Science Proficiency Scale

**Draft*

Competency/Ability	Developing	Approaching	On-Level	Honors and Beyond
Asking Questions and Defining Problems (Inquiry)				
Observing			I can notice details, patterns, and structures in natural phenomena I can draw conclusions from the patterns and structures I observe I can apply my prior knowledge from observation and experimentation to novel natural phenomena I can build on my initial observations by using scientific instrumentation and technology	I can elaborate on my observations and conclusions by reflecting on prior interdisciplinary knowledge
Questioning			I can ask questions based on examining scientific observations, models and theories I can elaborate my thinking by asking clarifying questions and/or seeking additional information I can evaluate a question to determine if it is testable and relevant I can define a problem that can be investigated using scientific and/or engineering practices	I can develop conceptual questions using research, input from others, and connections between concepts I can use inquiry to challenge the interpretation of a data set, the premise of an argument or idea, and/or the suitability of a design

Adapted from Rikema and Williams, *The Standards-Based Classroom* (Corwin: Thousand Oaks, 2019).

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Planning and Carrying Out Investigations (Investigation)				
Designing			I can develop a hypothesis based on observations and plan an investigation to produce and collect data I can create measurable questions upon which research can be conducted I can make quantitative and/or qualitative claims regarding the relationship between experimental variables I can use an objective mindset to implement a user-centered design model I can respond to peer feedback in review of hypotheses, experimental design, and collected evidence	I can anticipate design flaws and adjust for better results I can prioritize criteria and constraints in designing experiments and developing solutions to a problem I can address novel situations in the lab and the natural world without specific direction by applying prior knowledge and research as needed
Experimenting			I can follow prescribed directions to test a hypothesis, including using identified lab equipment safely and accurately I can collaborate as a full participant in completion of a project/experiment I can identify independent and dependent variables and controls, and explain their significance in the context of the investigation	I can test a hypothesis by conducting a self-designed experiment I can elect appropriate tools to collect, record, analyze, and evaluate data I can define new questions, adjust hypotheses, and adapt experimental design when challenged by unpredicted data and conclusions I can recognize the limitations imposed by the tools and methodologies used

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			I can accurately collect and represent experimental data and data sets I can connect the data collected to concepts from class	
Analyzing and Interpreting Data (Analysis)				
Interpreting			I can assess the accuracy and precision of data collection methods and identify sources of error I can display mathematical representations to describe and/or support solutions and scientific conclusions I can explain what I have learned in the context of cross-cutting concepts that apply in all science and engineering domains	I can consider the limitations of data analysis due to methods and tools used I can compare and contrast data sets to examine consistency of measurements and observations
Reasoning			I can construct an explanation based on valid and reliable evidence obtained from an investigation I can evaluate the source and validity of data, hypotheses, and/or conclusions in scientific and technical texts I can apply scientific reasoning to show why the data or evidence is adequate for the explanation/conclusion	I can formulate and revise more than one possible explanation/conclusion from examining evidence I can evaluate biases related to evidence in considering various conclusions I can apply scientific models and theories to assess the extent to which the reasoning and data support the explanation/conclusion

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Engaging in Argument from Evidence (Communication)				
Knowledge			I can convey my ideas accurately using scientific terms, including describing scientific principles, systems, and/or processes evident in an investigation I can make a scientific claim and support this claim using data analysis and valid sources of scientific theory. I can explain how my hypothesis, experiment design, and conclusions relate to the research question I am investigating. I can communicate scientific and technical information or ideas in various formats (orally, graphically, textually, and mathematically)	I can use precise terminology to describe concepts, processes, and other phenomena, including in describing experimental design and results I can respond to counter-evidence to my conclusions I can compare, integrate and evaluate sources of information in order to address a scientific question I can communicate scientific findings, knowledge, and other data in formats appropriate to the field I can communicate with a clear sense of purpose, audience, content, and form
Writing			I can follow norms of scientific writing in regards to accurate use of scientific terms, formatting of data, and citing of sources. I can use formal language, an objective tone, and logical sequencing of scientific ideas in explaining my understanding.	I can model professional technical writing through precise use of scientific terms, proper formatting of text, tables and graphics, delivery of organized ideas, and reference to relevant research.

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Habits			*I approach my learning through an active mindset. I realize that my learning originates from my own actions.* *I fully engage in all class activities and understand that (approach?) every activity is created purposefully* *I work to recognize the purpose of my assignments and seek to maximize their benefits to me*	I can advocate for my own knowledge and understanding. I can work independently or in a collaborative setting in order to achieve a goal I can demonstrate perseverance when meeting road blocks in my work I can prioritize my study time to review and annotate my notes after class, and identify where I need further clarification I can reflect on my practices and adjust to increase my proficiency and understanding

*****Note: Not all NGSS Practices were used as headers. There are 8 total NGSS Practices. The unused practices are below:*****

- *Developing and Using Models*
- *Using Mathematics and Computational Thinking (I think it should be "Mathematical")*
- *Constructing Explanations and Designing Solutions (see above)*
- *Obtaining, Evaluating and Communicating Information*

*****For contrast, the competency headings are:*

- *Lead Scientific Investigations*
- *Analyze and Interpret Data*
- *Develop and Use Models*
- *Technical Writing*