**NTN Knowledge and Thinking Rubric for Scientific Research, Grade 8**
The ability to reason, problem-solve, develop sound arguments or decisions, and create new ideas by using appropriate sources and applying the knowledge and skills of a discipline

| | EMERGING | E / D | DEVELOPING | D / P | PROFICIENT | P / A | ADVANCED (10th grade level) |
|---|---|---|---|---|---|---|---|
| **SITUATING SCIENTIFIC INQUIRY** *What is the evidence that the student can formulate a question and provide information to situate a scientific investigation?* | • Formulates a **general** question, though not necessarily scientific<br>• Provides **general** content information that is **not directly related to** the question being tested | | • Formulates a scientific question, though not clearly tied to a testable question<br>• Provides **general** content information that is only loosely **related to** the question being tested | | • Formulates a **general** scientific question<br>• Provides **general** content information that is **related to** the question being tested | | • Formulates a **specific** scientific question<br>• Provides **specific** content information that is **related to** the question being tested |
| **STATING A HYPOTHESIS** *What is the evidence that the student can articulate a hypothesis, when appropriate?* | • Articulates a general "If____, then ____" prediction of expected results | | • Articulates a **relevant prediction** on the expected results, but not clearly based on scientific knowledge | | • Articulates a **relevant scientific prediction** of the expected results | | • Articulates a relevant scientific prediction of the expected results, and a **general idea** of the experimental design |
| **DESIGNING THE INVESTIGATION** ***What is the evidence that the student can design investigations to explore scientific phenomena?*** | • Experimental design **is not connected to** the testable question<br>• **Describes** general experimental procedures, with major gaps in sequences | | • Experimental design **is not closely related to** the testable question<br>• **Describes** general experimental procedures | | • Experimental design is **generally related** to the testable question<br>• **Describes** experimental procedures including tools/instruments used, but is **not clear or detailed enough** to be replicated | | • Experimental design is **clearly related** to the testable question<br>• **Describes** experimental procedures including tools/instruments used, and could likely be replicated |
| **COLLECTING DATA** *What is the evidence that the student can collect data from a sufficient number of trials?* | • Gathers incomplete data from **part of** the experiment | | • Gathers incomplete data from **one replication** of the experiment | | • Gathers data from **one replication** of the experiment | | • Gathers data from **several replications** of the experiment |
| **DRAWING EVIDENCE-BASED INTERPRETATIONS AND CONCLUSIONS** *What is the evidence that the student can interpret results draw conclusions based on evidence?* | • Draws **largely invalid** scientific conclusions<br>• Conclusions of the experiment are mentioned, **with major details missing** | | • Draws somewhat valid scientific conclusions, though **not completely tied to the tested hypothesis**<br>• Conclusions of the experiment are mentioned, with some **details missing** | | • Draws somewhat valid scientific conclusions that **directly supports or refutes the tested hypothesis**<br>• Conclusions of the experiment are discussed, including **mentioning data collected** | | • Draws **generally valid** scientific conclusions that directly supports or refutes the tested hypothesis<br>• Conclusions of the experiment are discussed, including **mentioning data collected** and the **acceptable scientific theory** |
| **COMMUNICATING RESULTS** *What is the evidence that the student can clearly present their scientific findings?* | • Uses a **single, incomplete** representation of conclusion | | • **Uses** a single representation (words, tables, diagrams, graphs and/or mathematical expression) to communicate conclusions, with major gaps in information | | • **Uses** a single representation (words, tables, diagrams, graphs and/or mathematical expression) to communicate conclusions | | • **Uses** multiple representations (words, tables, diagrams, graphs and/or mathematical expression) to communicate conclusions |

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