Science Curriculum Review
Summary
Goal Statement

Scientifically literate people construct knowledge by applying the key principles of life science, physical science, and earth and space science when they raise questions, generate and synthesize ideas, and evaluate those ideas both individually and collaboratively. As critical thinkers, learners of science understand how scientific principles are integrated with technology and how scientific knowledge strengthens over time. They also recognize the influence of science on personal and social perspectives and behavior. In order to understand and productively participate in a global society, students use the following processes of inquiry:

- to engage in scientifically-oriented questions,
- to give priority to evidence,
- to formulate explanations from evidence,
- to connect to scientific knowledge, and
- to communicate and justify explanations.

Acceleration Plan

Elementary Options

K-5 Acceleration Plan

A child study team (classroom teacher, AELP teacher, principal) will be convened when a teacher, student, principal, or parent recognizes an individual student’s potential need for acceleration in science as indicated by advanced prior knowledge of content.

The grade level benchmark tests will be administered. If the student scores an 85% or above, the child study team will meet to determine the instructional plan (single-subject acceleration, whole-grade acceleration, STEM AELP involvement, differentiation, mentorships, etc.) best suited to meet the student’s needs.

Secondary Options

1. Honors Coursework

Students enrolled in honors courses will learn the material at greater depth than in the general version of the course. The power standards will be the same for both courses, but the honors course will include appropriate extensions by objective. Honors courses will provide increased opportunities for the following:

- Problem-seeking and problem-solving
- Participation in scholarly and creative processes
- Use of imagination
- Critical analysis and application
- Learning to express/defend ideas
- Learning to accept constructive criticism
- Becoming a reflective thinker
- Becoming an initiator of learning
Students who choose an honors science course are expected to work more independently than students in standard level courses. Challenging coursework and reading outside of class should be expected.

Students who choose honors science courses should have advanced interpretive skills and the ability to apply concepts to problem solving. Teachers help develop these skills, but students who are not independent thinkers, who look for the teacher to supply all the answers, will struggle and be frustrated.

Because students will be expected to cover more of the course material independently, there will be increased opportunities for open inquiry and in-depth investigations.

Students who choose an honors science course will be expected to participate in student generated (individual and/or group) research projects. They will present their scientific findings orally and in writing, which may include a more formal scientific laboratory report format.

Initial placement in honors science courses does not mean permanent placement. Students can transition between honors and standard courses as progress and needs are re-evaluated. Honors science courses in grades 9-12 are not weighted.

Available Honors Courses

- Honors Earth & Space Science (6th)
- Honors Life Science (7th)
- Honors Physical Science (8th)
- Honors Earth & Space Science (HS)
- Honors Biology (HS)
- Honors Chemistry (HS)

Student Criteria for Honors Course Placement:

Students will be recommended for Honors Science coursework if they have:

- A 98th percentile on the science ITBS/ITED or reading comprehension ITBS/ITED OR AELP STEM Identification OR
- A grade of an A or B in an honors science course from the previous school year OR
- An application (reviewed by science team at the next grade level)
- Application to include teacher recommendation, ITBS/ITED, CogAT, previous science grades, and a statement by the student

2. Simultaneous Course Enrollment

With counselor approval, students in grades 9 through 12 can take two science courses in one year to accelerate their access to advanced science coursework.

3. Testing Out

Secondary students can test out of any course by scoring 80% or above on a summative course posttest (to be administered in the summer or as needed), followed by a child study team meeting to discuss and decide each student’s needs in science. Additionally, a score of 80% or higher on a course pre-test administered at the start of the school year would also indicate a need for acceleration. Any student can attempt to test out of a course, regardless of identification or standardized test scores. The student transcript will reflect that the student has tested out of the course, but no credit or grade will be given.
Professional Development Plan

Teachers of science will continue to study best practice in the area of science through the support of their professional learning community in collaboration with the Curriculum and Instruction Team, their building instructional coaches, and their science instructional practices team. The primary focus of professional development for science teachers will be in the area of inquiry.

Materials Adopted

The elementary team members of the Curriculum Review Committee chose to adopt National Geographic Science for Kindergarten through Grade 5. The secondary Curriculum Review Committees chose the It’s About Time curriculum for Grades 6, 8, and 11; Holt-McDougal for grades 9 and 10; and Glencoe for grade 7.

