OREGON DEPARTMENT OF EDUCATION

Standards By Design:

Kindergarten, First Grade, Second Grade, Third Grade, Fourth Grade, Fifth Grade, Sixth Grade, Seventh Grade, Eighth Grade and High School for Science

Science

Kindergarten

Kindergarten science students learn about the living and non-living things in the natural world as they compare and contrast characteristics of plants and animals and examine the way things move. They identify changes in the things seen in the sky and that the sun warms Earth. Exploring questions and making observations about the natural world and designed structures creates the foundation for more advanced understanding of scientific inquiry and engineering design.

*It is essential that these standards be addressed in contexts that promote scientific inquiry, use of evidence, critical thinking, making connections, and communication.

K.1 Structure and Function: The natural world includes living and non-living things.

K.1P.1 Compare and contrast characteristics of living and non-living things.

K.1L.1 Compare and contrast characteristics of plants and animals.

K.1E.1 Gather evidence that the sun warms land, air, and water.

K.2 Interaction and Change: Living and non-living things move.

K.2P.1 Examine the different ways things move.

K.2E.1 Identify changes in things seen in the sky.

K.3 Scientific Inquiry: Science explores the natural world through observation.

K.3S.1 Explore questions about living and non-living things and events in the natural world.

K.3S.2 Make observations about the natural world

K.4 Engineering Design: Engineering design is used to design and build things.

K.4D.1 Create structures using natural or designed materials and simple tools.

Science Numbering Key Example: K.2P.1
K = Grade
2 = Core Standard strand (strands are 1=Structure and Function; 2=Interaction and change; 3=Scientific Inquiry; 4=Engineering Design)
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K.4D.2 Show how components of designed structures can be disassembled and reassembled.

First Grade

First grade science students build their basic understanding of the natural world through examination of characteristics and properties of objects, living organisms, and Earth materials. They begin to develop an understanding of how living and non-living things interact as they learn about the basic needs of living things and the motion of objects when a force is applied. Students explore the use of basic tools in observing the natural world and in engineering design. They develop their skills in making and recording observations and their understanding of scientific inquiry and engineering design.

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1.1 Structure and Function: Living and non-living things have characteristics and properties.

1.1P.1 Compare and contrast physical properties and composition of objects.

1.1L.1 Compare and contrast characteristics among individuals within one plant or animal group.

1.1E.1 Examine characteristics and physical properties of Earth materials.

1.2 Interaction and Change: Living and non-living things interact.

1.2P.1 Describe the motion of objects when a force is applied.

1.2L.1 Describe the basic needs of living things.

1.3 Scientific Inquiry: Science explores the natural world using evidence from observations.

1.3S.1 Identify and use tools to make careful observations and answer questions about the natural world.

1.3S.2 Record observations with pictures, numbers, or written statements.

1.3S.3 Describe why recording accurate observations is important in science.

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1.4 Engineering Design: Engineering design is used to design and build things to meet a need.

1.4D.1 Identify basic tools used in engineering design.

1.4D.2 Demonstrate that designed structures have parts that work together to perform a function.

1.4D.3 Show how tools are used to complete tasks every day.

Second Grade

Second grade science students refine their understanding of the natural world through investigation of the variation and change in living and non-living things. They explore how things respond to magnetic forces, the life cycles of living things, movement of the sun and moon, and daily and seasonal temperature changes. Students develop their skills in observing, measuring, recording, and organizing data, and making predictions based on observations. They use tools and work with a team to refine their engineering design skills.

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2.1 Structure and Function: Living and non-living things vary throughout the natural world.

2.1L.1 Compare and contrast characteristics and behaviors of plants and animals and the environments where they live.

2.2 Interaction and Change: Living and non-living things change.

2.2P.1 Compare and contrast how objects and materials respond to magnetic forces.

2.2L.1 Describe life cycles of living things.

2.2E.1 Observe and record the patterns of apparent movement of the sun and the moon.

2.2E.2 Record and summarize daily and seasonal temperature changes.

2.3 Scientific Inquiry: Scientific inquiry is a process used to explore the natural world using evidence from observations.

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2.3S.1 Observe, measure, and record properties of objects and substances using simple tools to gather data and extend the senses.

