

25 pts	Scientific Tools	Procedures & Reasoning	Concepts & Content	Communication & Data
Novice	<ul style="list-style-type: none"> Did not use appropriate scientific tools or technologies (e.g., rulers, pH paper, hand lens, computer, reference materials, etc.) to gather data (via measuring and observing). 	<ul style="list-style-type: none"> No evidence of a strategy or procedure, or used a strategy that did not bring about successful completion of task/ investigation. No evidence of scientific reasoning used. There were so many errors in the process of investigation that the task could not be completed. 	<ul style="list-style-type: none"> No explanation, or the explanation could not be understood, or was unrelated to the task/ investigation. Did not use, or inappropriately used scientific representations and notation (e.g. symbols, diagrams, graphs, tables, etc.). No conclusion stated, or no data recorded. 	<p>No use, or mostly inappropriate use, of scientific terminology.</p> <ul style="list-style-type: none"> No mention or inappropriate references to relevant scientific concepts, principles, or theories (big ideas). Some evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used.
Apprentice	<ul style="list-style-type: none"> Attempted to use appropriate tools and technologies (e.g., rulers, pH paper, hand lens, computer, reference materials, etc.) to gather data (via measuring and observing) but some information was inaccurate or incomplete. 	<ul style="list-style-type: none"> Used a strategy that was somewhat useful, leading to partial completion of the task/ investigation. Some evidence of scientific reasoning used. Attempted but could not completely carry out testing a question, recording all data and stating conclusions. 	<ul style="list-style-type: none"> An incomplete explanation or explanation not clearly presented (e.g., out of sequence, missing step). Attempted to use appropriate scientific representations and notations, but were incomplete (e.g., no labels on chart). Conclusions not supported or were only partly supported by data. 	<ul style="list-style-type: none"> Used some relevant scientific terminology. Minimal reference to relevant scientific concepts, principles, or theories (big ideas). Evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used.
Practitioner	<ul style="list-style-type: none"> Effectively used some appropriate tools and technologies (e.g., rulers, pH paper, hand lens, computer, reference materials, etc.) to gather and analyze data, with only minor errors. 	<ul style="list-style-type: none"> Used a strategy that led to completion of the investigation/ task. Recorded all data. Used effective scientific reasoning. Framed or used testable questions, conducted experiment, and supported results 	<ul style="list-style-type: none"> A clear explanation was presented. Effectively used scientific representations and notations to organize and display information. Appropriately used data to support conclusions. 	<ul style="list-style-type: none"> Appropriately used scientific terminology. Provided evidence of understanding of relevant scientific concepts, principles or theories (big ideas). Evidence of understanding observable characteristics and properties of objects, organisms, and/or materials used.
Expert	<ul style="list-style-type: none"> Accurately and proficiently used all appropriate tools and technologies (e.g., rulers, pH paper, hand lens, computer, reference materials, etc.) to gather and analyze data. 	<ul style="list-style-type: none"> Used a sophisticated strategy and revised strategy where appropriate to complete the task. Employed refined and complex reasoning and demonstrated understanding of cause and effect. Applied scientific method accurately: (framed testable questions, designed experiment, gathered and recorded data, analyzed data, and verified results). 	<ul style="list-style-type: none"> Provided clear, effective explanation detailing how the task was carried out. The reader does not need to infer how and why decisions were made. Precisely and appropriately used scientific representations and notations to organize and display information. Interpretation of data supported conclusions, and raised new questions or was applied to new contexts. Disagreements with data resolved when appropriate. 	<ul style="list-style-type: none"> Precisely and appropriately used scientific terminology. Provided evidence of indepth, sophisticated understanding of relevant scientific concepts, principles or theories (big ideas). Revised prior misconceptions when appropriate. Observable characteristics and properties of objects, organisms, and/or materials used went beyond the task/ investigation to make other connections or extend thinking.