Assessment Plan

The curriculum review committee has created a District Summative Exam for each science course. The assessment will be administered the first week of school and again the last week of school. This assessment will be used to measure students’ growth on the Power Standards. This assessment will also serve as the tool used to determine if a student will be considered for acceleration. In addition to the pre/post test, District Interim Assessments will be given throughout the year.

New Curriculum Implementation Timeline

K-5 (2012-13)
6th Earth & Space Science (2011-12)
7th Life Science (2011-12)
8th Physical Science (2011-12)
Earth & Space Science (2012-13)*
Biology (2011-12)
Chemistry (2011-12)
Honors 6th Earth & Space Science (2011-12)
Honors 7th Life Science (2011-12)
Honors 8th Physical Science (2012-13)
Honors Earth & Space Science (2012-13)
Honors Biology (2012-13)
Honors Chemistry (2012-13)
Anatomy and Physiology (2011-12)
AP Biology (2011-12)
AP Chemistry (2011-12)
AP Environmental Science (2012-13)
Geology (2011-12)
Astronomy (2012-13)
Physics (2011-12)
AP Physics C I for Science & Engineering (2012-13)

*Beginning in the 2012-13 school year, the Ankeny Science Curriculum, in alignment with the Iowa Core Curriculum, will include enrollment of all 8th grade students in physical science and all 9th grade students in earth science. In order to transition to this alignment, both 8th and 9th grade students will take physical science during the 2011-12 school year.
6-12 Program Overview

As per Board Policy 505.5, Graduation Requirements, Ankeny students must complete 6 credits in science or 3 full years of science in order to meet minimum graduation requirements. Therefore, as shown below, students must complete core coursework in Earth Science, Biology, and Chemistry or the corresponding Honors courses in order to meet the 6 credit/3 year requirement. The elective options listed will not supplant core requirements.

Grade Level: 6
Core Coursework: 6th Earth & Space Science
Honors Coursework (Implementation Year): Honors 6th Earth & Space Science (2011-12)
Elective Option: NA

Grade Level: 7
Core Coursework: 7th Life Science
Honors Coursework (Implementation Year): Honors 7th Life Science (2011-12)
Elective Option: NA

Grade Level: 8
Core Coursework: 8th Physical Science
Honors Coursework (Implementation Year): Honors 8th Physical Science (2011-12)
Elective Option: NA

Grade Level: 9
Core Coursework: Earth & Space Science
Honors Coursework (Implementation Year): Honors Earth & Space Science (2011-12)
Elective Option: NA

Grade Level: 10
Core Coursework: Biology
Honors Coursework (Implementation Year): Honors Biology
Elective Option: Electives are available beginning in 10th grade as long as pre and co-requisites are met.
- AP Biology (prerequisite – Biology/Honors Biology & pre or co-requisite – Chemistry/Honors Chemistry)
- AP Chemistry (prerequisite – Chemistry/Honors Chemistry)
- AP Environmental Science (pre or co-requisite – Chemistry/Honors Chemistry)
- Anatomy and Physiology (prerequisite – Biology/Honors Biology)
- Astronomy (prerequisite – Earth & Space Science/Honors Earth & Space Science)
- Geology (prerequisite – Earth & Space Science/Honors Earth & Space Science)
- Physics (pre or co-prerequisite – Chemistry/Honors Chemistry & pre or co-requisite – Algebra II)
- AP Physics C for Science & Engineering (prerequisite – Physics, co-requisite – AP Calculus)

Grade Level: 11
Core Coursework: Chemistry
Honors Coursework (Implementation Year): Honors Chemistry
Elective Option: Electives are available beginning in 10th grade as long as pre and co-requisites are met.
- AP Biology (prerequisite – Biology/Honors Biology & pre or co-requisite – Chemistry/Honors Chemistry)
- AP Chemistry (prerequisite – Chemistry/Honors Chemistry)
• AP Environmental Science (pre or co-requisite – Chemistry/Honors Chemistry)
• Anatomy and Physiology (prerequisite – Biology/Honors Biology)
• Astronomy (prerequisite – Earth & Space Science/Honors Earth & Space Science)
• Geology (prerequisite – Earth & Space Science/Honors Earth & Space Science)
• Physics (pre or co-prerequisite – Chemistry/Honors Chemistry & pre or co-requisite – Algebra II)
• AP Physics C for Science & Engineering (prerequisite – Physics, co-requisite – AP Calculus)