2.3S.2 Make predictions about living and non-living things and events in the environment based on observed patterns.

2.3S.3 Make, describe, and compare observations, and organize recorded data.

2.4 Engineering Design: Engineering design is a process used to design and build things to solve problems or address needs.

2.4D.1 Use tools to construct a simple designed structure out of common objects and materials.

2.4D.2 Work with a team to complete a designed structure that can be shared with others.

2.4D.3 Describe an engineering design that is used to solve a problem or address a need.

Third Grade

Third grade science students develop their understanding of the variation in living and non-living things and their interaction with energy and forces. They explore physical properties of the states of matter and how forces affect an object's position, motion, and speed. Students investigate the life cycles of plants and animals and characteristics of organisms and their offspring. They study Earth's seasonal weather patterns of precipitation and temperature. Students learn the basic concepts of scientific inquiry as they make observations, ask questions or form hypotheses, plan a simple investigation, and collect and use data to explain the results and draw conclusions. Students build their understanding of engineering design as they identify a problem, propose a potential solution, design a prototype, and learn how inventions have changed the way people live and pursue science.

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3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.

3.1P.1 Compare and contrast the properties of states of matter.

3.1L.1 Compare and contrast the characteristics of offspring and parents.

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3.2 Interaction and Change: Living and non-living things interact with energy and forces.

3.2P.1 Describe how forces cause changes in an object's position, motion, and speed.

3.2L.1 Compare and contrast the life cycles of plants and animals.

3.2E.1 Identify Earth as a planet and describe its seasonal weather patterns of precipitation and temperature.

3.3 Scientific Inquiry: Scientific inquiry is a process used to explore the natural world using evidence from observations and investigations.

3.3S.1 Plan a simple investigation based on a testable question, match measuring tools to their uses, and collect and record data from a scientific investigation.

3.3S.2 Use the data collected from a scientific investigation to explain the results and draw conclusions.

3.3S.3 Explain why when a scientific investigation is repeated, similar results are expected.

3.4 Engineering Design: Engineering design is a process that uses science to solve problems or address needs or aspirations.

3.4D.1 Identify a problem that can be addressed through engineering design, propose a potential solution, and design a prototype.

3.4D.2 Describe how recent inventions have significantly changed the way people live.

3.4D.3 Give examples of inventions that enable scientists to observe things that are too small or too far away.

Fourth Grade

Fourth grade science students build their understanding of the natural world learning how living and non-living things are classified by their characteristics and properties. Students study physical changes in matter, the properties of energy, and how objects vary in the way they interact with energy. They compare and contrast fossils and living organisms, and learn about interactions of organisms and their environment. They study Earth materials and the changes that take place on Earth's surface. Students build their scientific inquiry skills as they develop testable questions, design an investigation, and collect, record, summarize, and use the results to confirm and support a logical argument. They also develop their use of science and engineering design skills as they learn to identify a problem and design, construct, and

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test a possible solution.

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4.1 Structure and Function: Living and non-living things can be classified by their characteristics and properties.

4.1P.1 Describe the properties of forms of energy and how objects vary in the extent to which they absorb, reflect, and conduct energy.

4.1L.1 Compare and contrast characteristics of fossils and living organisms.

4.1E.1 Identify properties, uses, and availability of Earth materials.

4.2 Interaction and Change: Living and non-living things undergo changes that involve force and energy.

4.2P.1 Describe physical changes in matter and explain how they occur.

4.2L.1 Describe the interactions of organisms and the environment where they live.

4.2E.1 Compare and contrast the changes in the surface of Earth that are due to slow and rapid processes.

4.3 Scientific Inquiry: Scientific inquiry is a process of investigation through questioning, collecting, describing, and examining evidence to explain natural phenomena and artifacts.

4.3S.1 Based on observations identify testable questions, design a scientific investigation, and collect and record data consistent with a planned scientific investigation.

4.3S.2 Summarize the results from a scientific investigation and use the results to respond to the question being tested.

4.3S.3 Explain that scientific claims about the natural world use evidence that can be confirmed and support a logical argument.

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4.4 Engineering Design: Engineering design is a process of using science principles to solve problems generated by needs and aspirations.

