



Unit Performance Expectations

- Provide evidence that living things are made of many and different types of cells.
- Develop and use a model to describe the function of a cell and its parts.
- Understand that the body is a system of interacting subsystems composed of groups of cells.
- Identify how sensory receptors respond to stimuli by sending messages to the brain for memory and behavior.



How do body systems interact with each other to communicate and collaborate?

Evaluation and Feedback

Your work will be evaluated using the following rows in the Science and Engineering Practices Rubric:

- "Constructing Explanations and Designing Solutions".
- "Developing and Using Models".
- "Obtaining, Evaluating, and Communicating Information".

Group Culminating Project

As a group:

- Choose an activity.
- Design an Activity Brochure for an organization to give to individuals who do that activity.
- In the brochure, show how cells, tissues, organs, and body systems all work together.
- Share your brochure with peers for feedback.
- Make revisions to produce your final Activity Brochure.



Individual Culminating Project

- Write a script to present your activity brochure to an audience.
- Get feedback from others in your group.
- Revise your explanation.

Overview • **Design an Activity Brochure**

The Activity Brochure

In today's busy world, hobbies, special activities, and exercise have been promoted as healthy additions to everyone's life. People also like getting information that helps them understand their activities and their bodies better so they can be the best that they can be. Your group will create an informational brochure that describes and teaches a person all about their bodies during their favorite activity. The Activity Brochure should help individuals understand how the parts in their bodies work together as a system so they can do their activity well.

The Activity

People all over the world participate in hobbies, sports, and activities. Daily, people challenge themselves to

- □ Cast their fishing line to catch a fish
- Aim and kick a ball to their teammate
- □ Balance on their bicycle carefully to keep it upright
- **u** Turn their head out of the water to breathe
- □ Adjust their running pace to prevent a cramp
- □ Work precisely with their fingers to tie a knot
- □ Move their fingers with precise movements to play the trumpet
- Aim and shoot a basketball at the hoop from a seated position in a wheelchair

The Client

There are many groups, teams, retailers, camps, companies, and individuals in need of information about sports and hobbies. The list below is a starting point for the kinds of clients you may want to reach out to. You may choose a client group not listed here:

- Local swimming, soccer, basketball, or other sports teams
- Music teachers in your local elementary school or community
- □ Summer camp directors
- Boys and Girls Club of America and other youth groups
- □ Store managers and customers at sporting good stores

The Project Steps

- 1. Select your activity and the client you will write the Activity Brochure for.
- 2. Plan your Activity Brochure.
- 3. Make a rough draft of your Activity Brochure.
- 4. Share your Activity Brochure with another group for feedback.
- 5. Make a final draft of your Activity Brochure.
- 6. Individually write a letter to the client promoting the Activity Brochure.

Your Activity Brochure should include

- An introduction describing the activity and welcoming a specific client to read your Activity Brochure
- A visual showing a person doing the activity
 - □ Label the body parts involved in the activity.
- Diagrams with labels and explanations of what types of cells are used in the activity
 - □ Show where the cell(s) are located in the body (in what organs).
 - Explain the functions of the cells in a caption near the pictures.
- A model (visual) showing the organelles found in cells and how the cells function to help the body work efficiently in the activity
 - Label the organelles.
 - Show what materials your cells need in order to work efficiently and how they get those materials.
 - □ Show what products your cells make and where those products go.
- A model (visual) showing how the body systems interact to make the activity possible
 - □ Include an explanation of each body system's contribution and how the systems interact to do the activity.
 - □ Include labels that identify the organs in each system.
 - □ Include labels that identify tissues in one of the body systems.
- A model (diagram) showing the neural pathways that make the activity possible
 - Show the pathway of the stimuli to the response or memory.
 - Include captions that describe how information gets from the outside environment to the brain and body systems that are activated as a result of the stimuli.
- **•** Your final Activity Brochure should be:
 - Easy to understand
 - Legible (easy to read)
 - Organized
 - Informational
 - Clearly labeled (your diagrams and visuals)

Overview • Individual Culminating Project

You will be presenting your activity brochures to an audience, so in order to be prepared, it is your job to write a script for your presentation. Your script should include a discussion of all parts of your brochure. Use the graphic organizer below to help you write your script. Then write a final draft in essay format.

