5th Grade

Topic/Unit	NGSS Standards	Notes
Observation vs Inference / Measurement & Tools	* **Length -**metric ruler - cm **Mass -**triple beam balance - g **Volume -** graduated cylinder - mL **Density -** Compactness (floats/sinks) **Observations** **Inferences** **Claim/evidence** ● **Identify claim, evidence and reasoning**	**We can use the notes section to link resources for each standard as we find/use them.** **Essential Standards are starred** **Graph of the Week - comes with CER Prompts**
Matter & Energy in Organisms and Ecosystem Dynamics	***(5-PS1-1) Develop a model** to describe that matter is made of particles too small to be seen. **(5-PS1-2) Measure and graph** quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. ***(5-PS1-3) Make observations and measurements** to identify materials based on their properties. **(5- PS1-4) Conduct an investigation** to determine whether the mixing of two or more substances results in new substances. **(5-PS3-1) Use models to describe** that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. **(5-LS1-1) Support an argument** that plants get the materials they need for growth chiefly from air and water. ***(5-LS2-1) Develop a model to describe** the movement of matter among plants, animals, decomposers, and the environment.	
Earth's Systems	***(MS-ESS2-4) Develop a model to describe** the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ***(5-ESS2-1)Develop a model** using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **(5-ESS2-2) Describe and graph** the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	
Human Impacts	***(5-ESS3-1) Obtain and combine information**	

	about ways individual communities use science ideas to protect the Earth's resources and environment.	
Gravity	***(5-PS2-1) Support an argument** that the gravitational force exerted by Earth on objects is directed down. **(MS-PS2-4) Construct and present arguments using evidence** to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. (Will see this in 8th grade)	
Earth & the Universe	**(5-ESS1-1) Support an argument** that the apparent brightness of the sun and stars is due to their relative distances from the Earth. ***(5-ESS1-2) Represent data in graphical displays** to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	
Science and Engineering	***(3-5-ETS-1-1) Define a simple design problem** reflecting a need or want that includes specified criteria for success and constraints on materials, time and cost. **(3-5-ETS-1-2) Generate and compare** multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ***(3-5-ETS-1-3) Plan and carry out** fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

6th Grade

Topic/Unit	**NGSS Standards**	
Observation vs Inference / Measurement & Tools	* **Length -**metric ruler - cm **Mass -**triple beam balance - g **Volume -** graduated cylinder - mL **Density -** Compactness (floats/sinks), density of regularly shaped objects **Observations** **Inferences** **Claim, evidence, reasoning: Make a claim (what they are seeing and hearing to make that claim). Verbally in a discussion, then write using sentence starters and parts of a template**	CER Template- LD CER Template- RD
Thermal Energy	****(MS-PS1-4) Develop a model** that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. **(MS-PS3-3) Apply scientific principles to design, construct, and test** a device that either minimizes or maximizes thermal energy transfer. ***(MS-PS3-5) Construct, use, and present arguments** to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	pHET simulation
Matter & Its Properties	**(MS-PS1-1) Develop models** to describe the atomic composition of simple molecules and extended structures.	
Weather & Climate	***(MS-ESS2-4) Develop a model** to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. ***(MS-ESS2-5) Collect data** to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. ***(MS-ESS2-6) Develop and use a model** to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	
Tectonic Plates, Fossil Records, & Geological Time Scale	***(MS-ESS2-1) Develop a model** to describe the cycling of Earth's materials and the flow of energy that drives this process.	