4.4D.1 Identify a problem that can be addressed through engineering design using science principles.

4.4D.2 Design, construct, and test a prototype of a possible solution to a problem using appropriate tools, materials, and resources.

4.4D.3 Explain how the solution to one problem may create other problems.

Fifth Grade

Fifth grade science students develop an understanding of living and non-living things as systems composed of related parts that function together and interact with force, energy, and matter. They investigate the Sun-Earth-Moon system, how energy from the sun affects Earth's weather and climate, and how forces affect objects on Earth. They study adaptation and the interdependence of organisms and the environment. Students extend their work with scientific inquiry, designing and conducting simple investigations to answer questions or test hypotheses, and collecting, organizing, summarizing, analyzing, and interpreting data. They also extend their work with engineering design using science principles to describe, design, and build a solution to a problem given criteria and constraints. Students learn that inventions may lead to other inventions.

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5.1 Structure and Function: Living and non-living things are composed of related parts that function together to form systems.

5.1L.1 Explain that organisms are composed of parts that function together to form a living system.

5.1E.1 Describe the Sun-Earth-Moon system.

5.2 Interaction and Change: Force, energy, matter, and organisms interact within living and non-living systems.

5.2P.1 Describe how friction, gravity, and magnetic forces affect objects on or near Earth.

5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

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5.2E.1 Explain how the energy from the sun affects Earth's weather and climate.

5.3 Scientific Inquiry: Scientific inquiry is a process of investigation based on science principles and questioning, collecting, describing, and examining evidence to explain natural phenomena and artifacts.

5.3S.1 Based on observations and science principles, identify questions that can be tested, design an experiment or investigation, and identify appropriate tools. Collect and record multiple observations while conducting investigations or experiments to test a scientific question or hypothesis.

5.3S.2 Identify patterns in data that support a reasonable explanation for the results of an investigation or experiment and communicate findings using graphs, charts, maps, models, and oral and written reports.

5.3S.3 Explain the reasons why similar investigations may have different results.

5.4 Engineering Design: Engineering design is a process of using science principles to make modifications in the world to meet human needs and aspirations.

5.4D.1 Using science principles describe a solution to a need or problem given criteria and constraints.

5.4D.2 Design and build a prototype of a proposed engineering solution and identify factors such as cost, safety, appearance, environmental impact, and what will happen if the solution fails.

5.4D.3 Explain that inventions may lead to other inventions and once an invention exists, people may think of novel ways of using it.

Sixth Grade

Sixth grade science students refine their understanding of living and non-living systems as organized groups of related parts that function together, interact, and change. They investigate physical and chemical properties of matter, and energy. They study waves, electricity, and magnetism. Students learn about types, functions, components, relationships, and interactions of cells, tissues, organs, and organ systems, and changes in populations and ecosystems. Students study objects in the solar system, the layers of Earth, and the relationship of the water cycle to landforms and weather. They use their scientific inquiry skills to investigate the natural world through observing, proposing questions or hypotheses, and collecting, analyzing, and interpreting data to produce justifiable evidence-based explanations. Students apply their knowledge of science principles to engineering design by identifying problems, and proposing, testing, and evaluating potential solutions.

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6.1 Structure and Function: Living and non-living systems are organized groups of related parts that function together and have characteristics and properties.

6.1P.1 Describe physical and chemical properties of matter and how they can be measured.

6.1P.2 Compare and contrast the characteristic properties of forms of energy.

6.1L.1 Compare and contrast the types and components of cells. Describe the functions and relative complexity of cells, tissues, organs, and organ systems.

6.1E.1 Describe and compare the properties and composition of the layers of Earth.

6.1E.2 Describe the properties of objects in the solar system. Describe and compare the position of the sun within the solar system, galaxy, and universe.

6.2 Interaction and Change: The related parts within a system interact and change.

6.2P.1 Describe and compare types and properties of waves and explain how they interact with matter.

6.2P.2 Describe the relationships between: electricity and magnetism, static and current electricity, and series and parallel electrical circuits.

6.2L.1 Describe the relationships and interactions between and among cells, tissues, organs, and organ systems.

6.2L.2 Explain how individual organisms and populations in an ecosystem interact and how changes in populations are related to resources.

