

1.0 Common Core: Content
Science teachers know the concepts, ideas and relationships in science that are needed to advance student learning as defined by Washington Essential Academic Learning Requirements and national standards developed by the science education community, including major unifying themes. Content includes the big ideas of science and the mathematics underlying them, and refers to:
<u>Mathematics</u> - Applications of mathematics in science research, including:
K1.1.1 Algebra
K1.1.2 Calculus
K1.1.3 Probability and Statistics
<u>Knowing</u> –Science is a way of asking and answering questions about the physical universe
K1.2.1 Scientific method
K1.2.2 Other ways of knowing
<u>The Ordered Universe</u> – The universe is regular and predictable. Newton’s laws of motion and gravity predict the behavior of objects on Earth and in space.
K1.3.1 The history of Astronomy
K1.3.2 The history of Mechanics
K1.3.3 Newton’s laws of physics
K1.3.4 The universal force of gravity
<u>Energy and Heat</u> – The many different forms of energy are interchangeable, and the total amount of energy in an isolated system is conserved. Energy always goes from a more useful to a less useful form.
K1.4.1 Work, energy and power
K1.4.2 Forms of energy: kinetic, potential, thermal
K1.4.3 Wave energy
K1.4.4 Mass as energy
K1.4.5 The first law of thermodynamics
K1.4.6 Heat and temperature, specific heat capacity
K1.4.7 The second law of thermodynamics
<u>Electricity and Magnetism</u> – Electricity and magnetism are two different aspects of one force – the electromagnetic force
K1.5.1 Static electricity
K1.5.2 Electromagnetic radiation
K1.5.3 Interactions of electromagnetic radiation with matter
K1.5.4 Electric circuits
<u>Waves and Electromagnetic Radiation</u> – Whenever an electrically charged object is accelerated, it produces electromagnetic radiation – waves of energy that travel at the speed of light
K1.6.1 The nature of waves
K1.6.2 The electromagnetic wave
K1.6.3 The electromagnetic spectrum
<u>The Atom</u> – All of the matter around us is made of atoms – the chemical building blocks of our world
K1.7.1 Atomic theory
K1.7.2 The structure of the atom
K1.7.3 Interactions of matter and light

<u>The World of the Quantum</u> – At the subatomic scale everything is quantized. Any measurement at that scale significantly alters the object being measured
K1.8.1 Quantum particles
K1.8.2 The uncertainty principle
K1.8.3 Wave-particle duality
<u>Chemical Bonding</u> – Atoms bind together in chemical reactions by the rearrangement of electrons
K1.9.1 Types of chemical bonds
K1.9.2 States of matter
K1.9.3 Chemical reactions and the formation of chemical bonds
<u>Atomic Architecture</u> – A material's properties result from its constituent atoms and the arrangements of chemical bonds that hold those atoms together.
K1.10.1 The strength of materials
K1.10.2 Electrical properties of materials
K1.10.3 Magnetic properties of materials
<u>Nuclear Physics</u> – Nuclear energy depends on the conversion of mass into energy
K1.11.1 The organization of the nucleus
K1.11.2 Radioactivity
K1.11.3 Energy from the nucleus
<u>Particle Physics</u> – All matter is made of quarks and leptons – the fundamental building blocks of the universe.
K1.12.1 Elementary particles
K1.12.2 The four fundamental forces
<u>Relativity</u> – All observers, no matter what their frame of reference, see the same laws of nature.
K1.13.1 Frames of reference
K1.13.2 Relativity and the speed of light
K1.13.3 Special relativity
K1.13.4 General relativity
<u>Astronomy</u> – The Sun and other stars use nuclear fusion reactions to convert mass into energy. Eventually, when a star's nuclear fuel is depleted, the star must burn out.
K1.14.1 Energy and stars
K1.14.2 The anatomy of stars
K1.14.3 Types/variety of stars
K1.14.4 Death of stars
<u>The Cosmos</u> – The universe began billions of years ago in a 'big bang', and it has been expanding ever since.
K1.15.1 The nature of the cosmos
K1.15.2 The Big Bang
K1.15.3 The evolution of the universe
<u>The Earth and Other Planets</u> – The Earth, one of nine planets that orbit the Sun, formed 4.5 billion years ago from a great cloud of dust.
K1.16.1 The solar system
K1.16.2 The nebular hypothesis
K1.16.3 Evolution of the Earth and Moon
K1.16.4 The outer solar system
<u>The Restless Earth</u> – The entire Earth is still changing, due to the slow convection of soft, hot rocks deep within the planet.
K1.17.1 Plate tectonics
K1.17.2 Volcanoes and earthquakes

