

Application to Science and Society: One World (Criterion A)

This criterion refers to enabling students to understand the interdependence between science and society. Students should be aware of the global dimension of science, as a universal activity with consequences for our lives and subject to social, economic, political, environmental, cultural and ethical factors.

9 th Grade	10 th Grade	11 th Grade	12 th Grade
<i>Issue Identification</i>			
Identifies local and global issues of interest	Identifies and studies local and global issue of interest.	Studies and presents information regarding local and global issues.	Studies and presents information regarding local and global issues.
Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment	Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment	Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment	Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment
<i>Problem Solving</i>			
Explores a variety of possible solutions.	Explores a variety of possible realistic solutions	Explores a variety of possible solutions and blocks to action (i.e. social, economic, etc.)	Explores a variety of possible solutions and blocks to action (i.e. social, economic, etc.) Explores solutions worldwide.
<i>Contributions to Science and Society</i>			
Describes and discusses the benefits and limitations of scientific applications.	Describes and evaluates the benefits and limitations of scientific applications.	Develops an appreciation of the possibilities and limitations of science and scientists.	Develops an appreciation of the possibilities and limitations of the possibilities of science and scientists.
<i>Implications of Action</i>			
Explores how science interacts with social, economic, political, environmental, cultural and ethical factors.	Understands and discusses how science interacts with social, economic, political, environmental, cultural and ethical factors.	Understands and discusses how science interacts with social, economic, political, environmental, cultural and ethical factors as applied in Group 4 Project.	Understands and discusses how science interacts with social, economic, political, environmental, cultural and ethical factors as applied in Group 4 Project.

Communication in Science (Criterion B)

This criterion refers to enabling students to develop their communication skills in science. Students should be able to understand scientific information, such as data, ideas, arguments and investigations, and communicate it using appropriate scientific language in a variety of communication modes and formats as appropriate.

9 th Grade	10 th Grade	11 th Grade	12 th Grade
<i>Literacy :Writing</i>			
Outline scientific ideas, and practical experiences accurately in a variety of ways	Describe scientific ideas, arguments and practical experiences accurately in a variety of ways using scientific terminology correctly	Communicate scientific ideas, arguments and practical experiences accurately in a variety of ways using scientific terminology correctly following a given scientific format	Communicate scientific ideas, arguments, theories, and practical experiences accurately in a variety of ways using scientific terminology correctly following a given scientific format.
Are familiar with the Hilthi writing model (Sperts Write) as a tool for communicating ideas.	Use the Hilthi Writing Model with facility	Use the Hilthi writing model to express scientific ideas, logical arguments and scientific analysis clearly	Use the Hilthi writing model to express scientific ideas, logical arguments and scientific analysis clearly
Use and acknowledge additional sources of information in written pieces	Correctly employ a standard model of citation of sources	Correctly employ a standard model of citation of sources	Correctly employ a standard model of citation of sources
Present data in a variety of ways	Present data in the most appropriate format for the data	Present data in a manner which facilitate interpretation and understanding	Present data in a manner which facilitate interpretation and understanding
<i>Literacy: Reading</i>			
Obtain scientific information from a variety of sources, such as text, news articles and graphs.	Obtain scientific information from a variety of sources, such as text, articles and graphs.	Obtain scientific information from a variety of sources, such as text, journal articles and graphs.	Obtain scientific information from a variety of sources, such as text, journal articles and graphs.
Employ reading and vocabulary strategies to comprehend textbook readings. (<i>Sperts Read</i>)	Employ reading and vocabulary strategies to comprehend textbook readings and other supplementary readings.	Acquire scientific information from increasingly difficult scientific readings.	Acquire scientific information from increasingly difficult scientific readings.

Knowledge and Understanding of Science (Criterion C)

This criterion refers to enabling students to understand the main ideas and concepts of science and to apply them to solve problems in familiar and unfamiliar situations. Students are expected to develop critical and reflective thinking and judge the credibility of scientific information when this is presented to them.