6.2E.1 Explain the water cycle and the relationship to landforms and weather.

6.3 Scientific Inquiry: Scientific inquiry is the investigation of the natural world based on observations and science principles that includes proposing questions or hypotheses, and developing procedures for questioning, collecting, analyzing, and interpreting accurate and relevant data to produce justifiable evidence-based explanations.

6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.

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6.3S.2 Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.

6.3S.3 Explain why if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one variable.

6.4 Engineering Design: Engineering design is a process of identifying needs, defining problems, developing solutions, and evaluating proposed solutions.

6.4D.1 Define a problem that addresses a need and identify science principles that may be related to possible solutions.

6.4D.2 Design, construct, and test a possible solution to a defined problem using appropriate tools and materials. Evaluate proposed engineering design solutions to the defined problem.

6.4D.3 Describe examples of how engineers have created inventions that address human needs and aspirations.

Seventh Grade

Seventh grade science students refine their understanding of how the components and processes within living and non-living systems interact and affect their characteristics and properties. They learn about gravitation, forces, and laws of motion. They study atoms, elements, and compounds. They develop an understanding of reproduction, inheritance, phenotypes, genotypes, chromosomes, and genes. Students learn about the processes plants and animals use to obtain energy and materials for growth. They study how Earth's atmosphere, land forms, resources, and climate change. Students deepen their understanding of scientific inquiry as the investigation of the natural world based on observation and science principles that includes proposing questions or hypotheses, collecting, analyzing, and interpreting multiple forms of data to produce justifiable evidence-based explanations. They build their understanding of engineering design as a process of identifying needs, problems, and constraints, and developing and evaluating proposed solutions.

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7.1 Structure and Function: Living and non-living systems are composed of components which affect the characteristics and properties of the system.

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7.1P.1 Explain that all matter is made of atoms, elements are composed of a single kind of atom, and compounds are composed of two or more different elements.

7.1L.1 Compare and contrast sexual and asexual reproduction. Explain why reproduction is essential to the continuation of every species.

7.1L.2 Distinguish between inherited and learned traits, explain how inherited traits are passed from generation to generation, and describe the relationships among phenotype, genotype, chromosomes, and genes.

7.2 Interaction and Change: The components and processes within a system interact.

7.2P.1 Identify and describe types of motion and forces and relate forces qualitatively to the laws of motion and gravitation.

7.2L.1 Explain how organelles within a cell perform cellular processes and how cells obtain the raw materials for those processes.

7.2L.2 Explain the processes by which plants and animals obtain energy and materials for growth and metabolism.

7.2E.1 Describe and evaluate the environmental and societal effects of obtaining, using, and managing waste of renewable and non-renewable resources.

7.2E.2 Describe the composition of Earth's atmosphere, how it has changed over time, and implications for the future.

7.2E.3 Evaluate natural processes and human activities that affect global environmental change and suggest and evaluate possible solutions to problems.

7.2E.4 Explain how landforms change over time at various rates in terms of constructive and destructive forces.

7.3 Scientific Inquiry: Scientific inquiry is the investigation of the natural world based on observations and science principles that includes proposing questions or hypotheses, designing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations.

7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.

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7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.

7.3S.3 Evaluate the validity of scientific explanations and conclusions based on the amount and quality of the evidence cited.

7.4 Engineering Design: Engineering design is a process of identifying needs, defining problems, identifying constraints, developing solutions, and evaluating proposed solutions.

7.4D.1 Define a problem that addresses a need and identify constraints that may be related to possible solutions.

7.4D.2 Design, construct, and test a possible solution using appropriate tools and materials. Evaluate the proposed solutions to identify how design constraints are addressed.

7.4D.3 Explain how new scientific knowledge can be used to develop new technologies and how new technologies can be used to generate new scientific knowledge.