Grade Level: 12
Core Coursework: None required
Honors Coursework (Implementation Year): None required
Elective Option: Electives are available beginning in 10th grade as long as pre and co-requisites are met.
• AP Biology (prerequisite – Biology/Honors Biology & pre or co-requisite – Chemistry/Honors Chemistry)
• AP Chemistry (prerequisite – Chemistry/Honors Chemistry)
• AP Environmental Science (pre or co-requisite – Chemistry/Honors Chemistry)
• Anatomy and Physiology (prerequisite – Biology/Honors Biology)
• Astronomy (prerequisite – Earth & Space Science/Honors Earth & Space Science)
• Geology (prerequisite – Earth & Space Science/Honors Earth & Space Science)
• Physics (pre or co-prerequisite – Chemistry/Honors Chemistry & pre or co-requisite – Algebra II)
• AP Physics C for Science & Engineering (prerequisite – Physics, co-requisite – AP Calculus)

*Beginning in 9th grade students may also enroll simultaneously in the next sequential course.
Course Descriptions

6th Grade Earth and Space Science
Students will investigate Earth systems and processes. Topics of inquiry will include processes that change the Earth, atmospheric influences on weather and climate, the water cycle, and physical indicators of the Earth’s history. The focus on the objects in our solar system will include their composition, structure and motion. Throughout this course students will develop skills in scientific inquiry.

Honors 6th Grade Earth and Space Science
Students must meet the required criteria to enroll in an honors course.
Students will conduct comprehensive investigations of Earth systems and processes. Topics of inquiry will include processes that change the Earth, atmospheric influences on weather and climate, the water cycle, and physical indicators of the Earth’s history. The focus on the objects in our solar system will include their composition, structure and motion. Throughout this course students will develop skills in scientific inquiry. Students will use those skills to conduct independent work through research, data analysis, and/or investigations. Students will communicate the results of their investigations through in-depth writing and presentations. Students will also engage in complex scientific reading, writing, and discussion with intellectual peers.

7th Grade Life Science
Life science will provide a foundation for studies in biology-related fields. In this course students will study relationships between cells, tissues, organs, organ systems, and organisms. This will include studying the interdependence of organisms and organization of organisms. Students will study ecosystems, interconnections of human body systems, diseases of body systems, effects of humans on ecosystems, and heredity. Throughout this course students will develop skills in scientific inquiry.

Honors 7th Grade Life Science
Students must meet the required criteria to enroll in an honors course
Honors life science will provide a foundation for studies in biology-related fields. In this course students will study relationships between cells, tissues, organs, organ systems, and organisms in more depth. This will include studying the interdependence of organisms and organization of organisms. Students will study ecosystems, interconnections of human body systems, diseases of body systems, effects of humans on ecosystems, and heredity. Throughout this course students will develop skills in scientific inquiry, and use those skills to design their own investigations. Students will be expected to work independently as well as collaboratively in complex scientific reading and writing tasks, lab work, projects, presentations, and discussion with intellectual peers.

8th Grade Physical Science
Students in 8th grade Physical Science will become scientifically literate in the basic principles of chemistry and physics through an inquiry based approach. Major areas of study will include the nature of science, properties and classification of matter, the atom, chemical reactions, solutions, motion and forces, light, electricity, and heat. Student learning will occur in a collaborative setting with a focus on laboratory process skills resulting in a foundation for the future study of chemistry and physics.
Honors 8th Grade Physical Science

*Students must meet the required criteria to enroll in an honors course.*

Students in Honors 8th grade Physical Science will become scientifically literate in the basic principles of chemistry and physics through an inquiry based approach. Honors courses will create opportunities for students to design and conduct their own investigations several times throughout the year. Major areas of study will include the nature of science, properties, and classification of matter, the atom, chemical reactions, solutions, motion and forces, light, electricity, and heat. Student learning will occur in a collaborative setting with a focus on laboratory process skill resulting in a foundation for the future study of chemistry and physics. Students will be engaged in complex scientific reading, writing, discussion, and academic argumentation with intellectual peers.

