Sample rubric with connections to Next Generation Science Standards (NGSS)showing how instruction outlined in this article can be connected to the NGSS, and how the materials and activities outlined in this article may help students achieve relevant performance expectations through the NGSS dimensions. Note: The connections listed here and associated rubric expectations are not exhaustive—other connections to the science DCI may apply.

|  |  |  |  |
| --- | --- | --- | --- |
| **Integration of NGSS Strands: *How well does the student integrate disciplinary core ideas, cross cutting concepts, and science/ engineering practices?***  **Performance Expectations (PE’s)**   |  | | --- | | MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.  MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. | | | |
|  | *Uses science/engineering practice(s) to demonstrate and apply content while making connections to the cross cutting concepts with minor errors.* | *Uses science/engineering practice(s) to demonstrate and apply accurate content and makes connections to the cross cutting concepts* |
| **NGSS Dimension** | **Approaches Expectations** | **Meets Expectations** |
| ***Science & Engineering Practices***  Planning & Carrying Out Investigations; Analyzing and Interpreting Data | *Asks testable questions that require sufficient and relevant evidence to answer. Identifies the limitations of the data analysis (e.g., measurement error, sample selection) with minor errors or omissions.*   * Students ask a question that does not take into account the assigned boundary conditions discussed in the article text OR is outside the scope of the assigned task * Students inaccurately identify physical processes responsible for observed air temperature patterns from temperature sensor data OR suggest unreasonable possibilities | *Asks testable questions that require sufficient and relevant evidence to answer and evaluates the testability of the questions. Identifies the limitations of the data analysis (e.g., measurement error, sample selection) and identifies some implications for the findings.*   * Students ask a question that reasonably meets the assigned boundary conditions as discussed in the article text * Students accurately identify reasonable physical processes responsible for observed air temperature patterns from temperature sensor data |
| ***Disciplinary Core Ideas***  ESS2.D: Weather and Climate  PS3.A: Definitions of Energy (Temperature)  PS3.B: Conservation of Energy and Energy Transfer | *Identifies or otherwise applies relevant content with minor errors or omissions.*   * Students inaccurately explain how environmental temperatures are measured OR are unable to fully explain the reasoning for making temperature observations * Students inaccurately predict short-term patterns in air temperatures at small scales based on their experimental data sets * Students are unable to make predictions based on their experimental data or make inferences about large-scale patterns * Students are unable to accurately explain the reasoning for using a Solar Radiation Shield for housing sensors to measure environmental temperatures. | *Explains or otherwise applies relevant and accurate content.*   * Students accurately explain how environmental temperatures are measured and reasoning for making such observations * Students accurately predict short-term patterns in air temperatures at small scales based on their experimental data sets * Students use their small-scale data to suggest difficulties in accurately predicting large-scale patterns * Students accurately construct and explain the reasoning for using a Solar Radiation Shield for housing sensors to measure environmental temperatures. |
| ***Cross Cutting Concepts***  Patterns; Cause & Effect; Scale, Proportion, and Quantity | *Identifies or makes connection(s) to relevant cross cutting concept(s) with minor errors or omissions.*   * Students inaccurately use observed measurements to demonstrate complexity of air temperature patterns * Student presentations inaccurately demonstrate a comparison of expected versus actual results in observed data and suggest unreasonable future research approaches | *Explains OR makes accurate connections to relevant cross cutting concept(s).*   * Students use observed measurements (data) to accurately demonstrate the complexity of air temperature patterns at small scales * Student presentations accurately demonstrate a comparison of expected versus actual results in observed data and consider reasonable future research approaches |