Georgia Performance Standards Framework for Life Science- 7th Grade

Unit: Organization of Life

Inquiry Task
The Exercise Effect

Subject Area: Life Science
Grade: 7

Standards (Content and Characteristics):

S7L2: Students will describe the structure and function of cells, tissues, organs and organ systems.
   c. Explain that cells are organized into tissues, tissues into organs, organs into systems, and systems into organ systems.
   d. Explain that tissues, organs and organ systems serve the needs cells have for oxygen, food and waste removal.
   e. Explain the purpose of the major organ systems in the human body.

S7CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
   a. Understand the importance of—and keep—honest, clear, and accurate records in science.
   b. Understand that hypotheses can be valuable, even if they turn out not to be completely accurate.

S7CS2. Students will use standard safety practices for all classroom laboratory and field investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S7CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.
   a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents.
   b. Use the mean, median, and mode to analyze a set of scientific data.

Georgia Performance Standards Framework for Life Science- 7th Grade

c. Apply the metric system to a scientific investigation that includes metric to metric conversion. (i.e. centimeters to meters)
d. Draw conclusions based on analyzed data.

S7CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.
   b. Use appropriate tools for measuring objects and/or substances.
   c. Learn and use on a regular basis standard safety practices for scientific investigations.

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.
   a. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.

S7CS6. Students will communicate scientific ideas and activities clearly.
   a. Write clear, step-by-step instructions for conducting particular scientific investigations, operating a piece of equipment, or following a procedure.
   b. Write for scientific purposes incorporating data from circle, bar and line graphs, two-way data tables, diagrams, and symbols.
   c. Organize scientific information using appropriate simple tables, charts, and graphs, and identify relationships they reveal.

S7CS9. Students will investigate the features of the process of scientific inquiry.
Students will apply the following to inquiry learning practices:
   a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing competing theories.
   b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.
   c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.
   d. Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.
   e. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.
   f. Scientists use technology and mathematics to enhance the process of scientific inquiry.
   g. The ethics of science require that special care must be taken and used for human subjects and animals in scientific research. Scientists must adhere to the appropriate rules and guidelines when conducting research.

Georgia Performance Standards Framework for Life Science- 7th Grade

**Enduring Understanding:** Exercise increases the cell’s need for oxygen, food and waste removal.

**Essential Question(s):** How are cells, tissues, organs and organ systems affected by exercise?

**Pre-Assessment:** Students will write a brief paragraph on how they think cells are affected during exercise.

<table>
<thead>
<tr>
<th>Outcome/ Performance Expectations</th>
<th>Identify the learning goals for this inquiry-based task.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students will observe changes in body systems during exercise.</td>
<td></td>
</tr>
<tr>
<td>• Students will design an experiment to lead them to conclude that as you exercise the cell’s need for oxygen, food and waste removal increases.</td>
<td></td>
</tr>
<tr>
<td>• Students will explain how cells obtain oxygen and nutrients and remove waste.</td>
<td></td>
</tr>
<tr>
<td>• Students will recognize how cells, tissues, organs and organ systems are related.</td>
<td></td>
</tr>
<tr>
<td>• Students will create a lab report in which they will draw conclusions about the relationship between cellular needs and exercise. The report will also present evidence to explain/support their conclusions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Write a concept statement...<strong>How would you formulate an expert idea?</strong></th>
<th>List examples of how students may incorporate their ideas into experiments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class discussion to guide student. Begin with teacher led questions</td>
<td></td>
</tr>
<tr>
<td>• Think about the processes your body is carrying out while you are at rest. (Make sure to guide students to think about each level of organization.)</td>
<td></td>
</tr>
<tr>
<td>• How do cells get nutrients and oxygen that they need?</td>
<td></td>
</tr>
<tr>
<td>• How do cells remove wastes that they do not need?</td>
<td></td>
</tr>
<tr>
<td>• How does the hierarchy of organization help cells to gain needed materials and remove unneeded materials?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Write a concept statement / question...<strong>What kind of situation would cause this concept to become apparent in students’ understanding?</strong></th>
<th>Write questions or statements to assist students develop and explain their ideas (i.e. aid in conceptualizing their knowledge-making exploration).</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hypothesize about what will happen to your body and at each level when you begin to exercise.</td>
<td></td>
</tr>
<tr>
<td>• Why do you think you are breathing harder than when you were at rest?</td>
<td></td>
</tr>
</tbody>
</table>