<u>Cycles of the Earth</u> – All matter above and beneath the Earth’s surface operates in cycles	
K1.18.1	The atmospheric cycle
K1.18.2	The hydrologic cycle
K1.18.3	The rock cycle
<u>Ecosystems</u> – Ecosystems, interdependent communities of living things, recycle matter while energy flows through them	
K1.19.1	The interdependence of life: populations, communities, and ecosystems
K1.19.2	Threats to the global ecosystem and environment
<u>Strategies of Life</u> – Living things use many strategies to deal with the problems of acquiring and using matter and energy	
K1.20.1	The organization of living things
K1.20.2	Classifying living things
K1.20.3	Strategies of fungi
K1.20.4	Strategies of plants
K1.20.5	Strategies of animals
<u>Molecules of Life</u> – A cell’s major parts are constructed from a few simple molecular building blocks.	
K1.21.1	Characteristics of organic molecules
K1.21.2	Amino acids and the structure of proteins
K1.21.3	Carbohydrates
K1.21.4	Lipids
K1.21.5	Vitamins and minerals
<u>The Living Cell</u> – Life is based on chemistry, and chemistry takes place in cells.	
K1.22.1	The nature and variety of cells
K1.22.2	How a cell works
K1.22.3	Metabolism and energy transfer: photosynthesis, glycolysis, respiration
K1.22.4	Cell division: mitosis and meiosis
<u>Genetics</u> – All living things use the same genetic code to guide the chemical reactions in every cell.	
K1.23.1	Classical genetics: qualitative and quantitative
K1.23.2	Nucleotides, DNA and RNA
K1.23.3	The genetic code
K1.23.4	Genetic engineering, gene therapy
<u>Evolution</u> – All life on Earth evolved from single-celled organisms by the process of natural selection.	
K1.24.1	The diversity of life on earth
K1.24.2	Genetic variation within a species
K1.24.3	Evidence of evolution
K1.24.4	Adaption and natural selection
K1.24.5	Changes in diversity over time
Science teachers structure and interpret the concepts, ideas and relationships in science that are needed to advance student learning as defined by Washington Essential Academic Learning Requirements and national standards developed by the science education community. Skill content refers to:	
S1.1	Can conduct limited but original research in science, demonstrating the ability to design and conduct open-ended investigations and report results in the context of one or more science disciplines.
S1.2	Able to use applications of mathematics in science research.

2.0 Common Core: Nature of Science	
Science teachers know the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community, and contrast science to other ways of knowing. Nature of science refers to:	
K2.1	Know the characteristics that distinguish science from other ways of knowing.
K2.2	Know the characteristics that distinguish basic science, applied science and technology.
K2.3	Know the processes and conventions of science as a professional activity.
K2.4	Know standards defining acceptable evidence and scientific explanation.
K2.5	Know the unifying themes common to all sciences, including systems, order and organization; evidence, models and organization; constancy, change and measurement; evolution and equilibrium; and form and function.
Science teachers engage students in activities that require the application of the scientific method, and confront the values, beliefs and assumptions in our society. Nature of science refers to:	
S2.1	Able to use processes and conventions of science as a professional activity.
S2.2	Able to use standards defining acceptable evidence and scientific explanation.
3.0 Common Core: Inquiry	
Science teachers know and understand:	
K3.1	Scientific inquiry and its relationship to the development of scientific knowledge.
Science teachers engage students regularly and effectively in science inquiry and facilitate understanding of the role inquiry plays in the development of scientific knowledge. Inquiry refers to:	
S3.1	Questioning and formulating solvable problems.
S3.2	Reflecting on, and constructing, knowledge from data.
S3.3	Collaborating and exchanging information while seeking solutions.
S3.4	Developing concepts and relationships from empirical experience.
4.0 Common Core: Context of Science	
Science teachers know the relationship between science and the daily lives and interests of students and to a larger framework of human endeavor and understanding. The context of science refers to:	
K4.1	Know how science and technology interact with society.
K4.2	Know how values are used in scientific, technological, personal, social and cultural contexts.
K4.3	Know the relevance and importance of science to the personal lives of students.
Science teachers relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding. The context of science refers to:	
S4.1	Enabling students to recognize relationships between science and technology and society.
S4.2	Enabling students to recognize the use of values in scientific, technological, personal, social and cultural contexts.
S4.3	Enabling students to consider the ethical, human, and environmental implications of contemporary science issues.