9th Grade –Earth and Space Science
2 credits (Full year)

*Earth and Space Science or Honors Earth and Space Science is required for graduation*

This course will integrate the physical science concepts of forces, motion and energy into the student’s understanding of Earth and the universe. Students will focus their studies on how the Earth has changed over time and how it continues to change; the interactions of Earth’s systems; geology and plate tectonics; weather and climate change and the origin of stars, galaxies and the universe. Students who choose this course will be actively engaged in both guided and open-ended scientific inquiry investigations. Students are challenged to develop independent research capabilities and will practice and develop critical thinking skills. These skills include the ability to analyze, synthesize and apply scientific research information. Student will be actively engaged in reading, writing and discussing scientific concepts with their peers.

Honors 9th Grade –Earth and Space Science
2 credits (Full year)

*Earth and Space Science or Honors Earth and Space Science is required for graduation*

*Students must meet the required criteria to enroll in an honors course.*

This course will integrate the physical science concepts of forces, motion and energy into the student’s deeper understanding of Earth and the universe. Students will focus their studies on how the Earth has changed over time and how it continues to change; the interactions of Earth’s systems; geology and plate tectonics; weather and climate change and the origin of stars, galaxies and the universe. Students will be challenged to develop independent research capabilities and practice good critical thinking skills including the ability to analyze, synthesize and apply scientific information. Students who choose this course are expected to work more independently than students in 9th Earth and Space Science. This Honors course will incorporate more open-ended scientific inquiry investigations and research. Students will be engaged in complex reading, writing, and discussion with intellectual peers.
Biology
2 credits (Full year)
*Biology or Honors Biology is required for graduation

Pre-Requisite/Co-requisite: Earth and Space Science or Honors Earth and Space Science

Students will learn and apply basic principles of biology. Emphasis will be given to the study of cells, genetics, heredity, evolution, and ecology. Throughout the course students will develop their ability to practice scientific inquiry – asking questions, hypothesizing, designing experiments, analyzing data, reaching evidence-based conclusions, and communicating results. This course meets the entrance requirements for a 4-year Regents university and is also a prerequisite for AP Biology.

Honors Biology
2 credits (Full year)
*Biology or Honors Biology is required for graduation

Pre-Requisite/Co-requisite: Earth and Space Science or Honors Earth and Space Science

Students must meet the required criteria to enroll in an honors course.

Students will learn and apply basic principles of cells, genetics, heredity, evolution, and ecology in greater depth. Students will develop their ability to practice scientific inquiry – asking questions, hypothesizing, designing experiments, analyzing data, reaching evidence-based conclusions, and communicating results. All honors students will complete an investigative research project. Students will be engaged in complex scientific reading, writing, and discussion with intellectual peers. Honors students must have the ability to apply concepts to problem solving. This course is designed to further the development of these skills, but students who look for the teacher to supply all the answers will struggle and be frustrated. This course meets the entrance requirements for a 4-year Regents university and is also a prerequisite for AP Biology.

Student Criteria for Honors Course Placement:
Students will be recommended for Honors Science coursework if they have:
A 98th percentile on the science IA Assessment or reading IA Assessment

5th grade – 277 standard score 6th grade – 297 standard score 7th grade – 312 standard score 8th grade – 326 standard score 9th grade – 338 standard score 10th grade – 348 standard score 11th grade – 358 standard score OR
STEM AELP identification OR
A grade of an A or B in an honors science course from the previous school year OR
An application (reviewed by science team at the next grade level)

Chemistry
2 credits (full year)
*Chemistry or Honors Chemistry is required for graduation

Pre-Requisite/ Co-Requisite: Biology

Students will develop knowledge in how the structure of a substance influences its physical and chemical properties, such as placement of elements on the periodic table, bonding, and chemical reactions. Students will use an inquiry approach to problem solving through lab experiences. Students will utilize technology and mathematics to communicate and defend their scientific arguments. This course meets the entrance requirements for a 4-year Regents university and is also a prerequisite for AP Chemistry.
Honors Chemistry
2 credits (full year)
*Chemistry or Honors Chemistry is required for graduation

Co-requisite: Biology or Honors Biology
Students must meet the required criteria to enroll in an honors course.
Students will develop knowledge in how the structure of a substance influences its physical and chemical properties, such as placement of elements on the periodic table, bonding, and chemical reactions. Students will use an inquiry approach to problem solving through lab experiences. Students will utilize technology and mathematics to communicate and defend their scientific arguments. All honors students will complete an investigative research project. Students will be engaged in complex scientific reading, writing, and discussion with intellectual peers. Students should have strong mathematical foundations and problem solving skills. This course is designed to further the development of these skills, but students who look for the teacher to supply all the answers will struggle and be frustrated. This course meets the entrance requirements for a 4-year Regents university and is also a prerequisite for AP Chemistry.