	*(MS-ESS2-2) **Construct an explanation** based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. *(MS-ESS2-3) **Analyze and interpret data** on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. **(MS-ESS3-1) Construct a scientific explanation** based on evidence for how the uneven distributions of Earth's mineral, energy and groundwater resources are the result of past and current geoscience processes. **(MS-ESS3-2) Analyze and interpret data** on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. **MS-ESS1-4 Construct a scientific explanation** based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.	
Earth & the Solar System – Earth, sun, and moon systems	*MS-ESS1-1 **Develop and use a model** of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. *MS-ESS1-2 **Develop and use a model** to describe the role of gravity in the motions within galaxies and the solar system. *MS-ESS1-3 **Analyze and interpret data** to determine scale properties of objects in the solar system.	
Science and Engineering	**(MS-ETS1-1) Define the criteria and constraints** of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. *(MS-ETS1-2) **Evaluate competing design solutions** using a systematic process to determine how well they meet the criteria and constraints of the problem. *(MS-ETS1-3) **Analyze data** from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **(MS-ETS1-4) Develop a model** to generate data for iterative testing and modification of a	

	proposed object, tool, or process such that an optimal design can be achieved.	

7th Grade

Topic/Unit	**NGSS Standards**	
Observation vs Inference / Measurement & Tools	**Length -**metric ruler - cm **Mass -**triple beam balance - g **Volume -** graduated cylinder - mL **Density -** Compactness (floats/sinks), Density equation, Density of regularly and irregularly shaped objects **Observations** **Inferences** **Claim, Evidence, Reasoning - With Support, students are able to use the graphic organizer to write a paragraph independently.**	pHET
Chemical Reactions & Matter	***(MS-PS1-1) Develop models t**o describe the atomic composition of simple molecules and extended structures. ***(MS-PS1- 2) Analyze and interpret data** on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **(MS-PS1-5) Develop and use a model** to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **(MS-PS1-6) Undertake a design project** to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	pHET simulation
Cells & Cell Function/ Characteristics of Living Things	**MS- LS1-5 Construct a scientific explanation** based on evidence for how environmental and genetic factors influence the growth of organisms. ***MS-LS1-1 Conduct an investigation to provide evidence** that living things are made of cells; either one cell or many different numbers and types of cells. ***MS-LS1-2 Develop and use a model to describe** the function of a cell as a whole, and the ways parts of cells contribute to the function. ***MS-LS1-3 Use argument supported by evidence** for how the body is a system of interacting subsystems composed of groups of cells. **MS-LS1-4 Use an argument based on empirical evidence and scientific reasoning** to support an	

	explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. **MS-LS1-8 Gather and synthesize information** that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.	
Respiration	***MS-LS1-7 Develop a model** to describe how food is rearranged through chemical reactions, forming new molecules that support growth and/or release energy as this matter moves through an organism.	
Photosynthesis	***MS-LS1-6 Construct a scientific explanation** based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	
Ecology	***MS-LS2-1. Analyze and interpret data** to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. **MS-LS2-2. Construct an explanation** that predicts patterns of interactions among organisms across multiple ecosystems. ***MS-LS2-3. Develop a model** to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. ***MS-LS2-4. Construct an argument** supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **MS-LS2-5. Evaluate competing design solutions** for maintaining biodiversity and ecosystem services.	
Climate Change, Human Impact, & Natural Resources	***(MS-ESS3-5) Ask questions to clarify evidence** of the factors that have caused the rise in global temperatures over the past century. ***(MS-PS1-3) Gather and make sense of information** to describe that synthetic materials come from natural resources and impact society**.** **MS-ESS3-3. Apply scientific principles** to design a method for monitoring and minimizing a human impact on the environment. ***MS-ESS3-4. Construct an argument** supported by evidence for how increases in human population and per-capita consumption of natural resources	

	impact Earth's systems.	
Science and Engineering	***(MS-ETS1-1) Define the criteria and constraints** of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **(MS-ETS1-2) Evaluate competing design solutions** using a systematic process to determine how well they meet the criteria and constraints of the problem. ***(MS-ETS1-3) Analyze data** from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **(MS-ETS1-4) Develop a model** to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	

