Science Practices and Content Rubric - AP Biology

Science Practice	Did Not Demonstrate	Beginning	Developing	Proficient	Mastery
Concept Explanation (Course Content)	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	Attempts to describe and explain biological concepts, processes, and models in both conceptual and applied contexts but includes major inaccuracies or omissions.	Describes and explains biological concepts, processes, and models in both conceptual and applied contexts but may contain a minor inaccuracy and/or omission	Effectively describes and explains biological concepts, processes, and models in both conceptual and applied contexts but may contain a minor inaccuracy or omission.	Accurately and effectively describes and explains biological concepts, processes, and models in both conceptual and applied contexts.
Visual Representations	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	Attempts to describe characteristics of a biological concept, process, or model represented visually, as well as explain relationships between these different characteristics but include major inaccuracies or omissions. Attempts to explain how biological concepts or processes represented visually relate to larger biological principles, concepts, processes, or theories but may include major inaccuracies or omissions.	Describes characteristics of a biological concept, process, or model represented visually, as well as explain relationships between these different characteristics but may contain a minor inaccuracy and/or omission Explain how biological concepts or processes represented visually relate to larger biological principles, concepts, processes, or theories but may contain a minor inaccuracy and/or omission..	Effectively describes characteristics of a biological concept, process, or model represented visually, as well as explain relationships between these different characteristics but may contain a minor inaccuracy. Effectively explain how biological concepts or processes represented visually relate to larger biological principles, concepts, processes, or theories but may contain a minor inaccuracy.	Accurately and effectively describes characteristics of a biological concept, process, or model represented visually, as well as explain relationships between these different characteristics. Accurately and effectively explain how biological concepts or processes represented visually relate to larger biological principles, concepts, processes, or theories.

Questions and Methods	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	Asks general, imprecise questions that require greater specificity to be testable. Identifies dependent and independent variables with unclear predicted relationships. Attempts to state the null hypothesis or alternative hypothesis but uses incorrect terminology or is not testable as formulated.	Asks testable questions that require sufficient and relevant evidence to answer Identifies predicted relationships between dependent and independent variables with minor errors. Null and alternative hypotheses not stated in mathematical terms or stated incorrectly.	Asks precise, testable questions that require sufficient and relevant evidence to answer. Discusses predicted relationships between dependent and independent variables. Null and alternative hypotheses are stated correctly in either words or mathematical terms.	Asks precise, testable questions that require sufficient and relevant evidence to answer and evaluates the testability of the questions Discusses predicted relationships, including quantitative relationships, between dependent and independent variables and appropriate controls (if applicable). Null and alternative hypotheses are stated correctly in words and mathematical terms
Representing and Describing Data	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	Constructs a graph with the necessary components that include correct orientation, units, labeling, scaling, plotting, type, and trend lines but missing and/or incorrectly incorporate several of the above. Identifies specific data points, describes trends or patterns, and describes relationships between variables with incomplete or inaccurate elements.	Constructs a graph with the necessary components that include correct orientation, units, labeling, scaling, plotting, type, and trend lines but missing and/or incorrectly incorporate a few of the above. Accurately identifies specific data points, describes trends or patterns, and describes relationships between variables but may have minor errors.	Constructs an accurate graph with the necessary components that include correct orientation, units, labeling, scaling, plotting, type, and trend lines but may be missing or incorrectly incorporates one of the above. Accurately identifies specific data points, describes trends or patterns, and describes relationships between variables.	Constructs an accurate graph with all necessary components including correct orientation, units, labeling, scaling, plotting, type, and trend lines. Fully and accurately identifies specific data points, describes trends or patterns, and describes relationships between variables.

Statistical Tests and Data Analysis	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	Attempts to analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make scientific claims, or to determine an optimal design solution. Analysis or explanation includes major errors or omissions Identifies mathematical concepts or methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) relevant to scientific questions or engineering problems, but applies them with major errors or omissions.	Analyzes and explains data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable scientific claims, or to determine an optimal design solution. Analysis or explanation includes minor errors or omissions. Applies appropriate mathematical concepts or methods (e.g.,ratio, rate, percent, basic operations, algebra, and functions) relevant to scientific questions or engineering problems, but applies them with minor errors or omissions.	Analyzes and explains data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable and supported scientific claims, or to determine an optimal design solution. Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent,basic operations, algebra, and functions) to answer scientific questions or engineering problems.	Analyzes and evaluates data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable and well supported scientific claims, or to determine an optimal design solution Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent, basic operations, algebra, functions, chi-square testing) to represent and solve scientific questions or engineering problems and explains whether the answer "makes sense".
Argumentation	The student's response is missing, illegible, or irrelevant. Fails to address the standard.	The student is able to present arguments on a scientific claim, which are unfocused or unsupported with evidence.	The student is able to present arguments on a scientific claim , which are logical and focused, but lack evidence that supports the argument.	The student is able to present arguments on a scientific claim that are logical, focused and supported with sufficient and relevant evidence.	The student is able to present arguments on a scientific claim that are logical, focused and supported with sufficient and relevant data. Interpretation of the data makes insightful connections to other contents or disciplines, or draws relevant conclusions to real world

	applications or problems.