Student Criteria for Honors Course Placement:
Students will be recommended for Honors Science coursework if they have:
A 98th percentile on the science IA Assessment or reading IA Assessment
5th grade – 277 standard score 6th grade – 297 standard score 7th grade – 312 standard score 8th grade – 326 standard score 9th grade – 338 standard score 10th grade – 348 standard score 11th grade – 358 standard score OR
STEM AELP identification OR
A grade of an A or B in an honors science course from the previous school year OR
An application (reviewed by science team at the next grade level)

AP Biology - 2 credits (full year)
Requirements for admission into AP Biology include the following:
1. Completion of Biology or Honors Biology course,
2. Either completion of or simultaneous enrollment in Chemistry or Honors Chemistry course,
3. Requirement by DMACC of a cumulative 3.00 GPA for enrollment, and
4. Recommendation of current science instructor.

AP Biology is a two-semester course designed to be the equivalent of a college-level introductory biology course. It is purposely rigorous and requires good study habits, self-discipline, and time commitment. This course is designed to prepare the student for the AP Biology exam given in May. Topics covered include Biochemistry, Cells, Energetics, Heredity, Molecular Biology, Evolution, Diversity, Plant Structure and Function, and Animal Structure and Function. Students should plan to spend 1-2 hours outside of class for each hour spent in class. It is possible that students may need to complete some lab work outside of class time.

During the first semester of this course, students will enroll in the aligned 4 credit DMACC course BIO112 General Biology I. During the second semester of this course, students will enroll in the aligned 4 credit DMACC course BIO113 General Biology II.

At the conclusion of this course students will be prepared and encouraged to take the corresponding AP exam as a summative assessment of their achievement.
AP Chemistry - 4 credits (full year)

AP Chemistry Lab – Must be taken concurrently with AP Chemistry.

*Requirements for admission into AP Chemistry include the following:
  1. Completion of Chemistry or Honors Chemistry,
  2. Completion of Algebra II, and
  3. Recommendation of current science instructor.

AP Chemistry is a two-semester course designed to be the equivalent of a college-level introductory chemistry course. It is purposely rigorous and requires good study habits, self-discipline, and time commitment. This course is designed to prepare the student for the AP Chemistry exam given in May. The course differs from Chemistry with respect to the textbook used, the topics covered, the emphasis on chemical calculations, and the kind of lab work done by students. Some topics included are: atomic theory, chemical bonding, nuclear chemistry, gases, liquids, solids, solutions, reaction types, stoichiometry, equilibrium, kinetics, organic chemistry and thermodynamics. This course may qualify for postsecondary credit. Please see a counselor for more information. At the conclusion of this course students will be prepared and encouraged to take the corresponding AP exam as a summative assessment of their achievement.

AP Environmental Science
2 credits (Full year)

Requirement for admission into AP Environmental Science include the following:
  1. Completion of Biology/Honors Biology,
  2. Completion of or simultaneous enrollment in Chemistry/Honors Chemistry, and
  3. Recommendation of current science instructor.

AP Environmental Science is a two-semester course designed to be the equivalent of a college-level introductory environmental course. It is an interdisciplinary course encompassing Biology, Chemistry, Geology, Physics, and Social Studies. It is purposely rigorous and requires good study habits, self-discipline, and time commitment. This course is designed to prepare the student for the AP Environmental Science exam given in May. The goal is to help students understand the interrelationships within the natural world, to identify environmental problems, and to analyze associated issues. Major themes include ecosystems, earth’s natural resources and consumption, and pollution. Students should be prepared for field work in this course.

At the conclusion of this course students will be prepared and encouraged to take the corresponding AP exam as a summative assessment of their achievement.

Anatomy and Physiology - 2 credits (full year)
Prerequisite: Biology or Honors Biology

Students will conduct an in-depth study of the structures and functions of the mammalian body. This course explores interrelationships of body systems with an emphasis on skeletal/muscular, circulatory/respiratory/digestive, integumentary/nervous and endocrine systems. Students will further their science literacy skills through laboratory experiences and clinical studies.
Astronomy
1 credit (one semester) Prerequisite: Earth and Space Science or Honors Earth and Space Science
In this course, students will take a comprehensive look at the solar system and our universe. Students will develop an understanding of the historical development of astronomy, formation of Earth and the solar system, the origins of the stars, galaxies and other astronomical phenomena. Throughout the course students will develop their ability to conduct scientific inquiry – asking question, hypothesizing, designing experiments, analyzing data, researching data, researching evidence-based conclusions, and communicating results.

