

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

1. SYSTEMS: The student knows and applies scientific concepts and principles to understand systems.

To meet this standard, the student will:

Benchmark 1—Grade 5	Benchmark 2—Grade 8	Benchmark—grade 10
1.1 Properties: Understand how properties are used to identify, describe, and categorize substances, materials, and objects and how characteristics are used to categorize living things.		
Physical Science		
Properties of Substances		
1. Use properties to sort natural and manufactured materials and objects, for example, <i>size, weight, shape, color, texture, and hardness</i> .	1. Use physical and chemical properties to sort and identify substances, for example, <i>density, boiling point, and solubility</i> .	1. Recognize the atomic nature of matter, how it relates to physical and chemical properties, and serves as the basis for the structure and use of the periodic table.
Motion of Objects		
2. Describe the relative position and motion of objects.	2. Describe the positions, relative speeds, and changes in speed of objects.	2. Describe the average speed, direction of motion, and average acceleration of objects, for example, <i>increasing, decreasing, or constant acceleration</i> .
Wave Behavior		
3. Describe experiences with sound, for example vibrations, echoes, and pitch. Describe experiences with light in terms of bouncing off, passing through, and changes in path direction.	3. Describe sound, water waves, and light, using wave properties such as <i>wavelength, reflection, refraction, transmission, absorption, scattering, and interference</i> .	3. Describe waves, relating the ideas of frequency, wavelength, and speed, and by relating energy to amplitude.

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1. SYSTEMS: The student knows and applies scientific concepts and principles to understand Systems. (continued)

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Benchmark 1—GRADE 5	Benchmark 2—GRADE 8	Benchmark 3—GRADE 10
1.1 Properties: Understand how properties are used to identify, describe, and categorize substances, materials, and objects and how characteristics are used to categorize living things.		
Energy Sources and Kinds		
4. Understand that energy keeps things running and comes in many forms.	4. Understand that energy is a property of matter, objects, and systems and comes in many forms, including potential energy, kinetic energy, and thermal energy such as <i>heat, light, electrical, mechanical, sound, nuclear, and chemical.</i>	4. Understand many forms of energy as they are found in common situations on Earth and in the universe.
Earth/Space Science		
Nature and Properties of Earth Materials		
5. Observe and examine physical properties of earth materials, such as <i>rocks and soil, water (as liquid, solid, and vapor) and the gases of the atmosphere.</i>	5. Classify rocks and soils into groups based on their chemical and physical properties; describe the processes by which rocks and soils are formed.	5. Correlate the chemical composition of earth materials such as rocks, soils, water, gases of the atmosphere, with physical properties.
Life Science		
Characteristics of Living Things		
6. Distinguish living organisms from nonliving objects, and use characteristics to sort common organisms into plant and animal groups.	6. Categorize plants and animals into groups according to how they accomplish life processes and by similarities and differences in external and internal structures.	6. Classify organisms into distinct groups according to structural, cellular, biochemical, and genetic characteristics.

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1. SYSTEMS: The student knows and applies scientific concepts and principles to understand Systems. (continued)

To meet this standard, the student will:

Benchmark 1—GRADE 5	Benchmark 2—GRADE 8	Benchmark 3—GRADE 10
1.2 Structure: Understand how components, structures, organizations, and interconnections describe systems.		
Systems Approach		
1. Identify the parts of a system, how the parts go together, and how they depend on each other.	1. Describe how the parts of a system interact and influence each other.	1. Analyze systems, including the inputs and outputs of a system and its subsystems.
Physical Science		
Energy Transfer and Transformation		
2. Know that energy can be transferred from one object to another and can be transformed from one type of energy to another.	2. Determine factors that affect rate and amount of energy transfer; associate a decrease in one form of energy with an increase in another.	2. Understand that total energy is conserved; analyze decreases and increases in energy during transfers and transformations in terms of total energy conservation.
Structure of Matter		
3. Know that matter is made of small particles called atoms and molecules.	3. Understand that all matter is made up of atoms, which may be combined in various kinds, ways, and numbers to make molecules of different substances.	3. Relate the structural characteristics of atoms to the principles of atomic bonding.