9 th Grade	10 th Grade	11 th Grade	12 th Grade
Problem Solving			
Defines terminology with clarity. Communicates concepts with a limited range of content terminology.	Understands the meaning of and the relationship between a wide range of science content vocabulary. Communicates concepts with range of content terminology. Begins to express connections between ideas.	Understands vocabulary on a conceptual level. Communicate concepts with a range of content terminology. Expresses connections between ideas.	Understands vocabulary on a conceptual level. Communicates concepts with a wide range of content terminology. Expresses connections between ideas.
Collect and interpret data by identifying trends, patterns and relationships	Collect, analyze, and interpret data by identifying trends, patterns and relationships	Design scientific investigations that include variables and controls, material/equipment needed, a method to be followed, data to be collected and suggestions for its analysis	Design scientific investigations that include variables and controls, material/equipment needed, a method to be followed, data to be collected and suggestions for its analysis
Analyze, evaluate, synthesize scientific knowledge			
Hypothesize, infer, and predict explanations. Conduct experiments to reach a conclusion.	Hypothesize, infer, and predict explanations Conduct experiments to reach a conclusion.	Drawing on observations within the context of the laboratory setting to reinforce course content. Conduct experiments to reach a conclusion.	Drawing on observations within the context of the laboratory setting to reinforce course content Conduct experiments to reach a conclusion.
Identifies and begins to evaluate scientific knowledge from different sources. With guidance, understands the value of different sources.	Discusses and evaluates scientific information from a variety of sources. Independently, draws conclusions about the value of different sources.	Analyzes and synthesizes scientific information from a variety of sources. Determines and explains the value of scientific sources.	Analyzes, synthesizes, and evaluates familiar and unfamiliar scientific information. Determines and explains the value of scientific sources.
Scientific Inquiry (Criterion D)			
<i>This criterion refers to enabling students to develop scientific inquiry skills to design and carry out scientific investigations.</i>			

9 th Grade	10 th Grade	11 th Grade	12 th Grade
Experimental Design			
Collect and interpret data by identifying trends, patterns and relationships	Collect, analyze, and interpret data by identifying trends, patterns and relationships	Design scientific investigations that include variables and controls, material/equipment needed, a method to be followed, data to be collected and suggestions for its analysis	Design scientific investigations that include variables and controls, material/equipment needed, a method to be followed, data to be collected and suggestions for its analysis
Recognizes variables for any experimental procedure. Acknowledges variables and how they can be controlled. Understands the concept of independent, dependent, and controlled variables.	Recognizes the variables for any experimental procedure. Establishes control of at least one confounding variable. States controlled independent, and dependent variables.	Recognizes the relevant variables for self-designed procedures. Establishes controls. States independent/dependent variables.	Recognizes the relevant variables for self-designed procedures. Establishes controls. States independent/dependent variables. Procedures should indicate the handling of the variables.
Lists weaknesses and limitations. Considers the concepts of reliability and validity especially when suggesting improvements to method used in lab.	Lists relevant weaknesses and limitations. Comments on reliability and validity. Suggests realistic improvements in respect of identified weaknesses and limitations.	Evaluates weaknesses and limitations. Discusses reliability and validity. Suggests realistic improvements in respect of identified weaknesses and limitations.	Evaluates weaknesses and limitations. Discusses reliability and validity. Suggests realistic improvements in respect of identified weaknesses and limitations.
Processing Data (Criterion E)			
<i>This criterion refers to enabling students to record, organize and process data. Students should be able to collect and transform data by numerical calculations into diagrammatic form. Students should be able to analyze and interpret data and explain appropriate conclusions.</i>			
9 th Grade	10 th Grade	11 th Grade	12 th Grade
Organize and transform data into numerical and diagrammatic forms, including mathematical calculations and visual representation (tables, graphs and charts)	Organize and transform data into numerical and diagrammatic forms, including mathematical calculations and visual representation (tables, graphs and charts)	Organize and transform data into numerical and diagrammatic forms, including mathematical calculations and visual representation (tables, graphs and charts)	Organize and transform data into numerical and diagrammatic forms, including mathematical calculations and visual representation (tables, graphs and charts)
Uses the following calculations: • Mean, Median, Mode, Experiment-specific calculations.	Uses the following calculations (in addition to 9th): • % Error, % yield • Uses significant figures	Uses the following calculations with a calculator (in addition to 10th): • T-test, correlation, standard deviation and begins to explain the meaning. Uses Significant Figures.	Uses all calculations and can interpret the meaning of the tests independently. Uses Significant Figures.
Designs a procedure that allows for the collection of data. Uses methods of data collection from a description.	Designs a detailed procedure utilizing standard methods of data collection.	Designs a detailed, realistic procedure which allows for the collection of sufficient, relevant data.	Designs a detailed, realistic procedure which allows for the collection of sufficient, relevant data adapting standard methods of data collection in unfamiliar

