Draft NE High School Science Performance Level Descriptors: Interpretation of Data (IOD)			
Science Skills & Practices Developed in the Classroom	Developing (1–18)	On Track (19–22)	ACT Benchmark (23–36)
Locating and Understanding: While learning key concepts in the life, Earth/space, and physical sciences, students should work with scientific text, tables, graphs, and diagrams while learning and engaging in science. Students should become familiar with the conventions for presenting scientific information and be able to locate data in scientific data presentations.	• Determine what is being represented by a simple scientific table, graph, or diagram and then locate relevant pieces of the displayed data • Identify and describe the features of scientific tables, graphs, and diagrams (e.g., axis labels, units of measure) • Understand and properly use common scientific terminology, symbols, and units of measure when engaging in science	• Determine what is being represented by a complex scientific table, graph, or diagram and then locate relevant pieces of the displayed data	Students scoring 23 or higher can likely demonstrate all the science skills in **Locating and Understanding**.
Inferring and Translating: Students should interpret and construct scientific tables, graphs, and diagrams to find trends and relationships, compare and combine data within data displays, and convert data from one type of display to another. Students should be able to work with data across multiple scientific tables and graphs. Students should regularly apply an appropriate level of mathematics to scientific data.	Students scoring 18 or lower may demonstrate some of the skills and practices in the higher score ranges of **Inferring and Translating**, but not consistently.	• Determine how the value of a variable changes as the value of another variable changes in a simple scientific table, graph, or diagram (e.g., direct and inverse relationships) • Make meaningful comparisons between data in a simple scientific graph, table, or diagram (e.g., find the highest/lowest value; order data from a table) • Combine data from a simple scientific graph, table, or diagram in meaningful ways (e.g., summing daily measurements to obtain a weekly total) • Translate scientific information into a table, graph, or diagram (e.g., convert tabular data into a graph)	• Make meaningful comparisons across data located in two different simple scientific graphs, tables, or diagrams (e.g., compare a value in a table to a value in a related graph) • Combine data from two different simple scientific graphs, tables, or diagrams in meaningful ways (e.g., categorize data from a table using a scale found in another table) • Make meaningful comparisons between data in a complex scientific graph, table, or diagram (e.g., compare rates of change in different regions of a titration curve) • Combine data from a complex scientific graph, table, or diagram in meaningful ways (e.g., summing data from two different curves in a graph represented by two y-axes) • Determine how the value of a variable changes as the value of another variable changes in a complex scientific table, graph, or diagram • Determine and/or use a simple mathematical relationship that exists between data (e.g., averaging data) *ADVANCED SCIENCE SKILLS & PRACTICES* • *Make meaningful comparisons across data located in two different complex scientific graphs, tables, or diagrams (e.g., compare phases of two substances represented by different phase diagrams)* • *Combine data from two different complex scientific graphs, tables, or diagrams in meaningful ways (e.g., use a calibration curve to determine a concentration from a measured absorption value)* • *Determine and/or use a complex mathematical relationship that exists between data (e.g., unit conversions)*
Extending and Reevaluating: Students should examine trends in scientific graphs and tables to predict values that fall between known data points. Students should be able to predict values that are beyond the range of presented data and to apply new findings to their interpretations.	Students scoring 18 or lower may demonstrate some of the skills and practices in the higher score ranges of **Extending and Reevaluating**, but not consistently.	• Examine trends in a simple scientific table or graph to estimate a value or range of values that falls between two known values (interpolation)	• Examine trends in a simple scientific table or graph to estimate a value or range of values that extends beyond the set of known values (extrapolation) • Use new findings to reevaluate interpretations of simple scientific data *ADVANCED SCIENCE SKILLS & PRACTICES* • *Examine trends in a complex scientific table or graph to estimate a value or range of values that falls between two known values (interpolation)* • *Examine trends in a complex scientific table or graph to estimate a value or range of values that extends beyond the set of known values (extrapolation)* • *Use new findings to reevaluate interpretations of complex scientific data*

What do “simple” and “complex” mean when they describe scientific data presentations in the Nebraska Science Performance Level Descriptors?

Concepts/Quantities Represented by a Simple Data Presentation	Type/Nature of a Simple Data Presentation
Concepts are likely to be familiar to, or readily understood by, high school students regardless of their exposure to rigorous science instruction: temperature, rainfall—or density and concentration (even if only understood qualitatively); newly introduced but readily understood quantities (e.g., percent of offspring, angle of reflection); numbers of things—or a simple quantity—per another familiar quantity, like rotations per minute or number of lightning strikes per storm event.	The type and nature of these data presentations are likely to be familiar to high school students regardless of their exposure to rigorous science instruction: tables with one or more columns and single headings, bar graphs with clusters of three or fewer bars, line graphs with three or fewer curves (with a legend, when needed), pie charts, and flow diagrams (e.g., a food web).