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1.2 Structure: Understand how components, structures, organizations, and interconnections describe systems. (continued)		
Earth/Space Science		
Components and Patterns of the Earth System		
Components of the Solar System and Beyond (Universe)		
5. Know that the earth is one of several planets that orbits Sun, and Moon orbits Earth.	5. Describe the components of the solar system including Sun, Earth, Moon, the other planets and their moons, and smaller objects such as asteroids and comets.	5. Understand that the solar system is in a galaxy in an expanding universe composed of immense numbers of stars and celestial bodies.
Life Science		
Structure and Organization of Living Systems		
6. Know that living things are composed of parts made of cells.	6. Know that specialized cells within multi-cellular organisms form different kinds of tissues, organs, and organ systems to carry out life functions.	6. Understand that specific genes regulate the functions performed by structures within cells.

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1.2 Structure: Understand how components, structures, organizations, and interconnections describe systems.		
Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
Molecular Basis of Heredity		
7. Describe the life cycles of plants and animals, and recognize the differences between inherited and acquired characteristics.	7. Understand that all living things reproduce and pass on genetic information and that an organism’s characteristics are determined by both genetic and environmental influences.	7. Describe how genetic information (DNA) in the cell is controlled at the molecular level and provides genetic continuity between generations.
Human Biology		
8. Understand the organization and function of human body structures and internal organs and how they work together.	8. Identify and describe human life functions, and the interconnecting organ systems necessary to maintain human life, such as digestion, respiration, reproduction, circulation, excretion, movement, disease prevention, control, and coordination.	8. Compare and contrast the specialized structural and functional systems that regulate human growth and development, and maintain health.

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1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy..		
Physical Science		
Nature of Forces		
1. Describe forces in terms of strength and direction.	1. Know the factors that determine the strength and interactions of various forces.	1. Identify various forces, and their relative magnitudes, and explain everyday situations in terms of force.
Forces to Explain Motion		
2. Investigate and recognize factors, which determine the effects of a push or pull on the motion of objects.	2. Understand the effects of balanced and unbalanced forces on the motion of objects along a straight line.	2. Explain the effects of unbalanced forces in changing the direction of motion of objects.
Physical/Chemical Changes		
3. Know that matter can undergo changes of state, such as evaporation, condensation, or freezing and thawing.	3. Understand physical and chemical changes at the particle level, and know that matter is conserved.	3. Analyze and explain the factors that affect physical, chemical, and nuclear changes and how matter and energy are conserved in a closed system.

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Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy..		
Earth/Space Science		
Processes and Interactions in the Earth System		
4. Identify processes that change the surface of Earth such as earthquakes, erosion, landslides, volcanic eruptions, and weathering.	4. Describe constructive and destructive processes at work and how they continually change landforms on earth.	4. Explain how patterns and arrangements of landforms, oceans, and the atmosphere are determined by natural forces and how the theory of plate tectonics accounts for crustal movement over time; describe how volcanoes and earthquakes in Washington State occur because of this interaction.
History and Evolution of the Earth		
5. Recognize that fossils provide evidence of plants, animals, and environments that existed long ago.	5. Describe how fossils and other evidence are used to document life and environmental changes over time.	5. Explain how fossils, radioactive elements, and other evidence can be used to correlate and determine the sequence of geologic events.
Hydrosphere/Atmosphere		
6. Observe and measure weather indicators such as temperature, wind direction and speed, and precipitation, noting changes and patterns of change from day-to-day and over the seasons.	6. Relate global atmospheric movement and the formation of ocean currents to weather and climate.	6. Correlate global climate to energy transfer by the sun, cloud cover, the earth's rotation, and positions of mountain ranges and ocean.