8th Grade

Topic/Unit	**NGSS Standards**	
Observation vs Inference / Measurement & Tools	* **Length -**metric ruler - cm **Mass -**triple beam balance - g **Volume -** graduated cylinder - mL **Density -** Compactness (floats/sinks), Density equation, density of regularly and irregularly shaped objects. liquids **Observations** **Inferences** **Claim, Evidence, Reasoning - Write a 5-paragraph essay with scaffolding**	
Genetics	**(MS -LS4-5) Gather and synthesize information** about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. ***(MS-LS3-1) Develop and use a model** to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. ***(MS-LS3-2) Develop and use a model** to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. ***(MS -LS4-6) Use mathematical representations** to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	
Evolution & Common Ancestry	***(MS -LS4-4) Construct an explanation** based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. ***(MS-LS4-2) Apply scientific ideas to construct an explanation** for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. **(MS -LS4-3) Analyze displays of pictorial data** to compare patterns of similarities in the embryological development across multiple	• **Evolution is a good topic for the 5-paragraph essay**

	species to identify relationships not evident in the fully formed anatomy. ***(MS-LS4-1) Analyze and interpret data** for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.	
Forces, Motion and Energy (objects in motion → contact forces)	***(MS-PS2-1) Apply Newton's Third Law to design a solution to a problem** involving the motion of two colliding objects. ***(MS-PS2-2) Plan an investigation** to provide evidence that the change in an object's motion depends on the mass of the object. ***(MS-PS3-1) Construct and interpret graphical displays of data** to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. **(MS-PS3-2) Develop a model** to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. **(MS-PS3-4) Plan an investigation** to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. **(MS-PS3-5) Construct, use, and present arguments** to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.	
Types of Interactions (wave properties, electromagnetic → non-contact forces) **Two units- PS4 waves** **PS2- electromagnetics**	***(MS-PS2-3) Ask questions about data** to determine the factors that affect the strength of electric and magnetic forces. **(MS-PS2-4) Construct and present arguments using evidence** to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. ***(MS-PS2-5) Conduct an investigation** and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. ***(MS-PS4-1) Use mathematical representations to describe** a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. ***(MS-PS4-2 Develop and use a model to describe**	

	that waves are reflected, absorbed, or transmitted through various materials. **(MS-PS4-3) Integrate qualitative scientific and technical information** to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	
Culminating Science Project ("Science Fair" or other)		
Science and Engineering	**(MS-ETS1-1) Define the criteria and constraints** of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **(MS-ETS1-2) Evaluate competing design solutions** using a systematic process to determine how well they meet the criteria and constraints of the problem. **(MS-ETS1-3) Analyze data** from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. ***(MS-ETS1-4) Develop a model** to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	

Planning and Carrying out Investigations

PLANNING AND CARRYING OUT INVESTIGATIONS	• Designs an investigation that will produce relevant data but with minimal detail about the variables • Includes incomplete description of data collection procedures that impede replication • Describes general evidence to be used to answer the question(s) with minimal detail. • Uses appropriate scientific methods and collects multiple trials (if appropriate) of relevant data but the data is not consistent within a reasonable range.	• Designs an investigation identifying variables (dependent, independent, and controls). • Includes data collection procedures that are mostly replicable. • Identifies tools/instrument and type of measurements that will produce relevant data and/or evidence to answer the question(s). • Uses appropriate scientific methods and collects multiple trials (if appropriate) of relevant data consistent within a reasonable range.	• Designs an investigation identifying and explaining the variables (dependent, independent, and controls). • Includes sufficiently detailed description of replicable data collection procedures. • Describes tools/instrument and type of measurements that will produce relevant data and/or evidence to answer the question(s). • Uses appropriate scientific methods and systematically collects multiple trials (if appropriate) of relevant data consistent within a reasonable range • Evaluates the consistency (precision) of the data.	• Designs and evaluates an investigation identifying and explaining the variables (dependent, independent, and controls) • Identifies possible confounding variables. • Includes thorough description of replicable data collection procedures. • Justifies the selection of the tools/instrument and type of measurements that will produce relevant data and/or evidence to answer the question(s). • Uses appropriate scientific methods and systematically collects multiple trials (if appropriate) of relevant data consistent

				within a narrow range. • Evaluates the consistency (precision) of the data as well as the appropriateness of the data collection procedures.