Concepts/Quantities Represented by a Complex Data Presentation	Type/Nature of a Complex Data Presentation
Some concepts are likely to be familiar to high school students who have had rigorous science instruction (but may not be to students lacking this instruction), such as momentum, freezing point depression, and reaction rate (even if only understood qualitatively). Others may be newly introduced but readily understood quantities (e.g., genetic frequency, work). In some cases, the concepts may be unfamiliar to high school students, even those who have had rigorous science instruction, such as heat (enthalpy) of reaction ($\Delta H°$) or torque, or concepts specific to complex scenarios that are fully explained in the text but will be challenging to many high school students. For those concepts, students of all levels will likely need to rely heavily on the explanations and definitions provided.	Many of the data presentations will be familiar to high school students who have had exposure to rigorous science instruction but challenging to other high school students, such as histograms, Venn diagrams, bar graphs with clusters of four or more bars and a legend, line graphs with several curves and a legend, line graphs with two *y*-axes, and flow diagrams with multiple outcomes. Other data presentations may be unfamiliar to high school students regardless of their exposure to rigorous science instruction, such as phase diagrams, combination bar/line graphs with two *y*-axes, or graphs with logarithmic scales.

Draft NE High School Science Performance Level Descriptors: Scientific Investigation (SIN)			
Science Skills & Practices Developed in the Classroom	Developing (1–18)	On Track (19–22)	ACT Benchmark (23–36)
Locating and Comparing: While learning key concepts in the life, Earth/space, and physical sciences, students should examine investigations to determine why they were carried out and what facts underlie the investigation, and to compare and contrast the elements of the different experiments that make up an investigation.	• Examine the procedure for a simple scientific experiment to locate key concepts needed to understand what is being investigated	• Examine the procedure for a complex scientific experiment to locate key concepts needed to understand what is being investigated	• Examine a set of related scientific experiments to identify similarities and differences in their designs, methods, and tools
Designing and Implementing: Students should examine investigations to identify the experimental hypothesis, controls, and variables, and what methods and tools were used to carry out the investigation. Students should understand why these design aspects and procedures were used and whether those choices best served the intent of the investigation, and should apply findings to design and carry out investigations.	• Understand the methods, tools, and functions of tools used in a simple experiment	• Understand the methods, tools, and functions of tools used in a complex experiment • Understand the design of a simple experiment (e.g., controls, independent and dependent variables, constants)	• Understand the design of a complex experiment (e.g., controls, independent and dependent variables) *ADVANCED SCIENCE SKILLS & PRACTICES* • *Determine the scientific question that is the basis for an experiment (e.g., the hypothesis) and formulate a testable question for one's own investigation* • *Evaluate the design and methods used in an experiment (e.g., possible flaws, precision and accuracy issues)*
Extending and Improving: Students should examine the results and procedures of investigations to predict how changing the value of a variable or altering the experimental design will produce new results or allow new questions to be addressed. Students may be ready to explore revising and extending investigations and to carry out new investigations that more fully address the questions they seek to answer.	Students scoring 18 or lower may demonstrate some of the skills and practices in the highest score range of **Extending and Improving**, but not consistently.	Students scoring 19–22 may demonstrate some of the skills and practices in the highest score range of **Extending and Improving**, but not consistently.	• Examine the results of an investigation to predict the result of an additional trial or measurement in an experiment • Examine the results of an investigation to predict the experimental conditions that would produce a desired result *ADVANCED SCIENCE SKILLS & PRACTICES* • *Propose a valid alternate method for testing a hypothesis* • *Predict the effects of modifying the design or methods of an experiment* • *Determine which additional trial or experiment could be performed to enhance or evaluate the results of an experiment*

What do "simple" and "complex" mean when they describe scientific experiments in the Nebraska Science Performance Level Descriptors?

Concepts/Quantities in a Simple Experiment	Experimental Design and Methods of a Simple Experiment
Concepts are likely to be familiar to, or readily understood by, high school students regardless of their exposure to rigorous science instruction: temperature, rainfall—or density and concentration (even if only understood qualitatively); newly introduced but readily understood quantities (e.g., percent of offspring, angle of reflection); numbers of things—or a simple quantity—per another familiar quantity, like rotations per minute or number of lightning strikes per storm event.	These experiments are likely to be familiar to high school students, even those who have not had consistent and well-guided opportunities to engage in science investigations. Examples include field studies involving several test plots and experiments having several steps, some basic and some intricate, in which the number of variables measured and controlled is 4 or fewer. Methods and tools include simple dilutions to vary concentration, using instrumentation (like a pH meter), and sorting soils by particle size.