Activity Brochure Graphic Organizer

| Introduction | In this brochure, we will be talking about List a few interesting facts about your activity: • • |
|-----------------|---|
| | Before doing this activity, you should understand the physical demands and challenges your body will face. |
| Types of Cells | Here we have a diagram that shows the types of cells used in Describe your diagram. In what body parts are these cells located? How do the different cells' structures fit their function? Other information: |
| Cell Organelles | This is a map showing how the different cell parts within each of those cells work together to allow it to do its job for the activity. Describe your concept map. (Use your skit from Task 2 to help you explain.) What are the main cell parts and what do they do? How do the cell parts work together? Other information: |

| Interacting Body Systems | Here is a diagram showing how all the different body systems interact to make the activity possible. Describe your diagram. What are the main body systems and their functions? How do they work together? Other information: | |
|-----------------------------|---|--|
| Nervous System | Lastly, this is a flowchart showing how we are able to sense and respond to our environment | |
| Pathway to do | | |
| Describe your flowchart. | | |
| | • What is the stimulus and where is it received? | |
| | • Write sequenced steps starting with the stimulus and ending with the action. | |
| | Other information: | |
| | This is what makes our activity possible! | |
| Conclusion | Conclude with a general statement about why all types of cells, cell parts, and body systems are important to making your activity happen. | |

Lift-Off Task: Communication and Collaboration between Players

| Identify the activity your group will use for the Activity Brochure. |
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| Identify and list parts of the body that are used in the activity you chose. |
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| Draw a diagram of a person doing the activity you chose.Label the body parts involved in the activity. |
| Highlight two body parts that are working together (collaborating). Write a description of how the two body parts work together (collaborate and communicate) to do |
| one job. |
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Task 1: The Different Types of Cells in Your Body

| In this task, you saw many different types of cells with very different structures and functions. Choose three cell types—the cell types your group thinks are most important for doing your activity. Draw a diagram of someone doing your activity, and then tell students to zoom in and draw the three cell types (with the cells in the correct place in the body). Write captions near each cell type in your drawing that describe the cell and the function of the cell. | | | |
|---|-------------|-------------|--|
| Activity Diagram | | | |
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| Cell Type 1 | Cell Type 2 | Cell Type 3 | |
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| | | 2 2 | |
| Draw a picture of someone doing your activity and zoom in on cell type 1, 2, and 3. Write a caption near each cell type drawing that describes the cell and the function of the cell. | | | |
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Task 2: Model Structures and Functions within a Cell

| In this task, you | discovered that cells have many parts the | at work together. |
|--------------------|---|-----------------------|
| Label t | he cell parts. | |
| 📮 Use ar | ows to show molecules moving in, out, | or through the cell. |
| 📮 Label y | our arrows with "moves in" or "makes." | , |
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| Write a par | agraph that explains the model of your c | cell drama. |
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| Draw a diag | ram of someone doing your activity. | |
| 🖵 Zoom | n on a cell in the body that is active duri | ng the activity. |
| 🖵 Label t | he parts of the cell and describe the fund | ction of those parts. |
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Task 3: The Body and Its Interacting Systems

Model (diagram) a person doing your group's chosen activity. Your model on this page will be assessed using the Science and Engineering Practices Rubric. Write neatly.

- Model (diagram) a person doing your group's chosen activity. Illustrate and describe how the body systems you have studied communicate and collaborate during your activity.
 - Create a visual of your activity.
 - □ Represent each body system that is used in the activity.
 - □ Label the organs in the body systems.
 - □ In one body system, label the different tissues.
 - □ Show how the body systems collaborate to make the activity possible.
 - □ Next to each system, describe how that body system is used in the activity.

Task 4: Your Senses—Communicating with the Outside World

- **Draw** a diagram of a person doing your activity. Show the neural pathways that make your activity possible.
 - Draw in the stimuli for the sense organs.
 - □ Draw in the sensory organs needed for the activity.
 - Draw in the sensory receptors.
 - Draw in the pathways to the brain.
- Draw in the pathway to the response or memory and identify the body systems that are involved in the response.
 Include captions describing each part of your drawing.

