**Scientific Reasoning Rubric**

Community College of Philadelphia defines scientific reasoning as the interpretation of measurable and/or observable information through inference and analogy to develop hypotheses and draw conclusions.

| **Skills** | **Beginning** | **Developing** | **Competent** | **Accomplished** |
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| **Student can describe methods of scientific inquiry and apply them to investigating, questioningand solving problems** | The student cannot:  Identify a scientific problem  Recognize that problems have solutions  Recognize the definition of an hypothesis | The student can:  Identify and clearly state a scientific problem  Select one possible solution to the problem  Select a hypothesis appropriate to the problem | The student can:  Restate the scientific problem in a question format  Predict one or more possible solutions to the problem  Generate a testable hypothesis appropriate to the problem | The student can:  Develop a proper research question  Evaluate alternate solutions to the problem  Propose how to evaluate a hypothesis appropriate to the problem |
| **Student can describe and carry out experimental procedures.** | The student**cannot:**  Recognize the purpose/ bjective of an experiment  Determine the materials needed to complete the experimental procedure  Recognize experimental variables | The student can:  State the purpose/ objective of the experiment in their own words  Determine the materials needed to complete the procedure  Differentiate between independent and dependent variables | The student can:  State the purpose/ objective of the experiment in their own words  Determine the materials needed to complete the procedure  Differentiate between independent, dependent, and confounding variables and controls  Describe the relationship between the experimental steps | The student can:  Explain the purpose/ objective of the experiment in their own words  Determine the materials needed to complete the procedure  Select the experimental variables and controls  Manipulate the experimental variables and controls  Suggest modifications of the experimental design, as appropriate |
| Student can perform laboratory tasks appropriate to the field. | The student**cannot:**  Obey safety rules and handle lab equipment safely  Follow written procedures  Identify scientific tools appropriate to the task  Work independently | The student can, with frequent reminders:  Obey safety rules and handle lab equipment safely  Follow written procedures accurately  Employ scientific tools with proper technique  Measure and record data | The student can independently:  Obey safety rules and carefully handle lab equipment  Follow written procedures accurately  Employ scientific tools with proper technique  Measure and record data with minimal errors | The student takes initiative to:  Obey safety rules and carefully handle lab equipment  Follow written procedures accurately  Employ scientific tools with proper technique  Measure and record data accurately |
| Student can interpret and communicate scientific information using written, oral and/or graphical means | The student**cannot:**  Interpret quantitative information from tables and graphs using basic vocabulary | The student can:  Interpret quantitative information from tables and graphs using vocabulary appropriate to the discipline  Construct data tables and represent information graphically | The student can, with few errors:  Interpret quantitative information from tables and graphs results using technical vocabulary  Independently construct data tables and represent information graphically.  Communicate experimental or investigative results | The student can, with few to no errors:  Accurately interpret quantitative information using highly technical vocabulary and make appropriate inferences  Independently construct data tables and represent information graphically  Clearly communicate experimental or investigative results  Draw logical conclusions from collected data |
| Student can describe and analyze one or more relationships among science, technology and society and demonstrate an understanding of scientific applications in everyday life | The student**cannot:**  Identify a technological breakthrough and its connection to science | The student can:  Identify a technological breakthrough and its connection to science  Place a technological breakthrough in an historical context  Explain some of its impacts on society | The student can:  Identify a technological breakthrough and its connection to science  Place a technological breakthrough in an historical context  Explain some of its impacts on society  Explain one or more scientific principles behind a technology | The student can:  Identify a technological breakthrough and its connection to science  Place a technological breakthrough in an historical context  Explain and analyze some of its impacts on society  Explain one or more scientific principles behind a technology  Describe examples or possible future developments related to science, technology and society |
| Student can demonstrate logical reasoning in explaining natural phenomena, experimental procedures or outcomes, and/or application of scientific or technological concepts. | The student struggles to:  Identify logical explanations for observed phenomena | The student can:  Identify logical explanations for observed phenomena  Identify fallacies or illogical conclusions based on observations | The student can:  Identify possible alternative logical explanations for observed phenomena  Identify fallacies or illogical conclusions based on observations or data | The student can:  Develop possible alternative logical explanations for observed phenomena  Describe fallacies or illogical conclusions based on observations or data  Evaluate claims based on observation, experimentation or data presented |