Concepts/Quantities in a Complex Experiment	Experimental Design and Methods of a Complex Experiment
Some concepts are likely to be familiar to high school students who have had rigorous science instruction (but may not be to students lacking this instruction), such as momentum, freezing point depression, and reaction rate (even if only understood qualitatively). Others may be newly introduced but readily understood quantities (e.g., genetic frequency, work). In some cases, the concepts may be unfamiliar to high school students, even those who have had rigorous science instruction, such as heat (enthalpy) of reaction ($\Delta H°$) or torque, or concepts specific to complex scenarios that are fully explained in the text but will be challenging to many high school students. For those concepts, students of all levels will likely need to rely heavily on the explanations and definitions provided.	Some experiments are likely to be familiar to, or readily understood by, high school students who have had consistent and well-guided opportunities to engage in science investigations (but may not be to students lacking this experience). Examples include experiments having several intricate steps with 5 or more variables that are measured and controlled and experiments that employ methods and tools such as burets, paper chromatography, and simple circuits. Some experiments may be challenging for high school students to follow, regardless of their level of experience engaging in science investigations, such as experiments having several intricate steps and 6 or more variables measured and controlled, with more than one variable being measured simultaneously. These experiments may employ unfamiliar, newly introduced methods and tools.

Draft NE High School Science Performance Level Descriptors: Evaluation of Models, Inferences, and Experimental Results (EMI)			
Science Skills & Practices Developed in the Classroom	**Developing (1–18)**	**On Track (19–22)**	**ACT Benchmark (23–36)**
Models—Understanding & Comparing: Students should examine competing models proposed to explain a scientific phenomenon to determine each model's key assertions and to discern matters on which models agree or disagree.	• Find key facts and data cited in a *theoretical model* (a viewpoint proposed to explain scientific observations) • Determine which theoretical models cite certain key facts and data	• Examine theoretical models to identify and understand key scientific assumptions and implications	• Compare competing theoretical models to determine key similarities and differences in how they explain scientific observations
Models—Evaluating & Extending: Students will encounter competing models proposed to explain a scientific phenomenon. Students should evaluate the relative strengths and weaknesses of competing models, and students should be ready to use models to construct predictions and conclusions.	When working with theoretical models, students scoring 18 or lower may demonstrate some of the skills and practices in the higher score ranges of **Evaluating and Extending**, but not consistently.	• Evaluate a set of simple hypotheses, predictions, or conclusions to determine which one is, or is not, consistent with a theoretical model	• Evaluate a set of simple hypotheses, predictions, or conclusions to determine which one is, or is not, consistent with two or more competing theoretical models • Determine which theoretical models support or contradict a scientific hypothesis, prediction, or conclusion • Evaluate the strengths and weaknesses of competing theoretical models • Evaluate the impact of new findings on competing theoretical models • Make a simple scientific prediction and defend it based on one or more theoretical models *ADVANCED SCIENCE SKILLS & PRACTICES* • *Evaluate a set of complex hypotheses, predictions, or conclusions to determine which one is, or is not, consistent with one or more theoretical models* • *Construct and present an explanation for why scientific data supports or weakens a theoretical model* • *Make a complex scientific prediction and defend it based on one or more theoretical models*
Inferences & Results—Evaluating & Extending: While learning key concepts in the life, Earth/space, and physical sciences, students should examine reputable sources of scientific information along with the results of scientific investigations to evaluate claims and to make valid inferences. Students should be ready to generate and defend claims.	When working experimental results to make inferences, students scoring 18 or lower may demonstrate some of the skills and practices in the higher score ranges of **Evaluating and Extending**, but not consistently.	• Evaluate a set of simple hypotheses, predictions, or conclusions to determine which one is best supported by a source of scientific data (e.g., graph, table, diagram)	• Evaluate a set of simple hypotheses, predictions, or conclusions to determine which one is best supported by multiple sources of scientific data (e.g., a table and a graph) • Examine experimental results to determine which results support or contradict a hypothesis, prediction, or conclusion • Evaluate a simple scientific hypothesis or conclusion and explain why it is supported by the findings of scientific investigations • Make a simple scientific prediction and explain why it is consistent with the findings of scientific investigations *ADVANCED SCIENCE SKILLS & PRACTICES* • *Evaluate a set of complex hypotheses, predictions, or conclusions to determine which one is best supported by one or more sources of scientific data (e.g., a table and/or a graph)* • *Evaluate a complex scientific hypothesis or conclusion and explain why it is supported by the findings of scientific investigations* • *Make a complex scientific prediction and explain why it is consistent with the findings of scientific investigations*