Evaluation • Science Content Rubric

Assess Using Individual Culminating Project Script

| SCIENCE CONTENT RUBRIC | | | | |
|--|--|---|--|--|
| THE STUDENT DEMONSTRATES THEIR SCIENTIFIC KNOWLEDGE OF THE FOLLOWING CONTENT STANDARD | EMERGING | DEVELOPING | PROFICIENT | ADVANCED |
| All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) | Defines cells and describes the types of cells used in the activity with major errors. | Defines cells and describes the types of cells used in the activity with minor errors. | Accurately defines cells and describes the types of cells used in the activity. | Accurately defines cells and provides a detailed description of the types of cells used in the activity. |
| Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) | Constructs an explanation of the main cell parts and what they do (function) with major errors or missing elements. | Constructs an explanation of the main cell parts and what they do (function) with minor errors. | Constructs an accurate explanation of the main cell parts and what they do (function). | Constructs an accurate and detailed explanation of the main cell parts and what they do (function). |
| In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3) | Uses the model to describe how the body (tissues, organs, and body systems) interact to complete a specific activity with major errors or missing elements. | Uses the model to describe how the body (tissues, organs, and body systems) interact to complete a specific activity with minor errors. | Uses the model to accurately describe how the body (tissues, organs, and body systems) interact to complete a specific activity. | Uses the model to provide a detailed and accurate description of how the body (tissues, organs, and body systems) interact to complete a specific activity. |
| Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8) | Constructs an explanation that includes how the nervous system transmits information (initial stimuli, neural pathway, and response) with major errors or missing elements. | Constructs an explanation that includes how the nervous system transmits information (initial stimuli, neural pathway, and response) with minor errors. | Constructs an explanation that accurately demonstrates mastery of how the nervous system transmits information (initial stimuli, neural pathway, and response). | Constructs an explanation with detailed evidence that accurately demonstrates mastery of how the nervous system transmits information (initial stimuli, neural pathway, and response). |

Evaluation • Science and Engineering Practices Rubric

The Cells and Body Systems Unit will be assessed using the highlighted rows.

| SCIENCE AND ENGINEERING PRACTICES RUBRIC | | | | |
|--|---|---|---|---|
| SCORING DOMAIN | EMERGING | DEVELOPING | PROFICIENT | ADVANCED |
| ASKING QUESTIONS AND DEFINING PROBLEMS | Asks general questions that cannot be investigated. | Asks specific questions that can be investigated but do not require empirical evidence. | Asks questions that require empirical evidence to answer. | Asks questions that require empirical evidence to answer and evaluates the testability of the questions. |
| No Evidence* | Writes a problem or design statement but it does not match the intent of the problem or the need of the client. | Writes a problem or design statement that matches the intent of the problem or the need of the client with minor errors. | Writes a problem or design statement that accurately matches the intent of the problem or the needs of the client. | Writes a problem or design statement that accurately and completely matches the intent of the problem or the need of the client. |
| DEVELOPING AND USING MODELS | Makes models (drawings, diagrams, or other) with major errors. | Makes models (drawings, diagrams, or other) to represent the process or system to be investigated with minor errors. | Makes accurate and labeled models (drawings, diagrams, or other) to represent the process or system to be investigated. | Makes accurate and labeled models (drawings, diagrams, or other) to represent the process or system to be investigated and explains the model. |
| No Evidence* | Explains the limitations of the model with major errors. | Explains the limitations of the model with minor errors. | Explains the limitations of the model as a representation of the system or process. | Explains the limitations of the model as a representation of the system or process and discusses how the model might be improved. |
| PLANNING INVESTIGATIONS | Plans an investigation that will not produce relevant data to answer the empirical question(s). | Plans an investigation that will produce some relevant data to answer the empirical question(s). | Plans an investigation that will produce relevant data to answer the empirical question(s) and identifies the dependent and independent variables when applicable. | Plans an investigation that will completely produce relevant and adequate amounts of data to answer the empirical question(s) and identifies the dependent and independent variables when applicable. |
| No Evidence* | Plans a design that does not match the criteria, constraints, and intent of the problem. | Plans a design and writes an explanation that partially matches the criteria, constraints, and intent of the problem. | Plans a design and writes an explanation that accurately and adequately matches the criteria, constraints, and intent of the problem. | Plans a design and writes a detailed explanation that accurately and completely matches the criteria, constraints, and intent of the problem. |
| CARRYING OUT INVESTIGATIONS | Writes procedures that lack detail so the procedures cannot be duplicated by another person. | Writes procedures with enough detail that another person can duplicate (replicable) but does not conduct a sufficient number of trials. | Writes detailed replicable procedures with descriptions of the measurements, tools, or instruments and conducts adequate number of trials. | Writes detailed replicable procedures with descriptions of the measurements, tools, or instruments and conducts adequate number of trials with an explanation for the proposed data collection. |

* If there is no student response then check the No Evidence box.

