

## SCIENCE AND ENGINEERING PRACTICES RUBRIC

NOTE: Do **not** score students on the shaded (grey) dimensions of this rubric. The shaded dimensions are not assessed by the Designing Energy Efficient Vehicles task.

SCORING DOMAIN	EMERGING	DEVELOPING	PROFICIENT	ADVANCED
<b>ASKING QUESTIONS AND DEFINING PROBLEMS</b>	<ul style="list-style-type: none"> <li>Asks general questions that can be investigated.</li> </ul>	<ul style="list-style-type: none"> <li>Asks specific questions that can be investigated.</li> </ul>	<ul style="list-style-type: none"> <li>Asks questions that require sufficient and appropriate empirical evidence to answer.</li> </ul>	<ul style="list-style-type: none"> <li>Asks questions that require sufficient and appropriate empirical evidence to answer and evaluates the testability of the questions.</li> </ul>
	<ul style="list-style-type: none"> <li>Defines a problem (design) statement that is impractical or inadequate for the intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Defines a problem (design) statement that is minimally aligned to the intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Defines a problem (design) statement that is adequately aligned to the intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Defines a problem (design) statement that is completely aligned to the intent of the problem.</li> </ul>
<b>DEVELOPING AND USING MODELS</b>	<ul style="list-style-type: none"> <li>Model (labelled drawings, diagrams, etc.) relevant to the investigation include major conceptual or factual errors, or are missing.</li> <li>Discussion on limitations or precision of model as a representation of the system or process is flawed or missing.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs model (labelled drawings, diagrams, etc.) to represent the process or system to be investigated that include minor errors.</li> <li>Makes note of limitations or precision of model as a representation of the system or process.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs accurate model (labelled drawings, diagrams, etc.) to represent the process or system to be investigated.</li> <li>Explains limitations and precision of model as a representation of the system or process.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs accurate model (labelled, and precise drawings, diagrams, etc.) to represent the process or system to be investigated and provides an explanation of the representation.</li> <li>Explains limitations and precision of model as a representation of the system or process and discusses how the model might be improved.</li> </ul>
<b>PLANNING THE INVESTIGATION OR DESIGN</b>	<ul style="list-style-type: none"> <li>Proposes an investigation that will not produce relevant data to be used as evidence to answer the empirical question(s).</li> </ul>	<ul style="list-style-type: none"> <li>Proposes an investigation that will minimally produce relevant data to be used as evidence to answer the empirical question(s).</li> </ul>	<ul style="list-style-type: none"> <li>Proposes an investigation identifying dependent and independent variables that will adequately produce relevant data to be used as evidence to answer the empirical question(s).</li> </ul>	<ul style="list-style-type: none"> <li>Proposes an investigation identifying dependent and independent variables that will completely produce relevant data to be used as evidence to answer the empirical question(s).</li> </ul>
	<ul style="list-style-type: none"> <li>Proposes a design plan that does not address the criteria, constraints, and intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Proposes a design plan and description that minimally addresses the criteria, constraints, and intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Proposes a design plan and explanation that adequately addresses the criteria, constraints, and intent of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Proposes a design plan and detailed explanation that completely addresses the criteria, constraints, and intent of the problem.</li> </ul>
<b>CONDUCTING INVESTIGATION OR TESTING DESIGN</b>	<ul style="list-style-type: none"> <li>Provides procedures that are not replicable.</li> </ul>	<ul style="list-style-type: none"> <li>Provides replicable procedures with descriptions of measurements, tools or instruments, but conducts insufficient number of trials.</li> </ul>	<ul style="list-style-type: none"> <li>Provides replicable procedures with descriptions of measurements, tools or instruments, and conducts adequate number of trials.</li> </ul>	<ul style="list-style-type: none"> <li>Provides replicable procedures with descriptions of measurements, tools or instruments, and conducts adequate number of trials with a rationale for data collection.</li> </ul>