Geology – 1 credit (one semester)
Prerequisite: Earth and Space Science or Honors Earth and Space Science
Students will explore the interactions of Earth’s materials including rock and mineral formation and their physical and chemical characteristics. Students will use an inquiry approach in the development of their understanding of practical and essential geology concepts using labs and real world data. Specific topics will include Earth’s natural resources, geologic hazards, rock and mineral identification, water quality and the interpretation of the rock record.

Physics – 2 credits (full year)
2 credits (full year)
Pre/Co-requisites: Chemistry or Honors Chemistry, and Algebra II
Students will develop knowledge to describe motion using forces, work and energy, and momentum, as well as topics in electricity and waves. Students will investigate topics using an inquiry approach to problem solving, through lab experiences. Students will utilize technology and mathematics to communicate and defend their scientific arguments. The use of mathematics, including algebra and trigonometry functions, is important, but conceptual understanding of physical systems remains a primary concern. Limited instruction on algebraic techniques will be provided, and it is assumed that students will have a thorough understanding of algebra. This course meets the entrance requirements for a 4-year regents University and is also the prerequisite for AP Physics C.

AP Physics C: Mechanics and Electricity & Magnetism
Prerequisite(s): Physics.
Prerequisite(s) or co-requisite(s): AP Calculus.
AP Physics C is divided into two one-semester courses, assessed separately with two 90-minute AP exams. Students will receive a separate score on each exam. AP Physics C: Mechanics covers motion, forces, work, energy, momentum, circular motion, oscillations, and gravitation. AP Physics C: Electricity & Magnetism covers electrostatics, circuits, magnetic fields and electromagnetism. At the conclusion of this course students will be prepared and encouraged to take the corresponding AP exam as a summative assessment of their achievement.
Consensus Maps

Each grade level or course has created a consensus map that documents month by month the content of the unit, the essential questions for that unit, the alignment of the unit to the Iowa Core Curriculum, the resources used to teach the content, the common vocabulary for the unit, and the incorporation of technology into the unit.

Power Standards

**Kindergarten**

K.01 Apply the five essential features of scientific inquiry.
K.02 Explain events that are repeated in regular patterns.
K.03 Understands that living things are both similar to and different from each other and other nonliving things.
K.04 Classify plants and animals by their characteristics.
K.05 Identify the properties of matter.
K.06 Identify ways to keep your body healthy.

**First Grade**

1.01 Apply the five essential features of scientific inquiry.
1.02 Identify the characteristics of rocks, soil, water, and air.
1.03 Identify the basic needs of plants and animals and how the environment fulfills their needs.
1.04 Identify natural resources and their importance to all living things.
1.05 Distinguish between solids, liquids, and gases.
1.06 Identify human body parts and match them to their functions.

**Second Grade**

2.01 Apply the five essential features of scientific inquiry.
2.02 Explain how weather and seasonal changes impact living things.
2.03 Explain the life cycle of plants and animals.
2.04 Identify different ways that objects move.
2.05 Recognize Earth’s relationship to other objects in the solar system.

**Third Grade**

3.01 Apply the five essential features of scientific inquiry.
3.02 Identify how living things adapt to allow for survival in their environments.
3.03 Identify the changing states of matter.
3.04 Recognize light as a form of energy.
3.05 Explain the relationships among the properties, movements, and locations of objects in our solar system including stars in our universe.

**Fourth Grade**

4.01 Apply the five essential features of scientific inquiry.
4.02 Describe the life cycle of various organisms including plants and animals.
4.03 Evaluate how organisms interact and adapt to their environments.
4.04 Identify the specific properties of energy sources.
4.05 Understand and apply knowledge of the concept of conservation of matter.
4.06 Determine how Earth’s materials provide the many resources that humans use and their effects on living things and the environment.
4.07 Identify forces that change Earth’s surface and how they affect Earth’s surface and humans.

