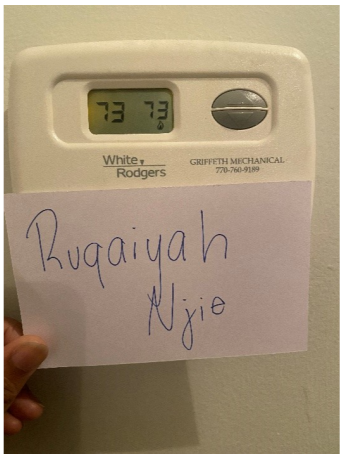
Place your photos and write your justification in this table.

The Function of Organelles		
Organelle Name	**Household Structure/ Item Picture**	**Justification of Relationship**
Nucleus		The nucleus directs all the cell's activities and basically acts like the brain of the whole cell. A thermostat has similar functions to a nucleus because it controls the temperature of our home in all areas.
Cytoplasm/ Cytoskeleton		A cytoplasm is a jelly-like fluid that fills in a cell and keeps all the organelles inside the cell in place. The floors in a home are like the cytoplasm of a cell because it fills up the home and provides structure for us to walk on. It also keeps all our chairs, tables etc. in place.

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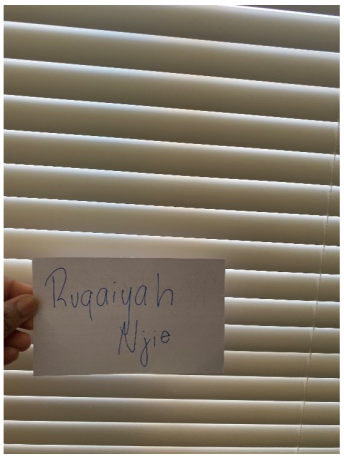
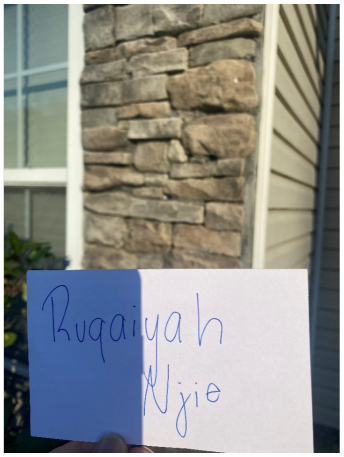
Cell Membrane		The cell membrane controls what goes in and out of the cell and is selectively permeable. The blinds on a door act like a cell membrane because they can let sunlight in or block it out. It can also allow someone to look in or out of the house when it's opened, but when it's closed no one can.
Cell Wall		A cell wall adds an extra layer of support and protection in plant cells. The outer stone walls of a home are like the cell wall because they provide structure for the home and protection for the residents in the home from any dangers that might be outside.

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Mitochondria		The mitochondria is responsible for providing energy to the cell and it does so through cellular respiration. An outlet is most like a mitochondria because once you plug something into it, it powers up the attached appliance or charger for use.
Chloroplast		The chloroplast produces glucose through photosynthesis. Plants use glucose for food. A microwave is most like a chloroplast because it turns things that you place in it into food. If you had cold chicken by itself, it would be unhealthy to eat, but once you microwave the chicken it becomes delicious, edible food.

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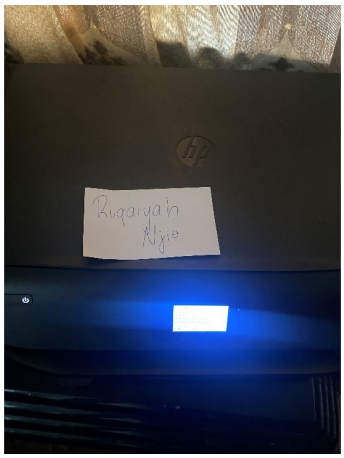
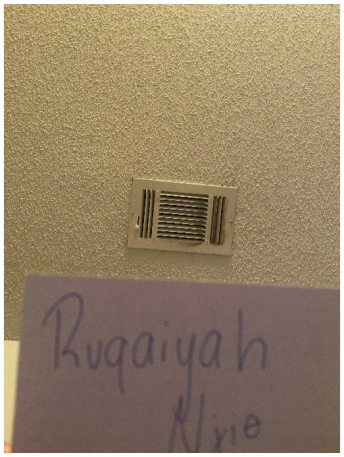
Ribosomes		The ribosome turns RNA (protein code) into proteins. A printer is like this because it turns a blank sheet of paper into something more meaningful and useful.
Endoplasmic Reticulum		The endoplasmic reticulum has a Smooth Er and a Rough ER. The Rough Er has ribosomes embedded on it. The purpose of the ER is to act as passageways that transport proteins. Vents are like the endoplasmic reticulum because they regulate air flow and transport oxygen throughout our homes so we don't die of asphyxia.

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Vacuole		A vacuole is an organelle used to store water and wastes. A refrigerator is like a vacuole because it also stores things like food, drinks, water bottles, milk, etc.
Golgi apparatus		A Golgi apparatus is an organelle that packages and ships proteins. A mailbox is like a Golgi apparatus because it's used to receive packages or shipments sent into you from people.

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Flagella/Cilia		A flagellum aids a cell in movement. A rolling chair is like a flagellum because it helps someone move to or away from a computer screen/desk in an effortless way.
EXAMPLE: **Lysosomes/ Peroxisomes**		Lysosomes and peroxisomes contain digestive enzymes that are responsible for breaking down and disposing cellular waste. This function is similar to the function of a garbage disposal because they are used to chop up waste into tiny pieces to be disposed of through the sink.

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The Function of Organelles Scoring Rubric

Criteria	Beginning (0-5)	Developing (6-10)	Proficient (11-15)	Distinguished (16-20)	Score
Household Structure/ Item Picture	+5 photos are missing. No names in photos. Poor quality/blurry photos.	<5 photos are missing. Some names in photos. Some poor quality/blurry photos.	A couple photos are missing. A couple photos do not have name. A couple photos are poor quality/blurry.	All photos are there and all of them have name in it. No photos are poor quality/blurry.	**20/20**
Justification of Relationship	+5 justifications are not properly written - the functions of organelles are incorrect and/or no description relating to household items.	<5 justifications are not written properly.	Most justifications are written properly, give or take a couple.	All justifications are written properly, and go beyond what is required.	**15/20**
Document Organization - Neat? Late?	Document is not concise or consistent. Fonts are not the same. Photos are not properly sized. Document is late.	Document is somewhat concise and consistent. Some fonts are the same and some photos are sized. Document is on time.	Most of the document is concise and consistent. Most fonts are the same and most photos are sized. Document is on time.	The entire document is concise and consistent. Some extra creativity is present. Document is on time.	**20/20**
				Total Score =	**55/60**

Additional Feedback:

Overall great project. Photos are spot on! I would've loved some more depth to your organelle definitions (longer summaries). Other than that, 92%! :)