<b>SCORING DOMAIN</b>	<b>EMERGING</b>	<b>DEVELOPING</b>	<b>PROFICIENT</b>	<b>ADVANCED</b>
<b>ANALYZING AND INTERPRETING DATA</b>  Accurately labeled includes title, column titles, description of units, proper intervals	<ul style="list-style-type: none"> <li>Constructs spreadsheets, data tables, charts, or graphs that are not accurately labelled or do not display all the data.</li> <li>Analyzes data using inappropriate methods or with major errors or omissions.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs accurately labelled spreadsheets, data tables, charts, or graphs to accurately summarize and display data; but does not allow for examining the relationships between variables.</li> <li>Accurately analyzes data using appropriate methods with minor omissions and/or mentions limitations of data analysis.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs accurately labelled spreadsheets, data tables, charts, or graphs to accurately summarize and display data to examine relationships between variables.</li> <li>Accurately analyzes data using appropriate and systematic methods to identify patterns OR explain limitations of the data analysis (measurement error).</li> </ul>	<ul style="list-style-type: none"> <li>Constructs accurately labeled spreadsheets, data tables, charts, and/or graphs and uses more than one of these methods to accurately summarize and display data to examine relationships between variables.</li> <li>Accurately analyzes data using appropriate and systematic methods to identify patterns AND explain limitations of the data analysis (measurement error).</li> </ul>
<b>CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS</b>	<ul style="list-style-type: none"> <li>Uses inaccurate or inappropriate scientific ideas, principles, and/or evidence (experimental data) to construct, evaluate, or revise an explanation.</li> </ul>	<ul style="list-style-type: none"> <li>Uses accurate but minimal scientific ideas, principles, and/or evidence (experimental data) to construct, evaluate, or revise an explanation.</li> </ul>	<ul style="list-style-type: none"> <li>Uses accurate and adequate scientific ideas, principles, and/or evidence (experimental data) to construct, evaluate, or revise an explanation.</li> </ul>	<ul style="list-style-type: none"> <li>Uses accurate and complete scientific ideas, principles, and/or evidence (experimental data) to construct, evaluate, or revise an explanation.</li> </ul>
	<ul style="list-style-type: none"> <li>Uses no data to evaluate how well the design addresses the problem and the redesign of the original model or prototype is inappropriate or incomplete.</li> </ul>	<ul style="list-style-type: none"> <li>Uses minimal data to evaluate how well the design addresses the problem and outlines an appropriate redesign of the original model or prototype.</li> </ul>	<ul style="list-style-type: none"> <li>Uses adequate data to evaluate how well the design addresses the problem and explains an appropriate redesign of the original model or prototype.</li> </ul>	<ul style="list-style-type: none"> <li>Uses complete data to evaluate how well the design addresses the problem and provides a detailed rationale for the appropriate redesign of the original model or prototype.</li> </ul>
<b>ENGAGING IN ARGUMENTS FROM EVIDENCE</b>	<ul style="list-style-type: none"> <li>Constructs argument(s) with an inappropriate claim OR both evidence and reasoning are inadequate or unclear.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs and/or evaluates argument(s) consisting of minimal claims, limited sources of evidence, OR minimal reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs and evaluates argument(s) consisting of appropriate claims, multiple sources of evidence, and adequate reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>Constructs and evaluates argument(s) consisting of appropriate claims, multiple sources of evidence, and detailed reasoning.</li> </ul>
<b>COMMUNICATING FINDINGS</b>	<ul style="list-style-type: none"> <li>Findings are inaccurate and/or inconsistent with the evidence.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately communicates clear but minimal findings consistent with the evidence and mentions the implications OR limitations of the investigation or design.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately communicates clear and adequate findings consistent with the evidence and explains the implications and/or limitations of the investigation or design.</li> </ul>	<ul style="list-style-type: none"> <li>Accurately communicates clear and complete findings consistent with the evidence and provides a rationale for the implications and limitations of the investigation or design.</li> </ul>