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Designs investigations with teacher guidance, identifying the **question** being tested. *(SEP: Identify variables that can affect outcomes.)*	**Designs investigations with some independence**, identifying and explaining the **independent and dependent variables** while controlling at least one variable. *(SEP: Identify independent, dependent, and controlled variables.)*	**Designs an investigation independently**, identifying and explaining **independent, dependent, and control variables** clearly. *(SEP: Identify and explain all variable types in an investigation.)*
Follows a provided procedure and begins to write simple steps for data collection.	**Writes a procedure** with enough detail for others to follow, including steps for controlling variables.	**Writes a sufficiently detailed procedure** that is replicable by others for reliable data collection.
Uses provided tools/instruments to make simple measurements (e.g., ruler, thermometer, graduated cylinder).	**Selects and describes tools/instruments** and units of measurement appropriate to the investigation.	**Describes tools/instruments** and explains how the chosen measurements will produce **relevant, valid data** to answer the investigation question.

Collects data in tables/charts, sometimes with guidance. May repeat trials if instructed.	**Collects systematic data**, including **multiple trials** if appropriate, and organizes results into tables or graphs.	**Uses appropriate scientific methods** to collect **systematic, replicable data** across multiple trials (if appropriate) within a reasonable range.
Begins to recognize when data seems inconsistent or has errors.	**Identifies inconsistencies in data** and suggests possible reasons (e.g., measurement error, uncontrolled variable).	**Evaluates the consistency (precision) of data**, noting variability, reliability, and possible sources of error.

Analyzing and Interpreting Data

ANALYZING AND INTERPRETING DATA	• 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 the limitations of the data analysis (e.g., measurement error, sample selection) with incomplete or inaccurate elements	• 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. • Identifies the limitations of the data analysis (e.g., measurement error, sample selection).	• 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. • Evaluates the limitations of the data analysis (e.g., measurement error, sample selection) and identifies some implications for the findings.	• 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. • Thoroughly evaluates the limitations of data analysis (e.g., measurement error, sample selection) and provides a detailed explanation of the implications on the findings.

NGSS-Aligned Progression: Analyzing & Interpreting Data (Grades 6–8)

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Uses simple tools (tables, bar graphs, line graphs) to organize and display data. *(SEP: Represent data in tables/graphs to reveal patterns.)*	**Uses tools and technologies (e.g., spreadsheets, digital graphing, simulations)** to analyze data and highlight trends. *(SEP: Use digital tools to identify relationships in data.)*	**Analyzes and explains data using tools, technologies, and/or models** (e.g., computational, mathematical) to **identify patterns, make scientific claims, or evaluate design solutions**.

		(SEP: Apply mathematical concepts and models to analyze data.)
Identifies obvious patterns or trends (e.g., "The temperature went up each day").	**Identifies and explains relationships** in data (e.g., correlations, cause-effect connections).	**Identifies complex patterns and relationships** in data and explains their significance to claims, phenomena, or design solutions.
Makes simple claims from data (e.g., "Plants grew taller with more water"), sometimes needing guidance to connect evidence and reasoning.	**Makes reasonable scientific claims** supported by evidence from data, including patterns and trends.	**Makes well-supported scientific claims** using evidence from data analysis and explains the reasoning that connects them.
Recognizes that errors can happen in data collection but may not articulate why.	**Evaluates data quality** by considering possible **sources of error** (e.g., measurement error, sample size, trial inconsistencies).	**Evaluates the limitations of data analysis** (e.g., measurement error, sample selection, scope of data) and **identifies implications for findings**.