			situations.
Uses measurement tools to collect data with guidance.	Selects and uses routine measurement tools independently to collect data and uses new instruments with guidance. Recognizes the presence of uncertainty.	Selects most appropriate measurement tools and independently uses them correctly. Selects proper data to measure during experiment. Indicates uncertainty. Uses significant figures.	Selects most appropriate measurement tools and independently uses them correctly. Adapts to unfamiliar tools through the use of appropriate resources. Selects proper data to measure during experiment. Uses significant figures.
Creates graphs of proper type (line, bar, or pie chart) and includes title, labels, units, and proper scale. Begins to evaluate graphs. Uses hand-generated graph as a template, may attempt the plotting of graphs using computer software. (not necessary for all students)	Creates multiple graphs of differing type (same as 9th grade) and includes title, labels, units, and proper scale. Distinguishes between data sets from same experiment to decide how to express data clearly to show patterns. Evaluates graphs. Uses hand-generated graph as a template, plots graphs using computer software.	Creates graphs of proper type (10th grade plus scatterplots, histograms) and includes title, labels, units, uncertainties (trend lines and error bars) and proper scale. Distinguishes between data sets from same experiment to decide how to express data clearly to show patterns. Evaluates graphs in relation to how it helps in interpretation. Plots meaningful graphs (with possible instruction) using computer software or spreadsheet programs including selection of scaling, trend lines and indication of uncertainties.	Creates graphs of proper type and includes title, labels, units, uncertainties (trend lines and error bars) and proper scale. Distinguishes between data sets from same experiment to decide how to express data clearly to show patterns. Evaluates graphs in relation to how they help in interpretation. Plots meaningful graphs using computer software or spreadsheet programs including selection of scaling, trend lines and indication of uncertainties.

Attitudes in Science (Criterion F)

This criterion encourages students to develop safe, responsible and collaborative working practices when carrying out experimental work in science.

9th Grade	10th Grade	11th Grade	12th Grade
Organizes given equipment so that it can be easily used to accomplish a task.	Collects and organizes equipment so that it can be easily used to accomplish a task as a team.	Collects and organizes all equipment needed for an experimental procedure.	Collects and organizes all equipment needed for an experimental procedure facilitating a cooperative venture.
Consistently follows safety protocols with guidance. Becomes aware of environmental impact of lab work.	Consistently follows safety protocols with some guidance. Begins to plans for safety issues. Shows awareness of environmental impact of lab work.	Consistently follows safety protocols. Plans for safety issues. Pays attention to environmental impact of lab work.	Consistently follows safety protocols. Initiates safety procedures. Pays attention to environmental impact of lab work.
Generates some work as an individual with some coaching. Recognizes group and individual	Generates some work as an individual with some coaching. Recognizes group and individual	Produces some work with complete autonomy acknowledging the contributions of others to their work.	Produces most work with complete autonomy acknowledging the contributions of others to their work.

