**QUALITY PERFORMANCE ASSESSMENT PLAN**

**Task Title:** Evaporation Rates

**Subject Area/Course:** Earth Science

**Grade Level:** 9-12 Performance Task

**Abstract/Summary:** Students collect data on the cooling of water in two different test tubes- one wrapped in wet newspaper and one in dry newspaper. They then identify trends in their data, make predictions, and describe how their experiment is similar to the evaporation rates in the Earth’s Atmosphere.

The task assesses students' abilities to make observations, gather and collect data, identify trends and make predictions, and to demonstrate their understanding by relating the experiment to real life.

**Time Needed to Complete Task:** 45-60 minute block of time

**Original Author:** New York State Alternative Assessment in Science Project (NYSED)

<http://pals.sri.com/tasks/9-12/Perspiration/admin.html> PALS SRI International. “How effective is perspiration at cooling”Accessed: November, 2014**.**

**Originally Reviewed and Revised by:** The Council of Chief State School Officers/State Collaborative on Assessment and Student Standards ([CCSSO](http://www.ccsso.org/standards-assessments.html)/[SCASS](http://www.ccsso.org/scass.html)), the Connecticut Academic Performance Test ([CAPT](http://www.state.ct.us/sde)), the Kentucky Department of Education ([KDE](http://www.kde.state.ky.us/)), the New York State Education Department ([NYSED](http://www.nysed.gov/)), the RAND Institution ([RAND](http://www.rand.org/)), the Assessment of Performance Unit (APU), and the Oregon State Education Department ([OSED](http://www.ode.state.or.us/)).

**Modified Assessment Submitted by:** Rochester School District

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| **ALIGN: Instructional Goals** |
| **New Hampshire Competencies**  |
| **Cause and Effect:** Students will demonstrate the ability to investigate, explain, and evaluate potential causal relationships by using evidence to support claims and predictions about the mechanisms that drive those relationships.**Nature of Science:** Students will demonstrate the ability to work collaboratively and individually to generate testable questions or define problem, plan and conduct investigations using a variety of research methods in various setting, analyze and interpret data, reason with evidence to construct explanation in light of existing theory and previous research and effectively communicate the research processes and conclusions.  |
| **New Hampshire Work Study Practices** |
| CommunicationI can use various media to interpret, question, and express knowledge, information, ideas, feelings, and reasoning to create mutual understanding. *Graduating seniors will be able to demonstrate that they can:** *Communicate effectively using multiple modalities*
* *Interpret information using multiple senses*
* *Demonstrate ownership of the work*

 CollaborationI can work in diverse groups to achieve a common goal.*Graduating seniors will be able to demonstrate that they can:** *Contribute respectfully*
* *Listen and share resources and ideas*
* *Accept and fulfill roles*
* *Exercise flexibility and willingness to compromise*
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| **Other Goals** * **Standards, 21st century skills, and school-specific goals**
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| * Students will demonstrate the ability to work independently and collaboratively to solve problems and accomplish goals.

National Science Education Standards:* 12 A SI 1: Abilities necessary to do scientific inquiry: Grades 9-12
* 1.3 Use technology and mathematics to improve investigations and communications. A variety of technologies, such as hand tools, measuring instruments, and calculators, should be an integral component of scientific investigations. The use of computers for the collection, analysis, and display of data is also a part of this standard. Mathematics plays an essential role in all aspects of an inquiry. For example, measurement is used for posing questions, formulas are used for developing explanations, and charts and graphs are used for communicating results.
* 1.4 Formulate and revise scientific explanations and models using logic and evidence. Student inquiries should culminate in formulating an explanation or model. Models should be physical, conceptual, and mathematical. In the process of answering the questions, the students should engage in discussions and arguments that result in the revision of their explanations. These discussions should be based on scientific knowledge, the use of logic, and evidence from their investigation.
* 8 B PS 3: Transfer of energy: Grades 5-8
* 3.2 Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.
* 8 C LS 3: Regulation and behavior: Grades 5-8
* 3.2 Regulation of an organism�s internal environment involves sensing the internal environment and changing physiologic activities to keep conditions within the range required to survive.
* (Use the "hot" link on the PALS home page to check the full text of related National Science Education Standards, if desired.)