Eighth Grade

Eighth grade science students build their understanding of the complexity and interaction of living and non-living systems. They learn about the Periodic Table, the atomic model, states of matter, and physical and chemical properties. They study physical and chemical changes and the law of conservation of mass. Students examine energy transfers, transformations, and conservation. Life science study includes examination of genetics, anatomical characteristics, natural selection, and evolution. They learn about gravity, the motion of objects in the solar system, and Earth's seasons. They study atmospheric and oceanic movement and the effects on weather and climate, and geologic, climatic, environmental, and life form changes over time. Students use their scientific inquiry skills to ask questions or form hypotheses, design an investigation, collect, organize, display, summarize, and analyze data, explain results, and provide interpretations and implications. They use their engineering design skills to define a problem, use science principles to investigate possible solutions given criteria, constraints, priorities, and trade-offs, collect data, evaluate a solution, and identify possible design improvements.

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8.1 Structure and Function: Systems and their components function at various levels of complexity.

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8.1P.1 Describe the atomic model and explain how the types and arrangements of atoms determine the physical and chemical properties of elements and compounds.

8.1P.2 Explain how the Periodic Table is an organization of elements based on their physical and chemical properties.

8.1P.3 Explain how the motion and spacing of particles determines states of matter.

8.1L.1 Explain how genetics and anatomical characteristics are used to classify organisms and infer evolutionary relationships.

8.2 Interaction and Change: Systems interact with other systems.

8.2P.1 Compare and contrast physical and chemical changes and describe how the law of conservation of mass applies to these changes.

8.2P.2 Explain how energy is transferred, transformed, and conserved.

8.2L.1 Explain how species change through the process of natural selection. Describe evidence for evolution.

8.2E.1 Explain how gravity is the force that keeps objects in the solar system in regular and predictable motion and describe the resulting phenomena. Explain the interactions that result in Earth's seasons.

8.2E.2 Describe the processes of Earth's geosphere and the resulting major geological events.

8.2E.3 Explain the causes of patterns of atmospheric and oceanic movement and the effects on weather and climate.

8.2E.4 Analyze evidence for geologic, climatic, environmental, and life form changes over time.

8.3 Scientific Inquiry: Scientific inquiry is the investigation of the natural world based on observations and science principles that includes proposing questions or hypotheses and designing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations and new explorations.

8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.

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8.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.

8.3S.3 Explain how scientific explanations and theories evolve as new information becomes available.

8.4 Engineering Design: Engineering design is a process of identifying needs, defining problems, identifying design criteria and constraints, developing solutions, and evaluating proposed solutions.

8.4D.1 Define a problem that addresses a need, and using relevant science principles investigate possible solutions given specified criteria, constraints, priorities, and trade-offs.

8.4D.2 Design, construct, and test a proposed engineering design solution and collect relevant data. Evaluate a proposed design solution in terms of design and performance criteria, constraints, priorities, and trade-offs. Identify possible design improvements.

8.4D.3 Explain how creating a new technology requires considering societal goals, costs, priorities, and trade-offs.

High School

High School students refine their understanding of systems' characteristics, form, function, interactions, and changes. They deepen their knowledge of atomic structure, the Periodic Table, physical and chemical properties of compounds, the law of conservation of mass, types and strengths of bonds, and chemical reactions. Students apply the laws of motion and gravitation to describe motion. They study interactions of energy and matter and the law of conservation of energy. Life science study includes cellular structures and processes, energy and matter flow in biological systems, the laws of heredity, DNA, reproduction, genetic diversity, natural selection, biological evolution, and change in ecosystems. Students deepen their understanding of our solar system, galaxy and universe, and Earth's atmosphere, geosphere, and hydrosphere. They evaluate the impact of human activities on Earth systems, and how environmental factors influence resource management. Students use their scientific inquiry skills to design an investigation, collect, organize, display, summarize, analyze, and interpret data, and propose and communicate explanations supported by data. They learn how scientific knowledge is modified and how technology and science interact. Students use their engineering design skills to formulate problem statements, identify criteria and constraints, propose and test possible solutions, incorporate modifications, and communicate recommendations. They evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how their work impacts human society and the environment.

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H.1 Structure and Function: A system's characteristics, form, and function are attributed to the quantity, type, and nature of its components.

H.1P.1 Explain how atomic structure is related to the properties of elements and their position in the Periodic Table. Explain how the composition of the nucleus is related to isotopes and radioactivity.

H.1P.2 Describe how different types and strengths of bonds affect the physical and chemical properties of compounds.

H.1L.1 Compare and contrast the four types of organic macromolecules. Explain how they compose the cellular structures of organisms and are involved in critical cellular processes.