Asking Questions and Defining Problems

ASKING QUESTIONS AND DEFINING PROBLEMS	• Asks general, imprecise questions that require greater specificity to be testable. • Identifies dependent and independent variables with unclear predicted relationships. • Identifies inappropriate control(s) (if applicable) and/or inappropriate model(s). • Defines a problem or design statement that partially matches the intent of the problem or the constraints.	• Asks testable questions that require sufficient and relevant evidence to answer. • Identifies predicted relationships between dependent and independent variables with minor errors. • Identifies control(s) (if applicable) OR relationships in the relevant model(s) with minor errors or omissions. • Defines a problem or design statement that matches the intent of the problem and identifies the constraints.	• Asks precise, testable questions that require sufficient and relevant evidence to answer. • Discusses predicted relationships between dependent and independent variables. • Identifies appropriate control(s) (if applicable) OR relationships in the relevant model(s) • Defines a problem and explains specific design elements necessary for a suitable design (e.g., fit to the problem, addresses the constraints, etc.).	• 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). • Thoroughly explains the predicted relationships in the relevant model(s). • Defines a problem precisely and thoroughly explains why specific design elements are necessary for a suitable design (e.g., fit to the problem, addresses the constraints, etc.).

NGSS-Aligned Progression: Asking Questions & Defining Problems (Grades 6–8)

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Asks simple, testable questions about phenomena that can be investigated with observations or measurements. *(SEP: Ask questions that can be investigated and predict reasonable outcomes.)*	**Asks more precise, testable questions** that focus on the relationship between **independent and dependent variables**. *(SEP: Ask questions that can be investigated within the scope of the classroom/lab.)*	**Asks precise, testable questions** that require **sufficient and relevant evidence** to answer. *(SEP: Ask questions that arise from careful observation and require evidence for answers.)*
Predicts simple outcomes of an investigation (e.g., "If we add more light, the plant will grow taller").	**Discusses predicted relationships** between **independent and dependent variables** in an investigation.	**Discusses predicted relationships** between **variables** in detail, including potential **controls or relevant model relationships**.
Recognizes when a "fair test" needs controls but may not identify them independently.	**Identifies basic control(s)** when planning an investigation (e.g., keeping water amount the same for all plants).	**Identifies appropriate controls** (if applicable) or **relationships in models** that ensure the investigation is valid.
Defines problems in simple terms, describing what needs to be solved.	**Defines problems with some detail**, explaining constraints or criteria for success.	**Defines a problem and explains specific design elements** necessary for a suitable solution (e.g., fit to problem, addresses constraints, criteria for success).

Constructing Explanations and Designing Solutions

CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS	• Proposes a design plan and description that misses one or more important aspects of the criteria, constraints, OR intent of the problem. • Uses inaccurate or irrelevant evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints OR identifies an impractical redesign without explanation or supporting evidence.	• Proposes a design plan and provides a general description that addresses the criteria, constraints, or intent of the problem. • Uses minimal relevant evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints OR identifies a potential redesign with limited explanation and supporting evidence.	• Proposes a design plan with detailed explanation that completely addresses the criteria, constraints, and intent of the problem. • Uses relevant and adequate amounts of evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints AND uses the evidence to explain an appropriate redesign of the original model or prototype	• Proposes a design plan and evaluates the suitability of the design to address the criteria, constraints, AND intent of the problem. • Uses detailed and multiple sources of evidence (data or scientific knowledge) to evaluate how well the design addresses the problem as well as constraints AND provides a detailed rationale with supporting data for the appropriate redesign of the original model or prototype.

NGSS-Aligned Progression: Designing Solutions (Grades 6–8)