**Fifth Grade**
5.01 Apply the five essential features of scientific inquiry.
5.02 Classify living organisms.
5.03 Explain the interrelationship among human body systems and their parts (cells, tissues, organs, and organ systems).
5.04 Identify substances based on their characteristic properties.
5.05 Explain how forces are related to an object’s motion.
5.06 Classify rocks and minerals according to their characteristics.
5.07 Evaluate climate and weather patterns and their effect on living organisms.

**6th Grade Earth and Space Science/Honors 6th Grade Earth and Space Science**
6.01 Apply the five essential features of scientific inquiry in the context of Earth and space science.
6.02 Compare and contrast objects in the solar system in terms of their composition, structure, and motions.
6.03 Explain how objects in the solar system are affected by gravity.
6.04 Analyze how the sun acts as a major source of energy for changes on the Earth’s surface.
6.05 Evaluate how features on the Earth’s surface are constantly changed by a combination of slow and rapid processes including weathering, erosion, volcanoes, mountain formation, soil formation, and earthquakes.
6.06 Differentiate how rock types are formed, destroyed and/or changed. (rock cycle)
6.07 Compare and contrast the layers of the Earth and their structures.
6.08 Apply knowledge of the water cycle including consideration of events that impact groundwater quality.
6.09 Understand and apply knowledge of Earth’s history based on physical evidence.
6.10 Identify and apply knowledge of atmospheric properties to predict how they influence weather and climate.

**7th Grade Life Science/Honors 7th Grade Life Science**
7.01 Apply the five essential features of scientific inquiry in the context of life science.
7.02 Summarize the relationship between cells, tissues, organs, organ systems, and whole organism.
7.03 Identifies and describes the structure and function of the cell.
7.04 Explain and demonstrate how different organisms pass on traits.
7.05 Explain and predict how gene functions influence traits of individual organisms.
7.06 Compare and contrast the structure and function within the levels of organization among organisms.
7.07 Describe how changes in external environmental conditions impact the survival of individuals and species.
7.08 Analyze the interdependency of organisms within an ecosystem.
7.09 Illustrate the cycling of matter and energy in ecosystems.
7.10 Determine the effects of human interactions on ecosystem stability and the global implications.
7.11 Explain potential causes of disease and their impact on body systems.
7.12 Analyze how organ systems interact with each other to coordinate body functions and prevent disease.

**8th Grade Physical Science/Honors 8th Grade Physical Science**
8.01 Apply the five essential features of scientific inquiry in the context of physical science.
8.02 Compare and contrast elements, compounds, mixtures, and solutions based on the nature of their physical and chemical properties.
Differentiate and diagram elements based upon their basic atomic structures (protons, neutrons, electrons).

Compare physical and chemical changes and summarize their relationship to the conservation of matter and energy.

Explain that electrical circuits provide a means of transferring & converting electrical energy.

Distinguish and analyze the movement of light at a boundary between two types of matter.

Investigate forms of energy and energy transfer (mechanical, light, heat).

Describe the motion of an object using its position, direction of motion, and speed.

Predict the effects of balanced and/or unbalanced forces on the motion of an object.

Earth and Space Science/Honors Earth and Space Science

Apply the five essential features of scientific inquiry in the context of Earth and space, and physical science.

Analyze real-world motion of objects verbally, mathematically, and graphically.

Evaluate the effects of balanced and/or unbalanced forces on the motion of an object.

Identify and apply major concepts of matter and energy transfer, transformation, and conservation, and entropy and their cyclical nature.

Describe the form and function of wave energy.

Identify, describe, and analyze the effects of external and internal energy sources on Earth.

Explain phenomena related to the origin of Earth and its evolution.

Explain phenomena related to the origin of the Universe and its components.

Biology/Honors Biology

Apply the five essential features of scientific inquiry in the context of biology.

Analyze how the structure and function of cell components relate to cell processes.

Explain how the structure of DNA codes for the production of proteins.

Apply basic principles of heredity to make predictions as to how traits are passed from one generation to another.

Apply the theory of natural selection to explain the change of species over time.

Evaluate the theory of evolution as an explanation for the diversity and classification of organisms.

Analyze the relationships between the living and non-living factors in an ecosystem.

Describe how energy is captured and transformed within an ecosystem.

Analyze how signals detected and transmitted by nerve cells influence an organism’s behavior.

Summarize how the endocrine, immune, and skeleto-muscular systems enable the human body to respond to and act upon the environment.

Chemistry/Honors Chemistry

Apply the five essential features of scientific inquiry in the context of chemistry.