H.1L.2 Describe the chemical structure of DNA and its relationship to chromosomes. Explain the role of DNA in protein synthesis.

H.1L.3 Explain and apply laws of heredity and their relationship to the structure and function of DNA.

H.1L.4 Explain how cellular processes and cellular differentiation are regulated both internally and externally in response to the environments in which they exist.

H.1E.1 Classify the bodies in our solar system based on properties and composition. Describe attributes of our galaxy and evidence for multiple galaxies in the universe.

H.1E.2 Describe the structure, function, and composition of Earth's atmosphere, geosphere, and hydrosphere.

H.2 Interaction and Change: The components in a system can interact in dynamic ways that may result in change. In systems, changes occur with a flow of energy and/or transfer of matter.

H.2P.1 Explain how chemical reactions result from the making and breaking of bonds in a process that absorbs or releases energy. Explain how different factors can affect the rate of a chemical reaction.

H.2P.2 Explain how physical and chemical changes demonstrate the law of conservation of mass.

H.2P.3 Describe the interactions of energy and matter including the law of conservation of energy.

H.2P.4 Apply the laws of motion and gravitation to describe the interaction of forces acting on an object and the resultant motion.

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H.2L.1 Explain how energy and chemical elements pass through systems. Describe how chemical elements are combined and recombined in different ways as they cycle through the various levels of organization in biological systems.

H.2L.2 Explain how ecosystems change in response to disturbances and interactions. Analyze the relationships among biotic and abiotic factors in ecosystems.

H.2L.3 Describe how asexual and sexual reproduction affect genetic diversity.

H.2L.4 Explain how biological evolution is the consequence of the interactions of genetic variation, reproduction and inheritance, natural selection, and time.

H.2L.5 Explain how multiple lines of scientific evidence support biological evolution.

H.2E.1 Identify and predict the effect of energy sources, physical forces, and transfer processes that occur in the Earth system. Describe how matter and energy are cycled between system components over time.

H.2E.2 Explain how Earth's atmosphere, geosphere, and hydrosphere change over time and at varying rates. Explain techniques used to elucidate the history of events on Earth.

H.2E.3 Describe how the universe, galaxies, stars, and planets evolve over time.

H.2E.4 Evaluate the impact of human activities on environmental quality and the sustainability of Earth systems. Describe how environmental factors influence resource management.

H.3 Scientific Inquiry: Scientific inquiry is the investigation of the natural world by a systematic process that includes proposing a testable question or hypothesis and developing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations and new explorations.

H.3S.1 Based on observations and science principles, formulate a question or hypothesis that can be investigated through the collection and analysis of relevant information.

H.3S.2 Design and conduct a controlled experiment, field study, or other investigation to make systematic observations about the natural world, including the collection of sufficient and appropriate data.

H.3S.3 Analyze data and identify uncertainties. Draw a valid conclusion, explain how it is supported by the evidence, and communicate the findings of a scientific investigation.

H.3S.4 Identify examples from the history of science that illustrate modification of scientific knowledge in light of challenges to prevailing explanations.

Science Numbering Key Example: K.2P.1
K = Grade
2 = Core Standard strand (strands are 1=Structure and Function; 2=Interaction and change; 3=Scientific Inquiry; 4=Engineering Design)
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H.3S.5 Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies.

H.4 Engineering Design: Engineering design is a process of formulating problem statements, identifying criteria and constraints, proposing and testing possible solutions, incorporating modifications based on test data, and communicating the recommendations.

H.4D.1 Define a problem and specify criteria for a solution within specific constraints or limits based on science principles. Generate several possible solutions to a problem and use the concept of trade-offs to compare them in terms of criteria and constraints.

H.4D.2 Create and test or otherwise analyze at least one of the more promising solutions. Collect and process relevant data. Incorporate modifications based on data from testing or other analysis.

H.4D.3 Analyze data, identify uncertainties, and display data so that the implications for the solution being tested are clear.

H.4D.4 Recommend a proposed solution, identify its strengths and weaknesses, and describe how it is better than alternative designs. Identify further engineering that might be done to refine the recommendations.

H.4D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.

H.4D.6 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.

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