**Unit Essential Question:** *How do our bodies produce and use the energy needed to move objects?*

**Engage**

In Task 4, you zoomed in on various specimens to learn that all living things, like yourself, are made up of different types of cells! How do these cells allow us to do the things we like to do? How do they provide the energy our bodies need to move objects?

Because cells are so small, we will be using models to explore their parts and functions. But what exactly is a model? Let’s learn about models with a simple example: a smartphone battery draining in power during the day.

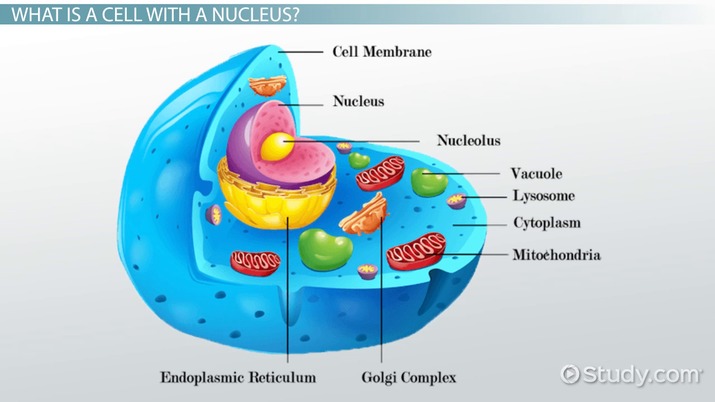
|  |  |
| --- | --- |
| **Labeled Diagram**:  Macintosh HD:Users:laurenstoll:Downloads:Smartphone Battery Models.jpg | **Flowchart or Mind Map**:  Macintosh HD:Users:laurenstoll:Downloads:Smartphone Battery Models.jpg |
| **Analogy**:  A draining smartphone battery is like a water jug that is slowly used throughout the day. Similar to the way a smartphone battery shows how much power is left, there are indicators on the jug to show how much water remains. Also, the power in a cell phone battery is used for different functions (internet, phone calls, music, etc.), just like the water in the jug is used for different functions (drinking, washing, etc.) | |

Discuss with a partner:

1. Based on the models shown, what do you think is the purpose of a model?
2. How are these three types of models different?
3. For this particular example, which type of model do you think is most helpful? Why?

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**Explore**

**Using Models**: To explore a cell’s function and parts, we will first use the type of model known as an analogy. Your group will receive a set of definition cards; each card defines a cell part or a substance that is used or created by a cell. In groups,

1. Cut out your *Cell Definition Cards*.
2. Read the analogy aloud.
3. Draw a picture of the factory, including all its parts.
4. Discuss which cell part or substance matches each part of the analogy.
5. Record your matches in the table below:

A Cell is like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Cell Part or Substance** | …is/are like… | **Part of the Analogy** | **Because…** |
| The Mitochondria… |  |  |
| The Nucleus… |  |  |
| The Cell Membrane… |  |  |
| Sugar… |  |  |
| Proteins… |  |  |

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**Explain**

**Developing Models**: While this analogy was helpful to show the functions of the entire cell and each of its parts, sometimes a visual model (like a diagram, mindmap, or flowchart) is better for showing the relationships between the different parts.

1. Individually, construct a visual model below to show how the different parts of a cell work together for the function of the whole cell. In your model, use and describe the key terms from the box below. Add any additional descriptions you need to make connections between all the different cell parts!

|  |  |  |
| --- | --- | --- |
| * Nucleus * Cell Membrane * Mitochondria | * Sugar * Proteins | * Energy * Instructions |

1. **Structure and Function**: At the bottom of your model, explain how each cell part contributes to the whole cell’s function.

**Unit Essential Question:** *How do our bodies produce and use the energy needed to move objects?*

**Elaborate**

## Making models is challenging and new to many of us! We can use a method called *Stronger/Clearer* to further develop and improve the model you just made.

1. **Individual Think Time:** Take a minute to think about how you will explain your model to a first partner.
2. **Partner Discussions 1:** You will work in pairs with another student. One of you will be Student A and the other Student B. Student A will start first:

* **Student A:** Without reading what you wrote down on your model, describe and support the thinking you used in your model.
* **Student B:** Listen and ask clarifying questions. Ask questions to help Student A describe relationships in their model. For example, you might ask, “Why did you connect these two cell parts?” or “Do you think a connection is missing here?” or “Do you think you can add some more written description here?”
* **Both Student A and Student B:** Write down any notes, thoughts, or questions that came up in this discussion.

|  |
| --- |
|  |

Now switch roles and repeat the steps above.

1. **Partner Discussion 2:**  Repeat the partnering process with another student. Remember to try to strengthen and clarify your model. Write down new notes, insights, and questions.

|  |
| --- |
|  |

1. **Partner Discussion 3:** Repeat the partnering process with another student. Remember to try to strengthen and clarify your model. Write down new notes, insights, and questions.

|  |
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|  |

1. **Final Explanation:** After you have worked with partners to clarify your thinking, review your notes. Revise your model in the *Explain*.

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**Evaluate: Connecting to the Culminating Project**

You have been asked to teach people how their bodies make the movement of objects possible in a specific activity. We know from Task 1 that your activity requires energy to move an object.

* Now that you have learned about cells and their parts, describe where this energy comes from.
* Pick one body system involved in your activity and do research to fill out the flowchart below. This will show how energy from your body is able to move your object!

This should be individually in your Project Organizer.

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**Reflection**

Individually reflect on Task 5, using the questions provided:

1. At the beginning of this task, you examined different types of models you might use in science. Based on what you learned in this task, when do you think each type of model should be used (diagram vs. flowchart vs. analogy)?
2. In this task, we focused on the crosscutting concept of:

* **Structure and Function**:Relationships between parts can be analyzed to determine how systems function.

Where do you see examples of **Structure and Function** in this task?

1. Now that you have learned more about how cells function, what questions do you still have?