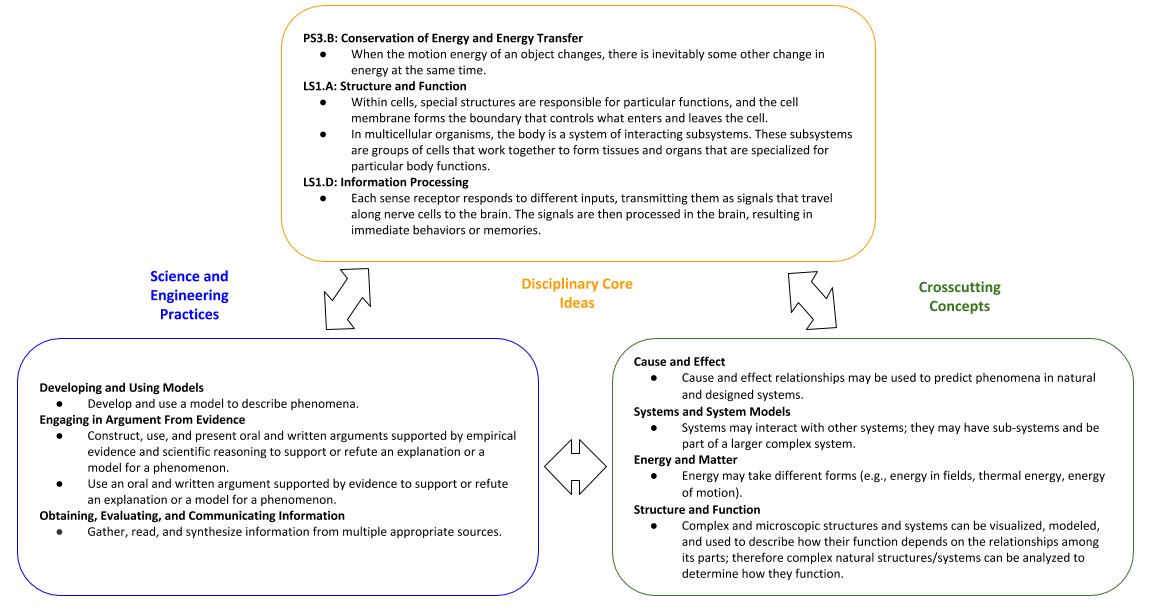
**Unit Essential Question:** *How do our bodies produce and use the energy needed to move objects?*

**Introduction**

Students use their bodies every day for a range of different activities without thinking twice about it. Many of these activities involve putting various objects in motion. In the Lift-Off task, students experienced how their bodies are able to make a kickball move. But what makes objects move? Where does the energy come from? And what is happening in humans’ bodies that make this movement possible?

In this project, each group will pick an activity that involves an object in motion and explain to people who do this activity how their bodies actually make the movement of the object possible. At the end of the unit, each group will create a video or presentation that not only demonstrates the activity, but also pauses throughout to describe the role of the human body in making the motion happen. Individually, they will then create a brochure to give more detail on the science involved in the human body putting an object in motion.

**3-Dimensional Assessment**

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**\***To maintain the authenticity of the Culminating Project, MS-LS1-1 is assessed in Task 4.

**Time Needed (Based on 45-Minute Periods)**

9 days at end of unit

* Group Project: 4 periods (includes 1 presentation day)
* Individual Project: 5 periods
  + First draft: 3 periods
  + Feedback: 1 period
  + Revision: 1 period

**Materials**

Presentation/Video

* Device with Video Recording
* Video Editing/Creation Software (e.g. iMovie, Sparkol VideoScribe, PowToons, etc.)
* Props (e.g. ball)
* Poster Paper
* Color pencils/markers or computer graphics

Brochure

* Blank Paper or Computer Program
* Color pencils/markers or computer graphics

**Instructions for the Culminating Project**

1. Introduce the Culminating Project at the end of the Lift-Off task, including both group and individual components outlined in the Challenge.
2. Read over the Culminating Project Task Card with students. We recommend only reading the Challenge and Group Project Criteria for Success at this time in order to not overwhelm students with information.

* Take questions for clarification.
* Optional: You may want to explain the different format options available for their group project (e.g., live presentation with props and posters, video using basic recording of presentation, whiteboard video using Sparkol VideoScribe, video using Powtoons, etc.)

1. Remind students as they complete the Project Organizer that they will be planning pieces of their presentation and recording scientific concepts they will likely need for their individual project. However, there is nothing wrong with going back and changing their ideas over the course of the unit. The students won’t fully design their presentation until the end of the unit, so change during the imaginative and creative time is acceptable and often experienced.
2. Make sure the students fill out the Project Organizer after each task, which will help the students think about different parts of their presentation along the way. This process allows students to both apply and document relevant scientific concepts as they move throughout the unit. This will inform both their group and individual projects.

* We recommend that students complete the Project Organizer individually, with the exception of choosing a physical activity after Task 1 as a group. They might discuss ideas first as a group, but should then respond individually. This allows students time to process concepts on their own and generate their own ideas, which can be used later when it comes to developing their group project.