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Proposes simple design ideas that address part of a problem, often with teacher guidance. ***(SEP: Generate and compare multiple solutions to a problem.)***	**Proposes a design plan that addresses the main criteria and constraints of the problem, with some explanation.** ***(SEP: Apply scientific ideas to design solutions that meet criteria and constraints.)***	**Proposes a detailed design plan with explanation that completely addresses criteria, constraints, and the intent of the problem.** ***(SEP: Design solutions that account for constraints and trade-offs.)***
Uses basic observations or facts (e.g., "This material is strong") to explain design choices.	**Uses relevant data or scientific knowledge to explain how the design addresses criteria and constraints.**	**Uses relevant and adequate evidence (data or scientific knowledge) to explain how the design addresses the problem and constraints.**
Begins to notice when a design does not fully solve the problem or could be improved.	**Suggests ways to improve or redesign a prototype, sometimes using evidence to support ideas.**	**Uses evidence to justify redesigns, explaining how revisions would better address the criteria/constraints and improve the solution.**
Compares design ideas informally (e.g., "This one is cheaper but weaker").	**Compares strengths and weaknesses of solutions using some data or observations.**	**Evaluates original and redesigned solutions with clear evidence-based reasoning about trade-offs, feasibility, and effectiveness.**

Engaging in Argument from Evidence

ENGAGING IN ARGUMENT FROM EVIDENCE	• The student is able to present arguments on disciplinary content, which are unfocused or unsupported with evidence. • The student is able to communicate some procedures but lack details needed for others to replicate.	• The student is able to present arguments on disciplinary content, which are logical and focused, but lack evidence that supports the argument. • The student is able to provide step by step procedures that lack the detail needed for others to replicate.	• The student is able to present arguments on disciplinary content that are logical, focused and supported with sufficient and relevant evidence. • The student is able to provide step by step procedures that are precise and detailed enough so that others can replicate them and (possible) produce the same results.	• The student is able to present arguments on disciplinary content 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.

NGSS-Aligned Progression: Scientific Argumentation & Communication (Grades 6–8)

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Provides simple explanations for observations or results using basic evidence. ***(SEP: Use evidence to support explanations.)***	**Presents arguments on disciplinary content that are logical and supported by evidence, with guidance.** ***(SEP: Construct arguments supported by evidence.)***	**Presents arguments on disciplinary content that are logical, focused, and supported with sufficient and relevant evidence.** ***(SEP: Engage in scientific argumentation independently and collaboratively.)***
Follows lab procedures and can describe them in general terms.	**Provides step-by-step procedures that are mostly precise and detailed enough for replication.**	**Provides step-by-step procedures that are precise and detailed enough for others to replicate the investigation and possibly produce the same results.**

Supports claims with simple observations or data collected.	**Supports claims with data or observations, referencing trends or patterns.**	**Supports claims with sufficient and relevant evidence, including quantitative and qualitative data, to justify reasoning.**
Begins to notice when explanations are unclear or incomplete.	**Evaluates explanations and procedures, revising steps or reasoning as needed with some guidance.**	**Evaluates and refines arguments and procedures for clarity, precision, and replicability.**

Developing and Using Models

DEVELOPING AND USING MODELS	• Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems. Design or explanation of the model includes major errors or omissions. • Uses or tests the model and identifies the limitations OR accuracy of the model (with minor errors or omissions) to support explanations, predict phenomena, analyze systems, or solve problems. • Explanation or evaluation of the model includes major errors or omissions.	• Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems. Design or explanation of the model includes minor errors or omissions • Uses or tests the model and evaluates the accuracy and limitations of the model to support explanations, predict phenomena, analyze systems, or solve problems. • Explanation or evaluation of model includes minor errors or omissions.	• Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems. • Uses or tests the model and evaluates the accuracy and limitations of the model to support explanations, predict phenomena, analyze systems, or solve problems • Makes recommendations to revise the model.	• Designs, explains, and evaluates a model to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems. • Uses or tests two different models of the same proposed tool, process, mechanism or system. • Evaluates the accuracy and limitations of the two different models in order to select a model that best fits the evidence or design criteria.