S4.4 Demonstrating the relevance and importance of science to the personal lives of students.
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5.0 Common Core: Skills of Teaching	
Science teachers know the equipment, materials, and preparation required in the physical/life/earth sciences laboratory, including:	
K5.1	Design of experiments
K5.2	Data analysis and presentation
K5.3	Preparation of laboratory reports
K5.4	Operation of equipment
K5.5	Preparation of materials
K5.6	Lab safety (including storage and disposal of hazardous waste)
Science teachers, incorporating instructional materials, create a community of diverse student learners who can construct meaning from science experiences and possess a disposition for further inquiry and learning. Skills of Teaching refers to:	
S5.1	Able to use science teaching actions, strategies and methodologies.
S5.2	Able to establish interactions with students, including questioning techniques, that promote learning and achievement.
S5.3	Able to effectively organize classroom laboratory, and field experiences in different student groupings.
S5.4	Able to use advanced technology to extend and enhance learning.
S5.5	Able to use prior conceptions and student interests to promote new learning.
S5.6	Able to design experiments for the physical/life/earth and space sciences
S5.7	Able to analyze and present data in the physical/life/earth and space sciences
S5.8	Able to prepare laboratory reports in physical/life/earth and space science labs
S5.9	Able to operate physical/life/earth and space science laboratory equipment
S5.10	Able to prepare materials used in the physical/life/earth and space science laboratory
S5.11	Able to establish and enforce lab safety (including storage and disposal of hazardous waste) in the physical/life/earth and space science laboratory
6.0 Common Core: Curriculum	
K6.1	Science teachers know a coherent, focused science curriculum that is consistent with state Essential Academic Learning Requirements and national standards for science education and appropriate for addressing the needs, abilities and interests of students.
Science teachers develop and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students. Science curriculum refers to:	
S6.1	Able to develop and apply an extended framework of goals, plans, materials, and resources for instruction.
S6.2	Able to develop and apply science principles, both in and out of school.
S6.3	Able to plan instruction which promotes problem analysis, critical thinking, creativity, and decision-making.

7.0 Common Core: Social Context	
Science teachers know the relationship between science and the community and know the human and institutional resources in the community. The social context of science teaching refers to:	
K7.1	Know examples of social and community support networks within which occur science teaching and learning.
K7.2	Know the relationship of science teaching and learning to the needs and values of the various communities.
Science teachers relate science to the community and to use human and institutional resources in the community to advance the education of their students in science. The social context of science teaching refers to:	
S7.1	Able to develop the social and community support network within which science teaching and learning occur.
S7.2	Able to relate science teaching and learning to the needs and values of the community.
S7.3	Able to involve people and institutions from the community in the teaching of science.
8.0 Common Core: Assessment	
Science teachers know a variety of contemporary assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science. Assessment refers to:	
K8.1	Know the measurement and evaluation of student learning through a variety of methods.
Science teachers use a variety of contemporary assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science. Assessment refers to:	
S8.1	Identifying outcomes to be measured.
S8.2	Able to align goals, instruction and outcomes.
S8.3	Measuring and evaluating student learning through a variety of methods.
S8.4	Able to use outcome data to guide and change instruction.
9.0 Common Core: Environment for Learning	
Science teachers know safe and supportive learning environments reflecting high expectations for the success of all students. Learning environments refers to:	
K9.1	Know examples of changes that can make physical spaces more effective for learning science.
K9.2	Know typical examples of psychological and social environments of the student engaged in learning science.
K9.3	Know safety in all areas related to science instruction.
Science teachers design and manage safe and supportive learning environments reflecting high expectations for the success of all students. Learning environments refers to:	
S9.1	Able to design/manage physical spaces to enhance learning of science.
S9.2	Able to create a climate that promotes fairness,
S9.3	Able to establish and maintain rapport with students,
S9.4	Able to communicate clear, challenging expectations to each student,

S9.5	Able to establish and maintain consistent standards of classroom behavior,
S9.6	Able to use instructional time effectively
S9.7	Able to demonstrate safe treatment and ethical use of living organisms.
S9.8	Able to create a safe environment conducive to learning,
10.0 Common Core: Professional Practice	
Science teachers have a knowledge base that prepares them for professional practice. Professional practice refers to:	
K10.1	Knowledge of science and educational professional organizations.
K10.2	Knowledge of standards of ethical behavior consistent with the best interests of students and the community.
Science teachers participate in the professional community, improving practice through their personal actions, education and development. Professional practice refers to:	
S10.1	Able to participate in the activities of the professional community, to include colleagues, organizations and other community agencies, to improve student learning.
S10.2	Able to demonstrate ethical behavior consistent with the best interests of students and the community, as stated in Washington's Code of Professional Conduct, and local, state, and federal laws and regulations.
S10.3	Able to reflect on professional practices and continuous efforts to ensure the highest quality of science instruction.
S10.4	Able to willingly work with students and new colleagues as they enter the profession.
S10.5	Able to communicate effectively with parents/guardians, business and industry, and other agencies, and the community at large to support learning by all students.