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1. SYSTEMS: The student knows and applies scientific concepts and principles to understand Systems. (continued)

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Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy. (continued)		
Earth/Space Science (Continued)		
Interactions in the Solar System and Beyond (Universe)		
7. Observe and describe the patterns of movement of Sun and Moon relative to each other and Earth, and relate them to Earth’s rotation.	7. Describe how the regular and predictable motions of objects in the solar system account for phenomena such as the day, year, phases of the moon, eclipses, seasons, and ocean tides.	7. Understand that Earth, other planets, Sun, and the rest of the celestial bodies in the universe are continuing to evolve because of interactions between matter and forces of nature.
Life Science		
Life Processes and the Flow of Matter and Energy		
8. Recognize that living things need constant energy supplied from food or light and that in ecosystems substances such as air, water, nutrients, and the chemicals in food are continually recycled.	8. Understand that individual organisms and ecosystems use matter and energy for life processes, and the mechanisms accomplishing these processes are complex, integrated, and regulated.	8. Explain how organisms and ecosystems can sustain life by obtaining, transporting, transforming, and releasing, matter and energy, and eliminating matter.
Biological Evolution		
9. Know that fossil records show patterns of structural change in species over time.	9. Describe how the theory of biological evolution and natural selection accounts for species diversity, adaptation, extinction, and change in species over time.	9. Investigate and examine the scientific evidence used to develop the theory of biological evolution, and the concepts of speciation, adaptation, and biological diversity.

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1. SYSTEMS: The student knows and applies scientific concepts and principles to understand Systems. (continued)

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
1.3 Changes: Understand how interactions within and among systems cause changes in matter and energy. (continued)		
Interdependence of Life		
10. Describe how an organism’s behavior and ability to survive is influenced by environment, other life forms, and the availability of food and/or other resources.	10. Explain how organisms interact with their environment and with other organisms to acquire energy, cycle matter, influence behavior, and establish competitive or mutually beneficial relationships.	10. Compare and contrast the complex biotic and abiotic factors that affect living organisms’ interactions in biomes, ecosystems, communities, and populations.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

2. INQUIRY: The student knows and applies the skills, processes, and nature of scientific inquiry.

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
2.1 Investigating Systems: Develop the knowledge and skills necessary to do scientific inquiry.		
Questioning		
1. Ask questions about objects, organisms, and events in the environment.	1. Generate questions that can be answered through scientific investigations.	1. Study and analyze questions and related concepts that guide scientific investigations.
Planning and Conducting Investigations		
2. Plan and conduct simple investigations, using appropriate tools, measures, and safety rules.	2. Plan, conduct, and evaluate scientific investigations, using appropriate equipment, mathematics, and safety procedures.	2. Plan, conduct, and evaluate systematic and complex scientific investigations, using appropriate technology, multiple measures, and safe approaches.
Explaining		
3. Use data to construct reasonable explanations.	3. Use evidence from scientific investigations to think critically and logically to develop descriptions, explanations, and predictions.	3. Formulate and revise scientific explanations and models using logic and evidence; recognize and analyze alternative explanations and predictions.
Modeling		
4. Model objects, events, or processes by representing them with concrete objects, metaphors, analogies, or other conceptual or physical constructs.	4. Correlate models of the behavior of objects, events, or processes to the behavior of the actual things; test models by predicting and observing actual behaviors or processes.	4. Use mathematics, computers and/or related technology to model the behavior of objects, events, or processes; analyze advantages and limitations of models.

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2. INQUIRY: The student knows and applies the skills, processes, and nature of scientific inquiry.

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
2.1 Investigating Systems: Develop the knowledge and skills necessary to do scientific inquiry.		
Communicating		
5. Record and report observations, explanations, and conclusions using visual, oral, written, and mathematical expression.	5. Communicate scientific procedures, investigations, and explanations visually, orally, in writing, with computer-based technology, and in the language of mathematics.	5. Research, interpret, and defend scientific investigations, conclusions, or arguments; use data, logic, and analytical thinking as investigative tools; express ideas through visual, oral, written, and mathematical expression.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

