



# Gold Seal Lesson

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<b>Grade Span</b>			<b>ICLE Application Model</b>			
K-4 X	5-8	9-12	A	B	C	D X

### Instructional Focus:

#### Basic Concepts and Knowledge

Students develop an understanding of scientific concepts using facts, theories, principles, and models.

#### Science as Inquiry

Students demonstrate knowledge and skills necessary to perform scientific inquiry.

#### Habits of Mind

Students develop habits of mind including curiosity, open-mindedness and persistence.

#### Tools and Technology

Students use appropriate tools and technologies to model, measure, and apply the results in a problem-solving situation. Students communicate the reasoning used in solving these problems.

#### Measurement

Students use a variety of tools and techniques of measurement in a problem-solving situation. Students communicate the reasoning used in solving these problems.

#### Statistics and Probability

Students use statistics and probability to analyze given situations and the results of experiments. Students communicate the reasoning used in arriving at a conclusion.

### Performance Task

In this lesson, students explore the relationship between level of physical activity and their pulse, breathing, and body temperature. They make predictions about how these change with different activities, and then test their predictions.

Before beginning the exercise, you will have to teach students how to take their pulse, monitor their breathing rate (using three general categories: slow, medium, and fast), and take their temperature. Depending on students' ability to take their pulses and the availability of thermometers, it will probably be necessary to divide the class into pulse monitors, breathing monitors, and temperature takers.

Let the class come up with a list of about five activities, such as sitting, standing up, singing, walking, running, dancing, and doing various exercises (push-ups, sit-ups, or jumping jacks). Either as a class or individually, have them predict how these activities will affect their pulse, breathing, and temperature. Have them state some reasons to justify their reasoning. Make sure these predictions and reasons are written down, either on the chalkboard, or the overhead, or in students' notebooks.

Have the students do one of the activities for three minutes, then, while they continue to do the activity, if possible, have the students measure their pulse, breathing rate, or temperature as assigned. Have them record their measurements. Repeat this procedure for the other four activities.

Give the students a few minutes to look at their results and compare them to their predictions. Then have students from the different groups (pulse monitors, breathing monitors, temperature takers) present their results. Either as a class or individually, have the students make tables and graphs showing their results.

Examine the results to see whether they agree with the students' predictions, and give reasons why or why not. Depending on students' level, you can enter into a larger discussion of—or have students investigate—the related body systems and how they are affected by activity. Students may be especially interested in why body temperature does not change like the other two do. Some students may want to search the Internet to see if they can find information or studies related to pulse, breathing, and temperature in humans.

## ICLE Essential Skills

Understand the best procedures for statistical data collection, organization, and display including making estimates and predictions and drawing inferences. (m5)
Understand and use various techniques for estimating, making and converting measure. (m33)
Identify and understand the structure and parts that comprise the systems (i.e., cardiovascular, nervous, lymphatic, muscular, etc.) and regions (i.e., head and neck, upper limb, thorax, abdominopelvic, back, and lower limb) of the human body. (s2)
Make observations using senses and instruments. Inferences and interpretations are arrived at based on observations. Classify observable properties and organize observations in a meaningful and logical way. (s5)
Exhibit good data management skills by collecting, organizing, and graphing data. (s19)
Know and apply the principles of scientific inquiry. (Implicit in this statement are the processes of prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.) (s114)

### Scoring Guide:

(If hypotheses, charts, graphs, and explanations are recorded individually)

Hypotheses 25 Points	Student provides predictions and reasons, reflecting some amount of thought. General statements based on observation and experience ("you have to breathe more when you run") are acceptable, but higher scoring reasons will connect to facts about how the body works that cannot be observed directly ("your body needs more oxygen when it works harder").
Data collection 25 Points	Student records each of his/her observations consistently and in a way that can be understood clearly and facilitates later use in charts and graphs.
Tables and graphs 25 Points	<p>Table:</p> <ul style="list-style-type: none"> <li>Includes major headings (activity and pulse, breathing, or temperature)</li> <li>Includes all observations</li> </ul> <p>Graph</p> <ul style="list-style-type: none"> <li>Appropriate type chosen</li> <li>Drawn properly (scales appropriate, axes/pieces labeled)</li> <li>Contains key information</li> <li>Appropriately labeled</li> <li>Is consistent with data in table</li> </ul>
Analysis 25 Points	<ul style="list-style-type: none"> <li>Student provides reasonable explanations for differences, such as initial lack of information about the way the body functions</li> <li>Student recognizes the possibility of errors in recording data</li> </ul>

### Keywords

English Language Arts	Mathematics	Science
Reading	Algebra	Earth Science
Writing	Geometry	Life Science Cause and effect Human body Respiration Vital functions
Communications	Statistics Charts Data analysis Data collection Data display Hypothesis testing Prediction Tables	Chemistry
Literature	Calculus	Physics
Other	Trigonometry	Other
	Other Rate Relationships	