The Cells and Body Systems Unit will be assessed using the highlighted rows.

| SCIENCE AND ENGINEERING PRACTICES RUBRIC | | | | |
|---|---|---|---|---|
| SCORING DOMAIN | EMERGING | DEVELOPING | PROFICIENT | ADVANCED |
| ANALYZING AND INTERPRETING DATA Accurately labeled" means inclusion of title, column titles, | Makes spreadsheets, data tables, charts, or graphs that are not accurately labeled or do not display all the data. | Makes accurate and labeled spreadsheets, data tables, charts, or graphs to summarize and display data but does not arrange the data to examine the relationships between variables. | Makes accurate and labeled spreadsheets, data tables, charts, and/or graphs to summarize and display data and arranges the data to examine relationships between variables. | Makes accurate and labeled spreadsheets, data tables, charts, and/or graphs and uses more than one of these methods to summarize and display data; arranges the data to examine relationships between variables. |
| proper intervals. | Uses inappropriate methods or makes major errors analyzing the data. | Uses appropriate methods but makes minor errors analyzing the data. | Uses appropriate methods to accurately and carefully identify patterns or explains possible error or limitations of analyzing the data. | Uses appropriate methods to accurately and carefully identify patterns and explains possible error or limitations of analyzing the data. |
| CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS | Constructs an explanation that includes an inappropriate claim, inaccurate evidence, and/or unclear reasoning. | Constructs or evaluates an explanation consisting of minimal claim(s), limited sources of accurate evidence, and/or minimal reasoning. | Constructs or evaluates an explanation that includes a claim, multiple sources of accurate evidence, and reasoning using accurate and adequate scientific ideas or principles. | Constructs, evaluates, or revises an explanation that includes a claim, multiple sources of accurate evidence, and reasoning using accurate and adequate scientific ideas or principles. |
| No Evidence* | Uses no data to evaluate how well the design answers the problem and the redesign of the original model or prototype is inappropriate or incomplete. | Uses minimal data to evaluate how well the design answers the problem and describes an appropriate redesign of the original model or prototype with minor errors. | Uses adequate data to evaluate how well the design answers the problem and accurately explains an appropriate redesign of the original model or prototype. | Uses adequate data to evaluate how well the design answers the problem and accurately provides a detailed rationale for the appropriate redesign of the original model or prototype. |
| ENGAGING IN ARGUMENTS FROM EVIDENCE | Constructs an argument that includes an inappropriate claim, inaccurate evidence, and/or unclear reasoning. | Constructs or evaluates an argument consisting of minimal claim(s), limited sources of evidence, or minimal reasoning. | Constructs and/or evaluates an argument consisting of appropriate claim(s), multiple sources of evidence, and reasoning using accurate and adequate scientific ideas or principles. | Constructs, evaluates, or revises an argument consisting of appropriate claim(s), multiple sources of evidence, and reasoning using accurate and adequate scientific ideas or principles. |
| OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION No Evidence* | Communicates information that is inaccurate and/or inconsistent with the evidence. | Communicates accurate but minimal information consistent with the evidence but does not explain the implications or limitations of the investigation or design. | Communicates accurate, clear, and adequate information consistent with the evidence and explains the implications and/or limitations of the investigation or design. | Communicates accurate, clear, and complete information consistent with the evidence and provides a rationale for the implications and limitations of the investigation or design. |

* If there is no student response then check the No Evidence box.

Evaluation • Peer Feedback for Activity Brochure

| Activity Brochure Owners' Names | Activity Brochure Reviewers' Names |
|---------------------------------|------------------------------------|
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Provide feedback on the following sections of the Activity Brochure.

An introduction describing the activity and welcoming a specific client to read your Activity Brochure
 Positive Comment:

Constructive Comment:

- A visual showing a person doing the activity
 - Label the body parts involved in the activity.

Positive Comment:

Constructive Comment:

Diagrams with labels and explanations of what types of cells are used in the activity

- Show where the cell(s) are located in the body (in what organs).
- Explain the functions of the cells in a caption near the pictures.

Positive Comment:

Constructive Comment:

□ A **model** (visual) showing the organelles found in cells and how the cells function to help the body work efficiently in the activity

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- Label the organelles.
- Show what materials your cells need in order to work efficiently and how they get those materials.
- Show what products your cells make and where those products go.

Positive Comment:

Constructive Comment:

A model (visual) showing how the body systems interact to make the activity possible

- Include an explanation of each body system's contribution and how the systems interact to do the activity.
- Include labels that identify the organs in each system.
- Include labels that identify tissues in one of the body systems.

Positive Comment:

Constructive Comment:

- A model (diagram) showing the neural pathways that make the activity possible
 - Show the pathway of the stimuli to the response or memory.
 - Include captions that describe how information gets from the outside environment to the brain and to the body systems that are activated as a result of the stimuli.

Positive Comment:

Constructive Comment: