7th Grade Science — Performance Level Descriptors

Reporting Categories	Needs Support	Close	Ready	Exceeding
Interpretation of Data Students apply science knowledge, skills, and practices to locate, translate, infer and extend from, and evaluate data and information in scientific graphs, tables, and diagrams of varying complexity.	*A student performing at the Needs Support level:* • selects one piece of data from a moderately complex data presentation. • finds information in text that describes a moderately complex data presentation. • selects two or more pieces of data from a simple data presentation. • identifies features of a simple table, graph, or diagram (e.g., axis labels, units of measure).	*A student performing at the Close level:* • selects one piece of data from a complex data presentation. • finds information in text that describes a complex data presentation. • selects two or more pieces of data from a moderately complex data presentation. • identifies features of a moderately complex table, graph, or diagram (e.g., axis labels, units of measure). • understands common scientific terminology, symbols, and units of measure used in a simple scientific context. • translates simple information into a table, graph, or diagram. • determines how the value of a variable changes as the value of another variable changes in a simple data presentation. • compares data from a simple data presentation (e.g., find the highest/lowest value; order data from a table). • combines data from a simple data presentation (e.g., sum data from a table). • performs an interpolation using data in a simple table or graph.	*A student performing at the Ready level:* • selects two or more pieces of data from a complex data presentation. • identifies features of a complex table, graph, or diagram (e.g., axis labels, units of measure). • understands common scientific terminology, symbols, and units of measure used in a moderately complex scientific context. • translates moderately complex information into a table, graph, or diagram. • determines how the value of a variable changes as the value of another variable changes in a moderately complex data presentation. • compares data from a moderately complex data presentation (e.g., find the highest/lowest value; order data from a table). • combines data from a moderately complex data presentation (e.g., sum data from a table). • compares data from two or more simple data presentations (e.g., compare a value in a table to a value in a graph). • combines data from two or more simple data presentations (e.g., categorize data from a table using a scale from another table). • determines and/or use a mathematical relationship that exists between simple data (e.g., averaging data, unit conversions). • performs an interpolation using data in a moderately complex table or graph. • performs an extrapolation using data in a simple table or graph. • analyzes presented data when given new, simple information (e.g., reinterpret a graph when new findings are provided).	*A student performing at the Exceeding level:* • understands common scientific terminology, symbols, and units of measure used in a complex scientific context. • translates complex information into a table, graph, or diagram. • determines how the value of a variable changes as the value of another variable changes in a complex data presentation. • compares data from a complex data presentation (e.g., find the highest/lowest value; order data from a table). • combines data from a complex data presentation (e.g., sum data from a table). • compares data from two or more moderately complex data presentations (e.g., compare a value in a table to a value in a graph). • combines data from two or more moderately complex data presentations (e.g., categorize data from a table using a scale from another table). • determines and/or use a mathematical relationship that exists between moderately complex data (e.g., averaging data, unit conversions). • performs an interpolation using data in a complex table or graph. • performs an extrapolation using data in a moderately complex table or graph. • analyzes presented data when given new, moderately complex information (e.g., reinterpret a graph when new findings are provided).
Scientific Investigation Students apply science knowledge, skills, and practices to understand the tools, procedures, and design of scientific experiments and to compare, extend, and modify those experiments.	*A student performing at the Needs Support level:* • finds information in text that describes a moderately complex experiment. • identifies similarities and differences between simple experiments. • determines which simple experiments utilized a given tool, method, or aspect of design.	*A student performing at the Close level:* • finds information in text that describes a complex experiment. • identifies similarities and differences between moderately complex experiments. • determines which moderately complex experiments utilized a given tool, method, or aspect of design. • understands the methods, tools, and functions of tools used in a simple experiment. • understands a simple experimental design. • determines the scientific question that is the basis for a simple experiment (e.g., the hypothesis). • predicts the results of an additional trial or measurement in a simple experiment.	*A student performing at the Ready level:* • identifies similarities and differences between complex experiments. • determines which complex experiments utilized a given tool, method, or aspect of design. • understands the methods, tools, and functions of tools used in a moderately complex experiment. • understands a moderately complex experimental design. • determines the scientific question that is the basis for a moderately complex experiment (e.g., the hypothesis). • evaluates the design or methods of a simple experiment (e.g., possible flaws or inconsistencies; precision and accuracy issues). • predicts the results of an additional trial or measurement in a moderately complex experiment. • determines what conditions in a simple experiment would produce specified results.	*A student performing at the Exceeding level:* • understands the methods, tools, and functions of tools used in a complex experiment. • understands a complex experimental design. • determines the scientific question that is the basis for a complex experiment (e.g., the hypothesis). • evaluates the design or methods of a moderately complex experiment (e.g., possible flaws or inconsistencies; precision and accuracy issues). • predicts the results of an additional trial or measurement in a complex experiment. • determines what conditions in a moderately complex experiment would produce specified results. • determines an alternate method for testing the scientific question that is the basis for a simple experiment. • predicts the effects of modifying the design or methods of a simple experiment. • determines which additional trial or experiment could be performed to enhance or evaluate the results of a simple experiment.
Evaluation of Models, Inferences, and Experimental Results Students apply science knowledge, skills, and practices to evaluate the validity of scientific information and formulate conclusions and predictions based on that information.	*A student performing at the Needs Support level:* • finds information in a moderately complex theoretical model (a viewpoint proposed to explain scientific observations). • identifies implications and assumptions in a simple theoretical model. • determines which simple theoretical models present or imply certain information.	*A student performing at the Close level:* • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a simple data presentation or piece of information in text. • determines which results of a simple experiment support or contradict a hypothesis, prediction, or conclusion. • finds information in a complex theoretical model (a viewpoint proposed to explain scientific observations). • identifies implications and assumptions in a moderately complex theoretical model. • determines which moderately complex theoretical models present or imply certain information. • identifies similarities and differences between simple theoretical models. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a simple theoretical model.	*A student performing at the Ready level:* • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a moderately complex data presentation or piece of information in text. • determines which results of a moderately complex experiment support or contradict a hypothesis, prediction, or conclusion. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with two or more simple data presentations and/or pieces of information in text. • identifies implications and assumptions in a complex theoretical model. • determines which complex theoretical models present or imply certain information. • identifies similarities and differences between moderately complex theoretical models. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a moderately complex theoretical model. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with two or more simple theoretical models. • identifies the strengths and weaknesses of simple theoretical models. • determines which simple theoretical models are supported or weakened by new information. • determines which simple theoretical models support or contradict a hypothesis, prediction, or conclusion.	*A student performing at the Exceeding level:* • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a complex data presentation or piece of information in text. • determines which results of a complex experiment support or contradict a hypothesis, prediction, or conclusion. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with two or more moderately complex data presentations and/or pieces of information in text. • explains why a hypothesis, prediction, or conclusion is, or is not, consistent with a simple data presentation or piece of information in text. • explains why simple information, already presented or new, supports or contradicts a hypothesis or conclusion. • explains why a hypothesis, prediction, or conclusion is, or is not, consistent with two or more simple data presentations and/or pieces of information in text. • identifies similarities and differences between complex theoretical models. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with a complex theoretical model. • determines which hypothesis, prediction, or conclusion is, or is not, consistent with two or more moderately complex theoretical models. • identifies the strengths and weaknesses of moderately complex theoretical models. • determines which moderately complex theoretical models are supported or weakened by new information. • determines which moderately complex theoretical models support or contradict a hypothesis, prediction, or conclusion. • uses new information to make a prediction based on a simple theoretical model. • explains why presented information, or new information, supports or weakens a simple theoretical model. • explains why a hypothesis, prediction, or conclusion is, or is not, consistent with a simple theoretical model. • explains why a hypothesis, prediction, or conclusion is, or is not, consistent with two or more simple theoretical models.

Simple Data Presentations, Experiments, and Theoretical Models for the Middle School Grade Band

Concepts/quantities encompassed in a simple data presentation, experiment, or theoretical model: Concepts are likely to be familiar to, or readily understood by, middle school students regardless of their exposure to rigorous science instruction, such as mass, volume, or speed, even if only understood qualitatively; newly introduced but readily understood quantities (e.g., average gestation period or exposure time); or a simple quantity (or number of things) per another familiar quantity, like number of flowers per pot or inches of rainfall per week.

Nature of simple data presentations, experiments, and theoretical models: Likely to be familiar to, or readily understood by, middle school students regardless of their exposure to rigorous, active science instruction. Examples of data presentations include tables with one or more columns and single headings, bar graphs with single bars or double bars and a legend, pie charts, very simple line graphs, simple flow diagrams (like a basic food web). Examples of simple experiments include simple field studies involving test plots, experiments having several, straightforward steps in which the number of variables measured and controlled is three or fewer; methods and tools are very common, such as using a balance, graduated cylinder, or a heat source. Simple theoretical models are brief, competing explanations given by students or scientists to explain observations The scientific phenomena being observed is likely to be familiar to, or readily understood by, all middle school students.

Moderately Complex Data Presentations, Experiments, and Theoretical Models for the Middle School Grade Band

Concepts/quantities encompassed in a moderately complex presentation, experiment, or theoretical model: Concepts are likely to be familiar to middle school students who have had rigorous science instruction (but may not be to students lacking this instruction), such as density, pressure, and concentration (even if only understood qualitatively); newly introduced but readily understood quantities (e.g., average particle diameter or root biomass).

Nature of moderately complex data presentations, experiments, and theoretical models: Likely to be familiar to middle school students who have had exposure to rigorous, active science instruction but challenging to other middle school students. Examples of moderately complex data presentations include tables with shared and stacked headings, bar graphs with triple bars and a legend, line graphs with more than two or three curves and a legend, bar or line graphs with negative quantities, scatterplots, flow diagrams with multiple branching and multiple levels. Examples of moderately complex experiments include field studies involving several test plots, experiments having several steps, some basic and some intricate, in which the number of variables measured and controlled is four or fewer; methods and tools include simple dilutions to vary concentration, using instrumentation (like a pH meter), sorting soils by particle size. Moderately complex theoretical models are competing explanations given by students or scientists to explain observations. The scientific phenomena being observed is likely to be familiar to, or readily understood by, most middle school students, but may be challenging to those who have not had adequate exposure to rigorous science instruction.

Complex Data Presentations, Experiments, and Theoretical Models for the Middle School Grade Band

Concepts/quantities encompassed in a complex presentation, experiment, or theoretical model: Concepts are introduced to students and are likely unfamiliar to middle school students, even many who have had rigorous science instruction, such as acceleration or ΔT, or concepts specific to complex scenarios that are fully explained in text but will be challenging to many middle school students. Students of all levels will likely need to rely heavily on the explanations and definitions provided.

Nature of complex data presentations, experiments, and theoretical models: May be challenging to middle school students regardless of their exposure to rigorous, active science instruction. Examples of complex data presentations include histograms, Venn diagrams, bar graphs with clusters of four or more bars and a legend, line graphs more than three lines (and a legend), tables with negative numbers, line graphs with two y-axes, flow diagrams with decision points. Examples of complex experiments include experiments having several intricate steps and the number of variables measured and controlled being five or greater, often using unfamiliar, newly introduced methods and tools. Complex theoretical models are competing explanations given by students or scientists to explain observations. The scientific phenomena being observed may be challenging to students regardless of their exposure to science instruction. Even advanced students may need to rely heavily on the provided explanations.