accountability. Understands and practices academic honesty.	accountability. Begins to write for assessment individually. Understands and practices academic honesty.	Understands and practices academic honesty.	Understands and practices academic honesty.
--	--	---	---

9-10 Content Map	
IB MYP Year 4 Science (Biology)	IB MYP Year 5 Science (Chemistry)
<p><u>Scientific Inquiry</u></p> <ul style="list-style-type: none"> Application of the basic skills needed to conduct scientific investigations including how to ask good questions, how to organize your investigations, how to gather, collect and organize data, and how to report your findings. 	<p><u>Measurement and Mathematics</u></p> <ul style="list-style-type: none"> Determine how to collect and report measurements to the correct level of precision, depending on the instrument. Express measurements in scientific notation form to the correct number of significant figures. Use the process of dimensional analysis to solve problems.
<p><u>Chemistry and Biochemistry</u></p> <ul style="list-style-type: none"> Investigation of the the basic concepts of chemistry and how these apply to biochemistry, the chemistry of living organisms. Emphasis is placed on the four major organic macromolecules. 	<p><u>Atomic Structure and Function</u></p> <ul style="list-style-type: none"> Describe the structure of an atom using traditional as well as modern theories. Identify and Interpret trends in the periodic table to predict properties of specific elements.
<p><u>Cell Structure and Function</u></p> <ul style="list-style-type: none"> Compare the characteristics of plant and animal cells. Analyze how the parts of the cells work together to carry out all of the processes needed to support “life”. 	<p><u>Chemical Bonding and Nomenclature</u></p> <ul style="list-style-type: none"> Investigate and describe the properties of ionic, covalent, and metallic compounds. Provide the proper name and formula for compounds and molecules. Describe the shapes of molecules using Lewis Dot and VSEPR models.
<p><u>Cellular energy and relationships</u></p> <ul style="list-style-type: none"> Investigate the concept of “energy flow” and learn how living organisms transfer energy from cell-to-cell and from organism-to-organism. 	<p><u>Chemical Reactions</u></p> <ul style="list-style-type: none"> Determine if a chemical reaction has occurred. Construct a balanced chemical equation for a given reaction. Predict the amount of products and reactions use the stoichiometry of the equation.

<p><u>Cell division and Mendelian genetics</u></p> <ul style="list-style-type: none"> • Students will understand how cells divide and pass on their genetic information from one generation to the next. • Investigate mitosis and meiosis. • Investigate several different patterns of inheritance and study how these account for the vast amount of variety that is seen in the characteristics of living organisms. 	<p><u>States of Matter</u></p> <ul style="list-style-type: none"> • Analyze the dependence of state on temperature and pressure. • Examine the relationships between pressure, volume, temperature, and quantity of a sample of gas.
<p><u>DNA, Genes, Chromosomes and Protein Synthesis</u></p> <ul style="list-style-type: none"> • Understand mechanisms such as DNA/RNA replication, translation, and transcription that are used to give the traits of an organism 	<p><u>Solution Chemistry</u></p> <ul style="list-style-type: none"> • Apply the terms: unsaturated, saturated, supersaturated, molarity, molality, and PPM to a solution. • Predict the changes in physical properties as a result of adding a solute to a pure solvent • Understand acid base chemistry (KSUS)
<p><u>Biotechnology</u></p> <ul style="list-style-type: none"> • Analyze how humans can change the traits of an organism or species. 	
<p><u>Adaptations and change</u></p> <ul style="list-style-type: none"> • Investigate the mechanisms that have given rise to the vast biological diversity on Earth. 	
<p><u>Classification and ecology</u></p> <ul style="list-style-type: none"> • Investigate the accepted schemes for organizing species. • Analyze the affect of individuals and species on their environment. 	