2. INQUIRY: The student knows and applies the skills, processes, and nature of scientific inquiry. (continued)

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
2.2 Nature of Science: Understand the nature of scientific inquiry.		
Intellectual Honesty		
1. Understand that all scientific observations should be reported accurately even when they contradict expectations.	1. Understand the operational and ethical traditions of science and technology such as skepticism, cooperation, intellectual honesty, and proprietary discovery.	1. Analyze and explain why curiosity, honesty, openness, and skepticism are integral to scientific inquiry.
Limitations of Science and Technology		
2. Distinguish between questions that can be answered with science and technology and those that cannot.	2. Understand how scientific investigations are used to answer questions about the natural and constructed worlds.	2. Identify and analyze factors that limit the extent of scientific investigations.
Evaluating Inconsistent Results		
3. Explain why similar investigations may not produce similar results.	3. Provide more than one explanation for events or phenomena; defend or refute the explanations using evidence.	3. Compare, contrast, and critique divergent results from scientific investigations based on scientific arguments and explanations.
Evaluating Methods of Investigation		
4. Recognize that results of scientific investigations can come from expected and unexpected sources.	4. Describe how methods of investigation relate to the validity of scientific, experiments, observations, theoretical models, and explanation.	4. Analyze and evaluate the quality and standards of investigative processes and procedures.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

2. INQUIRY: The student knows and applies the skills, processes, and nature of scientific inquiry. (continued)

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
2.2 Nature of Science: Understand the nature of scientific inquiry.		
Evolution of Scientific Ideas		
5. Know that ideas in science change as new scientific thinking, theories, and evidence arise.	5. Explain how scientific theory, prediction or hypothesis generation, experimentation, and observation are interrelated and may lead to changing ideas.	5. Know that science involves testing, revising, and occasionally discarding theories; understand that scientific inquiry and investigation lead to a better understanding of the natural world and not to absolute truth.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

3. DESIGN: The student knows and applies the design process to develop solutions to human problems in societal contexts.

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
3.1 Designing Solutions: Apply design processes to develop solutions to human problems or meet challenges using the knowledge and skills of science and technology.		
Identifying Problems		
1. Identify problems found in familiar contexts in which science/technology can be or has been used to design solutions.	1. Identify and examine common, everyday challenges or problems in which science/technology can be or has been used to design solutions.	1. Study and analyze challenges or problems from local, regional, national, or global contexts in which science and technology can be or has been used to design a solution.
Designing and Testing Solutions		
2. Propose, design, and test a solution to a problem.	2. Identify, design, and test alternative solutions to a challenge or problem.	2. Research, model, simulate, design, and test alternative solutions to a problem.
Evaluating Potential Solutions		
3. Evaluate how well a design or a product solves a problem.	3. Compare and contrast multiple solutions to a problem or challenge.	3. Propose, revise, and evaluate the possible constraints, applications, and consequences of solutions to a problem or challenge.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS—SCIENCE

3. DESIGN: The student knows and applies the design process to develop solutions to human problems in societal contexts.
(continued)

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
3.2 Science, Technology, & Society: Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace.		
<i>All Peoples Contribute to Science and Technology</i>		
1. Know that science and technology have been practiced by all peoples throughout history.	1. Know that science and technology have been developed, used, and affected by many diverse individuals, cultures, and societies throughout human history.	1. Analyze how scientific knowledge and technological advances discovered and developed by individuals and communities in all cultures of the world contribute to changes in societies.
<i>Relationship of Science and Technology</i>		
2. Recognize that people have invented tools for everyday life and for scientific investigations.	2. Compare and contrast scientific inquiry and technological design in terms of activities, results, and influence on individuals and society; know that science enables technology and vice versa.	2. Analyze how the scientific enterprise and technological advances influence and are influenced by human activity, for example, societal, environmental, economical, political, or ethical considerations.
<i>Careers and Occupations Using Science, Mathematics, and Technology</i>		
3. Identify the knowledge and skills of science, mathematics, and technology used in common occupations.	3. Investigate the use of science, mathematics, and technology within occupational/career areas of interest.	3. Investigate the scientific, mathematical, and technological knowledge, training, and experience needed for occupational/career areas of interest.

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3. DESIGN: The student knows and applies the design process to develop solutions to human problems in societal contexts.
(continued)

To meet this standard, the student will:

Benchmark 1—grade 5	Benchmark 2—grade 8	Benchmark 3—grade 10
3.2 Science, Technology, & Society: Know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace.		
Environmental and Resource Issues		
4. Know humans and other living things depend on the natural environment and can cause changes in their environment that affect their ability to survive.	4. Explain how human societies' use of natural resources affects quality of life and the health of ecosystems.	4. Analyze the effects of natural events and human activities on Earth's capacity to sustain biological diversity.