Analyze how the structure of an atom affects its properties and stability.

Analyze the properties of substances (solutions, solids, gases) based on molecular structure.

Apply the appropriate nomenclature for different types of compounds.

Analyze chemical reactions to predict the outcomes of the reaction.

Predict the properties of a gas based on the relationships between pressure, volume, temperature, and moles.

AP Biology

Students will be able to analyze the effects of enzymes on biochemical reactions.

Students will be able to describe the function of cell parts and the regulation of the cell cycle.

Students will be able to compare and contrast the cell processes of photosynthesis and cellular respiration.
APB.04 Students will be able to analyze both Mendelian and Non-Mendelian heredity patterns.
APB.05 Students will be able to explain DNA structure, the regulation of gene expression, and mutation.
APB.06 Students will be able to evaluate evidence for the process and mechanisms of evolution.
APB.07 Students will be able to apply evolutionary patterns to explain the diversity of life.
APB.08 Students will be able to examine relationships between structure and function in plants and animals.
APB.09 Students will be able to explain ecological principles identified in populations, communities, and ecosystems.
APB.10 Students will be able to apply the essential features of scientific inquiry in the context of biology.

AP Chemistry
APC.01 Apply the five essential features of scientific inquiry in the context of chemistry.
APC.02 Evaluate how the structure of an atom affects its properties and stability.
APC.03 Evaluate the properties of substances (solutions, solids, liquids and gases) based on molecular structure and intermolecular forces.
APC.04 Apply the concepts of kinetics, thermodynamics, equilibrium, electrochemistry, and stoichiometry to evaluate the outcomes of chemical reactions.
APC.05 Justify laboratory claims through the discussion and analysis of error.

AP Environmental Science
APES.01 Apply technology, social perspectives, and the five essential features of scientific inquiry in the context of Environmental Science.
APES.02 Analyze the flow and conversions of energy through earth systems.
APES.03 Summarize the interconnections between and changes in natural systems through time and space.
APES.04 Evaluate humans’ impact on natural systems.
APES.05 Describe environmental issues with respect to cultural, social, and economic factors.

Anatomy and Physiology
ANA.01 Apply the five essential features of scientific inquiry in the context of anatomy and physiology
ANA.02 Apply terms of anatomical orientation to the mammalian body.
ANA.03 Relate the structure to the function of body systems with emphasis on: the skeletal, muscular, circulatory, respiratory, digestive, integumentary, and nervous, endocrine systems.
ANA.04 Explain the interrelationships between human body systems with emphasis on: the skeletal, muscular, circulatory, respiratory, digestive, integumentary, and nervous, endocrine systems.
ANA.05 Analyze the causes and effects of homeostatic imbalances in the body systems with emphasis on: the skeletal, muscular, circulatory, respiratory, digestive, integumentary, and nervous, endocrine systems.

Astronomy
AST.01 Apply technology, social perspectives, and the five essential features of scientific inquiry in the context of astronomy.
AST.02 Explain complex phenomena, such as tides, variations in the length of day, solar insolation, and apparent motion of moons, stars, and planets and annual traverse of constellations.
AST.03 Summarize and compare the historical development of modern astronomy and the current theories of the origin of the solar system and universe.
AST.04 Recognize various tools used to investigate astronomical objects and phenomena and analyze the data and research-based evidence collected by these tools.
AST.05 Investigate, compare, and evaluate the various hypotheses and theories proposed to explain the structure and formation of planets, stars and galaxies.
Geology
G.01 Apply technology, social perspectives, and the five essential features of scientific inquiry in the context of geology.
G.02 Relate the geology of the earth to its wealth of natural resources as well as its natural hazards.
G.03 Apply knowledge of rock and mineral formation to their chemical and physical properties.
G.04 Identify, describe and analyze major phenomena and examples of how earth is in a continual state of change in terms of both energy and physical form.
G.05 Explain the features and processes of groundwater systems and how the sustainability of North American aquifers has changed in recent history.

Physics
P.01 Apply the five essential features of scientific inquiry in the context of physics.
P.02 Describe motion of objects through mathematical and graphical relationships.
P.03 Predict motion in terms of net forces.
P.04 Apply laws of conservation of energy and momentum to predict changes of motion.
P.05 Analyze the flow of electrically charged particles through a circuit.
P.06 Apply the properties of waves to explain light and sound phenomenon.

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