NGSS CORRELATIONS

WEATHER AND CLIMATE

Crosscutting Concepts		Activity number
Cause and Effect	Cause and effect relationships may be used to predict phenomena in natural or designed systems.	2, 4, 6, 7, 8, 9, 10, 13, 16
	Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.	2, 3, 9, 10, 13, 17
	Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.	16, 17
Energy and Matter	Within a natural system, the transfer of energy drives the motion and/or cycling of matter.	9, 10, 14
Patterns	Patterns can be used to identify cause and effect relationships.	4, 7, 8, 9, 11, 16, 17
	Graphs, charts, and images can be used to identify patterns in data.	2, 3, 4, 5, 6, 7, 10, 11, 16, 17
	Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems.	3, 9, 16, 17
Stability and Change	Small changes in one part of a system might cause large changes in another part.	14, 16
	Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale.	14, 15
	Stability might be disturbed either by sudden events or gradual changes that accumulate over time.	1, 14, 15, 16, 17
Structure and Function	Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.	12
Systems and System Models	Systems may interact with other systems and be a part of larger complex systems.	7, 8, 10, 13, 16
	Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems.	4, 6, 7, 8, 11, 13, 14
Scale, Proportion, and Quantity	Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.	15

Crosscutting Concepts		Activity number
Connections to Engineering, Technology, and Applications of Science	Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems	9
	Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations.	9, 12
	All human activity draws on natural resources and has both short- and long-term consequences, positive as well as negative, for the health of people and the natural environment.	17
Connections to the Nature of Science	Science assumes that objects and events in natural systems occur in consistent patterns and are understandable through measurement and observation.	1, 2, 7, 11, 13
	Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.	16
Science and Engineering Practices		**Activity number**
Analyzing and Interpreting Data	Analyze and interpret data to determine similarities and differences in findings.	2, 3, 4, 5, 6, 7, 11
	Construct and interpret graphical displays of data to identify linear and nonlinear relationships.	2, 3, 4, 6
	Analyze and interpret data to provide evidence for phenomena.	3, 6, 8, 11, 13, 15, 17
	Analyze displays of data to identify linear and nonlinear relationships.	16
Asking Questions and Defining Problems	Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.	3
	Ask questions to identify and clarify evidence of an argument.	1, 16
Constructing Explanations and Designing Solutions	Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future.	6, 7, 8
	Construct an explanation that includes qualitative or quantitative relationships between variables that predict or describe phenomena.	6, 8, 9, 10
	Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system.	12

Science and Engineering Practices		Activity number
Developing and Using Models	Develop a model to predict and/or describe phenomena.	6, 7, 8, 14
	Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.	12
	Evaluate limitations of a model for a proposed object or tool.	12
	Use and/or develop a model of simple systems with uncertain and less predictable factors.	13
Engaging in Argument from Evidence	Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.	4, 16
	Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon.	13, 17
	Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	12
	Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.	9
	Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.	15
	Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.	12
Obtaining, Evaluating, and Communicating Information	Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings.	14
	Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.	17

Science and Engineering Practices		Activity number
Planning and Carrying Out Investigations	Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.	6
	Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation.	6, 8
	Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.	2, 3, 5, 6, 7, 8, 11, 12, 13, 15
	Evaluate the accuracy of various methods for collecting data.	5, 9
Using Mathematics and Computational Thinking	Use mathematical representations to describe and/or support scientific conclusions and design solutions.	5, 16, 17
	Create algorithms (a series of ordered steps) to solve a problem.	5
	Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.	12
Constructing Explanations and Designing Solutions	Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system	12
	Optimize performance of a design by prioritizing criteria, making trade-offs, testing, revising, and retesting.	12
Analyzing and Interpreting Data	Distinguish between causal and correlational relationships in data	16
	Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible.	2, 5
Connections to the Nature of Science	Scientific knowledge is based on logical and conceptual connections between evidence and explanations.	1, 4, 9, 11, 16
	Science findings are frequently revised and/or reinterpreted based on new evidence	9

Disciplinary Core Ideas		Activity number
Developing Possible Solutions (ETS1.B)	A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem.	12
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	Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.	12
	Models of all kinds are important for testing solutions.	
Optimizing the Design Solution (ETS1.C)	Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design.	12
	The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.	12
The Roles of Water in Earth's Surface Processes (ESS2.C)	The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.	2, 3, 7, 9, 10, 11, 12, 13, 14
	Global movements of water and its changes in form are propelled by sunlight and gravity.	9, 10, 14
	Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.	8, 9, 10, 14
Weather and Climate (ESS2.D)	Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.	2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 14
	Because these patterns are so complex, weather can only be predicted probabilistically.	2, 3, 10, 11, 12, 13
	The ocean exerts a major influence on weather and climate by absorbing energy from the Sun, releasing it over time, and globally redistributing it through ocean currents.	5, 6, 9, 10, 14

Disciplinary Core Ideas		Activity number
Natural Resources (ESS3.A)	Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.	17
Human Impacts on Earth Systems (ESS3.C)	Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.	1
	Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.	17
Global Climate Change (ESS3.D)	Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.	1, 10, 14, 15, 16, 17
Adaptation (LS4.C)	Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.	1, 4
Conservation of Energy and Energy Transfer (PS3.B)	Energy is spontaneously transferred out of hotter regions or objects and into colder ones.	8

Performance Expectations		Activity number
Earth's Systems (ESS2)	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. (MS-ESS2-5)	13
	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. (MS-ESS2-6)	14
	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. (MS-ESS3-5)	16
Engineering Design (ETS1)	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-ETS1-3)	12
	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. (MS-ETS1-4)	12

COMMON CORE STATE STANDARDS CORRELATIONS

WEATHER AND CLIMATE

Common Core State Standards – English Language Arts		Activity number
Reading in Science and Technical Subjects (RST)	Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. (RST.6-8.3)	6, 7, 8, 11, 12
	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (RST.6-8.7)	4, 14, 17
	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (RST.6-8.9)	9, 10
Speaking and Listening (SL)	Engage effectively in a range of collaborative discussions (e.g., one-on-one, in groups, teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. (SL.8.1)	1, 2, 4, 7, 9, 12, 13, 15, 16, 17
	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound and valid reasoning, and well-chosen details: use appropriate eye contact, adequate volume, and clear pronunciation. (SL.8.4)	7, 12, 13
Writing in History/ Social Studies, Science, and Technological Subjects (WHST)	Write arguments focused on discipline-specific content. (WHST.6-8.1)	16, 17
	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (WHST.6-8.7)	3
Common Core State Standards – Mathematics		**Activity number**
Mathematical Practice (MP)	Reason abstractly and quantitatively. (MP.2)	2, 4, 5
	Model with mathematics. (MP.4)	16