### Georgia Performance Standards Framework for Life Science- 7th Grade

<table>
<thead>
<tr>
<th>Why do you think you might be thirstier than when you were at rest?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do you think you are perspiring more than when you were at rest?</td>
</tr>
<tr>
<td>Why do you think your heart is beating more rapidly than when you were at rest?</td>
</tr>
<tr>
<td>Are all of these things related? If so, explain how they are related.</td>
</tr>
<tr>
<td>How does exercise change a cell’s needs for nutrients, oxygen, and waste removal?</td>
</tr>
<tr>
<td>How is the cell’s change in needs related to body processes (respiration, excretion, nutrient intake, blood pressure, pulse rate) and the tissues, organs, and systems that are associated with the body processes?</td>
</tr>
</tbody>
</table>

#### Identify necessary data and observations...What data would demonstrate the mastery of the concept by ALL students in the classroom?

- Identify relevant observations and data collected made students to aide in conceptualizing their knowledge-making exploration. In addition, lists misconceptions that arise and may prohibit students internalizing their own understandings, and what steps should a teacher take to overcome these misconceptions?

Students may:
- Record data relating to body processes such as pulse rate, breathing rate, blood pressure, and perspiration rate while at rest.
- Record data relating to the same body processes after a period of exercise (i.e., running in place or jumping jacks).
- Construct some type of chart to compare their data.
- Use a lab report to discuss conclusions drawn from inquiry task. Students should make sure to provide the evidence that they used to support their conclusions.

**Possible Misconceptions:**
- Body systems/processes are not related to one another. Each system acts independently of each other. ---The inquiry task should result in the students drawing the conclusion that all systems work together to ensure the needs of the cells.
- Only the digestive system rids the body of wastes. ---From observations made in the inquiry lab, students should note that perspiration and respiration both increase. Lead students to the understanding that not only are they taking in more oxygen as they inhale more frequently, but they are ridding the body of more carbon dioxide as they are exhaling more frequently. Also, they should note that their sweat contains waste products.

<table>
<thead>
<tr>
<th>Write procedures that will cause students to organize data... Test a procedure using known concepts.</th>
<th>List sample procedural statements that students may use to organize their data.</th>
</tr>
</thead>
</table>
| 1. Students will record their blood pressure, pulse rate and respiration while at rest. Data will be recorded on a data table. Students may use computer based spreadsheet programs to organize data.  
2. Students will then begin running in place, doing jumping jacks or some other aerobic exercise for a period of time as indicated by students. They will then record blood pressure, pulse rate, and respiration following the period of exercise. Data will be recorded on a data table. Students may use probe ware to gather data. Students may use stopwatches to gather data.  
3. Students will then use the computer to construct a graph to compare their data.  
4. Students will use prior knowledge and critical thinking to draw conclusions about the effect of exercise on the needs of cells. Conclusions will be recorded on a lab report. Students may generate this document using a word processing program. |  |
| Write questions or activities to use or apply the concept (represent, model, visualize, or design new experiments). | Create a pamphlet for a doctor’s office or exercise facility explaining how exercise affects body systems in a positive manner. Information in the pamphlet can be supported with research and data from their inquiry task.  
Students may use computer generated graphics combined with a word processing program to create the pamphlet. |
| Homework/Extension | Students will keep an exercise log for one week recording the types of exercise that they get and the duration of each exercise session. |
| Instructional Tasks Accommodations for ELL Students | ELL students will be provided with a list of step-by-step directions for lab.  
ELL student will work with student proficient in English.  
ELL student will be provided with a teacher-generated lab report containing notations to ensure their understanding of lab terminology. |
| Instructional Tasks Accommodations for Students with Disabilities | Students will be provided with a checklist for lab.  
Students will be provided a step-by-step checklist for making the pamphlet.  
Student will work with a responsible student when constructing the graph on computer.  
Provide students with a teacher-generated lab report. |

### Instructional Tasks for Gifted Students

| Accommodations for Gifted Students | Students will gather all students’ data and construct a graph to display students’ pulse rate and blood pressure. Students will analyze the data and hypothesize why there were differences among the students’ data. |