National Council of Teachers of Mathematics:* AL1: Understand patterns, relations and functions:
* Grades 9-12 k. analyze functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior
* AL3: Use mathematical models to represent and understand quantitative relationships:
* Grades 9-12 f. draw reasonable conclusions about a situation being modeled
* AL4: Analyze change in various contexts :
* Grades 9-12 f. use graphs to analyze the nature of changes in quantities in linear relationships
* DAP1: Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them:
* Grades 9-12 l. understand the meaning of measurement data and categorical data, of univariate and bivariate data, and of the term variable
* Grades 9-12 m. understand histograms, parallel box plots, and scatter plots and use them to display data
* PS2: Solve problems that arise in mathematics and in other contexts:
* Grades 9-12 COM2: Communicate their mathematical thinking coherently and clearly to peers, teachers, and others:
* Grades 9-12 REP1: Create and use representations to organize , record, and communicate mathematical ideas:
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| **Depth of Knowledge Alignment** |
| It is a DOK Level 3. Students use concepts to solve a non-routine problem, explain/connect ideas using supporting evidence, analyze and draw conclusions citing evidence. |
| **Essential Questions or Key Concepts for Learning** |
| * How effective is perspiration at cooling?
* What happens to evaporation rates when wind or humidity is presented?
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| **Students will know (content) . . .** * Bullet points
* Specify discreet content and key concepts that align to the competencies and standards (e.g., types of angles)
 | **Students will be able to (skills). . .** * Bullet points
* Specify process and skills that align to the competencies and standards
* Start with a verb (e.g., justify why an angle is classified the way it is)
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| * Nature of Science
* Cause and Effect
* Evaporation Rates
* Relative Humidity
* Wind Chill
 | * Define Problems
* Plan and conduct investigations
* Analyze and Interpret Data
* Make a claim
* Use data/evidence to support a claim
* Communicate research results and conclusions
* Explain the cause and effect relationship between the data collected and the real-world scenario
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| **DESIGN: Performance Task and Evidence**  |
| **Common performance task summary** This is a high level summary about what the students will be doing. It should be no more than 3-5 sentences or bullet points.  |
| Students collect data on the cooling of water in two different test tubes- one wrapped in wet newspaper and one in dry newspaper. They then identify trends in their data, make predictions, and describe how their experiment is similar to the body's perspiration. The final portion of the performance assessment asks students to use the information they have gathered to design a new experiment to find the effect when the humidity of the classroom has been changed.  |
| **Key criteria for performance assessment** Please list the criteria used in the rubric. We recommend no more than 4-5 criteria. These criteria should come from the competencies, standards, work study practices, skills and/or content. |
| Define ProblemsPlan and Conduct investigationsAnalyze and Interpret dataCommunicate using claim, evidence and ReasoningCause and Effect Relationships |
| **Possible Accommodations** What will teachers do in terms of instruction, curriculum and assessment to support the learning of SPED/ELL/other students in class?  | **Resources/Texts/Scaffolding Materials** What’s included here depends on the task assignment. It is recommended that a variety of resources are provided that allow students to make choices to access the information needed to complete the assignment. |
| * Additional time
* Oral reading of instructions
* Computer as needed for responses
 | Students should have:* two test tubes
* test tube rack - clear container to hold test tubes upright
* newspaper- cut into strips the same length as the test tubes
* hot water- in styrofoam or insulated cups
* thermometers- that fit in the test tubes
* 2 rubber bands
* eye dropper
* funnel
* Timer/Clock

**Advance Preparation:*** Cut strips of newspaper that are the same length as the test tubes.
* Prepare a source of hot water (about 70 degrees Celsius) so that students will have water samples that are a consistent temperature for the experiment.
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| **Teacher Guide**  |
| **Pre-requisites and Placement in the Curriculum** |
| * Scientific inquiry with design, data collection, graphing and analytical reasoning
* Thermal Energy
* Wind Chill and Heat Index
* Evaporation Rates
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| **Possible Formative Assessments** |
| The steps in the process could serve as benchmarks or points for formative assessment.* 1. Objective/Hypothesis
	2. Materials and Methods
	3. Observations
	4. Graphs with multiple data sets
	5. Humidity and evaporation rates
	6. Analysis of Results and Error
	7. Conclusions
	8. Questions
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| **Teacher Instructions**To ensure the fidelity in implementation, this section includes:* Step-by-step procedures to implement task as designed
* Information on the time allotted for each step of the task
* Materials needed
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| * Unit will take 1-2 weeks with 1 class day to complete task
* Teacher will need to plan lessons, reading materials or activities to explore thermal energy in preparation for the task.
* Students should be allowed to use any notes, formulas, or resources that they desire to complete the project. The only stipulation is that they must do and show their own work.
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| **Teaching/Learning Plan***To be completed by individual teacher, as learning plan may vary by teacher* The lesson plan is written as an outline that other teachers could understand and/or apply in their respective classroom (s). This generally outlines the scope and sequence of the lesson plans within the unit. It is recommended that the following are included: * The lesson plan includes how the goals will be addressed (what students know and can do
* The different steps and the specific instructions that correspond with each step of the process
* A timeline for each task
* Time or space for student reflection and feedback
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| This can be varied according to the time available and the unique needs of your classroom. It could exist within a two week unit or a five week unit. |