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Uses given models (diagrams, simulations, or physical representations) to **describe and explain simple processes**. *(SEP: Use models to represent systems and their interactions.)*	**Builds or modifies simple models** (physical, digital, diagram-based) to **represent a system or process**. *(SEP: Develop a model to describe unobservable mechanisms.)*	**Designs and explains original models** that **generate data** to support explanations, predict phenomena, analyze systems, and/or solve problems. *(SEP: Develop, revise, and use models to predict and explain relationships.)*
Identifies parts of a model and explains how they relate to real-world objects, systems, or events. *(SEP: Identify limitations of models.)*	**Uses models to test ideas** by making predictions or analyzing how system changes affect outcomes. *(SEP: Use models to test and communicate ideas.)*	**Tests and evaluates models** for accuracy and limitations. *(SEP: Evaluate limitations of a model for a proposed solution.)*
Recognizes patterns in data from models. *(SEP: Analyze and interpret data using models.)*	**Collects and interprets data** from models to support explanations or solutions. *(SEP: Use data from models as evidence.)*	**Makes recommendations to revise models** to improve accuracy or usefulness. *(SEP: Revise models to increase explanatory or predictive power.)*
Begins to notice limitations of models (e.g., “this diagram shows particles, but we can’t actually see particles”). *(SEP: Compare models to identify limitations.)*	**Evaluates models** by comparing predictions to actual results, **identifying strengths and weaknesses**. *(SEP: Evaluate the effectiveness of models.)*	**Communicates how revisions strengthen** explanations, predictions, or solutions. *(SEP: Communicate revised models for clarity and precision.)*

Using Mathematics and Computational Thinking

USING MATHEMATICS AND COMPUTATIONAL THINKING	• 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.	• 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.	• Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) to answer scientific questions or engineering problems.	• Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) to represent and solve scientific questions or engineering problems and explains whether the answer "makes sense".

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Accurately uses basic operations (addition, subtraction, multiplication, division) to make simple calculations with data. ***(SEP: Apply mathematical concepts to represent data in tables/graphs.)***	**Applies ratios, rates, and percents to analyze relationships in scientific data (e.g., speed, density, concentration).** ***(SEP: Use proportional relationships to interpret data.)***	**Accurately applies appropriate mathematical concepts and methods (ratio, rate, percent, basic operations, algebra, and functions) to answer scientific questions or engineering problems.** ***(SEP: Use mathematical models and functions to predict and describe phenomena.)***
Uses whole numbers and decimals in measurements and data sets.	**Uses fractions, decimals, and percentages to represent and compare scientific data.**	**Uses algebraic expressions and functions to represent and solve problems in science/engineering.**
Creates and interprets simple graphs (bar, line, scatter) to show data trends.	**Creates, interprets, and analyzes graphs to identify proportional relationships and patterns.**	**Uses mathematical models and computational tools to analyze data and evaluate design solutions.**

Recognizes when math is needed to describe data (e.g., averaging results).	**Selects appropriate math tools and methods (e.g., ratio, percent, average) to analyze evidence.**	**Chooses and justifies appropriate mathematical methods to answer scientific questions or optimize design solutions.**

Obtaining, Evaluating and Communicating Information

6th Grade – Foundations	7th Grade – Developing	8th Grade – Mastery
Uses a few teacher-provided sources to gather information on a topic. ***(SEP: Obtain information from reliable sources.)***	**Selects relevant scientific sources to answer questions, and begins to evaluate evidence for reliability and relevance.** ***(SEP: Evaluate information from multiple sources.)***	**Selects multiple relevant scientific sources when conducting independent research and evaluates the credibility and evidence of each source.** ***(SEP: Critically evaluate sources to support claims or solutions.)***
Communicates findings simply (oral or written) with basic organization.	**Communicates findings with logical organization, clear reasoning, and some attention to audience.**	**Communicates findings clearly and coherently, with development, organization, and style appropriate to the task, purpose, and audience.**
Begins to cite sources with guidance.	**Cites sources properly and integrates information to support explanations or solutions.**	**Integrates evidence from multiple sources effectively, clearly explaining how it supports conclusions or solutions.**
Uses simple visuals or text features to help explain ideas (e.g., diagrams, charts).	**Uses visuals and text features to support and clarify explanations.**	**Selects and integrates appropriate visuals or representations to enhance clarity, coherence, and persuasiveness.**