1. The table below summarizes how the Project Organizer guides the students through developing different components of their activity presentation (group product) and brochure (individual product).

|  |  |  |
| --- | --- | --- |
| **Task** | **Project Organizer** | **Group and Individual Culminating Project** |
| **Lift Off**  Objects in Motion | * Brainstorm a list of activities that involve putting an object in motion. | * Group: A physical demonstration of the activity * Individual: A diagram and description of the physical activity and object in motion |
| **Task 1**  Energy in Motion | * Decide on an activity for the group culminating project. * Describe how an object moves in your group’s chosen activity. * Explain what you would need to change the motion of the object (e.g., make it go faster/slower or farther/closer). Cite evidence from your argument or investigations to support your explanation. | * Group: A recommendation for how you could change the movement of the object * Individual: An argument for why the motion of the object can vary, including the relationship between kinetic energy and energy transfer as well as observable evidence |
| **Task 2**  Sense and Respond | * Describe the nervous system pathway involved in your chosen activity, using a flowchart with labels, numbered list, or paragraph. | * Group: A description of the body’s nervous system pathway that results in the object’s motion * Individual: A description or labeled diagram of the nervous system pathway that causes their object to move, including citation of sources |
| **Task 3**  Interacting Subsystems | * In a paragraph, flowchart, or diagram, explain how different subsystems of the body work together to do your chosen activity. | * Group: An explanation of how different body systems interact to make the activity possible * Individual: An argument for how subsystems of the body interact to make the activity possible |
| **Task 4**  Got Cells? | * Research and identify the types of cells that make up these body systems you identified. * Why do you think these different types of cells look so different? * Even though they appear different, why are they all called cells? | * Group: N/A * Individual: N/A   \*This PE, MS-LS1-1, is assessed within Task 4. |
| **Task 5**  Parts of a Whole | * Now that you have learned about cells and their parts, describe where the energy to move objects comes from. | * Group: An explanation of where the energy comes from that moves the object * Individual: An explanation of where the energy to move the object actually comes from in the human body. Supported by a model that shows the interaction of cell parts for overall cell function. |

1. After all the learning tasks and the Project Organizer are completed, the students can start to design the presentation of their activity in live or video format. The Project Organizers and Group Project Criteria for Success should be used as reference to remind students to include all the components of their presentation.

* As always, we recommend the use of group roles for Culminating Project work time (See “How to Use This Curriculum” for details). We recommend changing the roles every work day.

1. Once class presentations are complete and have been exhibited, students are ready to move on to their individual project. Each student will create a brochure that explains the science behind their activity in more detail and meets all the criteria in the student handout. An optional template is provided at the end of this document to help students organize their brochure.
2. Conduct a peer review of the brochures after students have completed a first draft.

* Copy the Brochure Peer Review Feedback form found in the Student Instructions. Another option is to use the Student 3-Dimensional Individual Project Rubric.
* Assign each student a partner, preferably a partner from a different group.
* Students switch drafts and assess them using the peer review feedback form.
  + Remind each student to give one positive comment and one constructive comment for each section on the checklist.
  + Allow students time to present their feedback to their partner, so their partner may ask clarifying questions if needed.

1. After receiving feedback, allow students time to complete a final draft based on the feedback they received.

**Assessment**

The Project Organizer can be formatively assessed using:

* *Criteria of your choice.* We recommend using the 3-Dimensional Assessment matrix from the Unit Overview to inform your criteria.

The Group Culminating Project will be summatively assessed using:

* The *Group Project Criteria for Success* Checklist

The Individual Culminating Project will be summatively assessed using:

* The *3-Dimensional Individual Project Rubric*.
* Keep in mind that the Proficient level indicates that the student has successfully demonstrated understanding of the criteria. Because we are in the early stages of NGSS adoption, it may take multiple opportunities throughout the course of the year for students to reach Proficient.
* If you wish to give students a numeric score, you could take the average score of all of their rubrics or add up rubric scores to give students a summation out of the total. Because of the note above, this scoring may not correlate to traditional grading systems.
* While we recommend scoring all of the project criteria with the rubrics for each student, we understand the burden of that level of scoring.
  + One option is to select the rubrics that you wish to focus on for this project and use those to assess each student’s individual project.
  + Another option is to review the Proficient level of each of the project’s rubrics and use the descriptions to generally analyze all student work for trends.

**Activity Brochure Template**

|  |  |  |
| --- | --- | --- |
| *(First Page When Opened)*  Optional diagram showing how the motion of the object can vary  An argument for why the motion of the object can vary, including the relationship between kinetic energy and energy transfer as well as supporting evidence. | *(Back Cover)*  Additional Information or Suggestions for Your Audience | *(Front Cover)*  Title of Activity  Your Name  Diagram of physical activity  and object in motion |
| *Left Inside Page*  Labeled diagram of the nervous system pathway that results in the physical activity  Any additional information about the nervous system pathway  Cite the sources you used to predict that this is the nervous system pathway used in your activity   * Source 1 * Source 2 * Source 3 | *Middle Inside Page*  Your argument for how subsystems of the body interact to make the activity possible.  A labeled diagram showing how the subsystems interact | *Right Inside Page*  An explanation of where the energy to move the object actually comes from in the human body.    A model that shows the different cell parts, their specific functions, and how they interact  A description of how the function of the whole cell depends on relationships between these cell parts |