North Dakota Science

Content and Achievement Standards

K-12

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North Dakota Department of Public Instruction

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FOREWORD

By Dr. Wayne G. Sanstead,
State Superintendent

There is perhaps no greater responsibility for a community than to provide for the care and education of its citizens. We stand together, committed to the advancement of quality education for all our students. It is toward this aim that I am pleased to issue this document, the *North Dakota Science Content and Achievement Standards*. This document represents an important step in defining and implementing what constitutes a quality education for North Dakota citizens.

The State's Protocols for Developing Standards

As a matter of public policy, the North Dakota Department of Public Instruction believes that public education stakeholders must define "what students should know and be able to do." State law (NDCC 15.1-02-04.3) places responsibility for the writing of state academic standards with the State Superintendent. State law (NDCC 15.1-02-04.4; 15.1-21-08) also places responsibility with the State Superintendent for the supervision of State assessments that are based on the State's academic standards. To this end, the Department of Public Instruction has worked closely with the State's educators, through a clearly articulated process, to develop academic standards and aligned assessments that reflect the profession's best insights into what constitutes a quality education for every citizen.

The North Dakota State content and achievement standards offer guidance in core curriculum areas while, at the same time, they allow for, indeed *encourage*, a dynamic and living curriculum created at the local school district level. To ensure educational relevance, the North Dakota State content and achievement standards are (1) based on academic standards developed nationally by various professional education associations, (2) periodically revised as suggested by classroom and community experiences and expectations, and (3) widely supported by state and national education policymakers.

While the North Dakota State content and achievement standards represent an official, statewide reference point for content and proficiency, local school districts are encouraged to use the State's content and achievement standards as guides in the development of local, customized curriculum in the core content areas. Put another way, standards-based education requires that a community agree upon what skills and abilities students should have upon leaving high school and what an appropriate K-12 educational experience should look like in the classroom.

The Department seeks to engage stakeholders in the development and performance reporting of a valid and reliable educational accountability system. To ensure that the State's accountability system engenders confidence among constituents, the Department has established a system of prescribed activities that are designed to assure procedural validity and reliability, product quality, and systemic integrity. The Department, with the assistance of professional educators from across the State, has established process and content protocols to articulate the governing rules for the development of State content and achievement standards and assessments.

I encourage all citizens to familiarize themselves with the process used to define, review, and implement the State's challenging content and achievement standards. The *North Dakota Standards and Assessment Development Protocols* (refer to the following website: http://www.dpi.state.nd.us/standard/protocols.pdf) identify the procedures Department staff and statewide educator design teams follow regarding the staffing, design process, formatting, and content of all documents. These protocols ensure that quality assurance measures are observed and that the process and its resulting product are valid. The *North Dakota Science Content and Achievement Standards* document has been developed with care and attention to the requirements of the State standards protocols.

State's Accountability for Every Student

Article VIII of the State's Constitution places a high-level responsibility on the State to ensure the literacy of every citizen. A high-quality education is the right of every student.

Assuring comparable educational opportunity is a primary responsibility of the State's education system. The State's challenging content and

achievement standards define what students should know and be able to do. In a sense, these standards represent a state contract with our students.

I urge school districts to build their respective curricula upon these worthy standards. A school's curriculum encompasses that collection of textbooks, media, experiences, and instruction that guide a student's exposure to the standards. The standards define the "what" and the curriculum defines the "how" of education.

To hold itself accountable for the educational services it provides through its schools, the State has developed an assessment system that is designed to measure student performance in terms of these State standards. By measuring student achievement in terms of the State's challenging standards, we are able to monitor growth, address deficiencies, and ensure comparability of educational opportunity statewide.

The State's academic assessments are aligned to the State's challenging content and achievement standards. The State measures, through a sampling of test questions, the annual performance of students statewide. Results are analyzed based on overall student achievement and on the performance of student subgroups, i.e., students of different ethnic backgrounds, limited English proficient students, economically disadvantaged students, and students with disabilities.

The State issues annual reports on the progress students make toward overall proficiency in terms of the State's standards. I invite all educators and citizens to learn more about the State's Accountability Plan which details this annual report. (Refer to the following website: http://www.dpi.state.nd.us/grants/acctwb.pdf.)

I assure you that our State's accountability system exists to protect the interests of every student—*every* student.

Continuing Tradition of Improvement and Excellence

The legacy of the North Dakota educational system is represented by the quality of the students it graduates every year. Every student who graduates at the proficient level from a North Dakota school testifies to the strength of the families, communities, and schools that nurtured and educated that student.

Yet, as long as there are students who graduate from a North Dakota school scoring at levels less than proficient—or who do not graduate at all, then evidence exists of our need to improve. School improvement requires a healthy network of families, communities, and schools, working together, to achieve the ultimate aim set forth within the State Constitution.

The State standards, by their very nature, define the measure of success we seek to achieve. We cannot summarily claim success as long as any of our students fall below the proficient level as defined by our achievement standards. Proficiency of every student is our mission. This is why we do what we do. Each and every student, in every subgroup, is that important.

North Dakota schools embody a long-standing tradition to build on success and improve where necessary. These standards establish our measures for success. These standards anchor us and guide us. If we, indeed, are to continue to improve as an educational system, then it is these standards that will lead us ultimately to our goal. The North Dakota content and achievement standards are that important to us all.

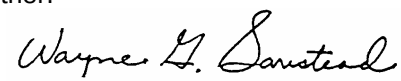
Gratitude to a Dedicated Profession

We stand on the shoulders of those educators who have preceded us. Whatever measure of success we have experienced to date rests in large measure on their efforts and dedication. Each passing generation stands as a testament to the spirit of excellence that exists within the education community. Each generation builds upon the strengths of its predecessors in order to secure a better future for those who follow.

The work of developing and implementing the State science standards finds its origins in many past efforts. The contributions of countless educators are astounding and inspiring. It is now for our generation to harvest the best of the past, to incorporate our best insights based on current research, and to restate our mission for future learners.

I wish to recognize each individual team member and the hundreds of reactors who contributed to the writing of this important document. We must be mindful of the many months and iterations of background research, discussions, drafting, reflective analysis, debating, and ultimate resolution that have been invested in this document. No words of gratitude can ever do justice to the quality of work or the commitment found within this document.

Now, the work rests with us. Our current and future students depend on us. Let us go forth and touch the future together.



INTRODUCTION

A high-quality science program is essential for all students. It provides a foundation for intelligent and precise thinking. Science should also provide every student with the opportunity to choose among a full range of future career paths and to contribute to society as an informed citizen. To be a responsible and productive member of today's society a student needs to have a broad, connected, and useful knowledge of science.

The *North Dakota Science Content and Achievement Standards* document provides a framework for the skills and knowledge that students in grades K-12 are expected to attain in science. Based on its predecessor, the *2002 North Dakota Science Content Standards*, this document includes standards and benchmarks and defines levels of achievement at each grade level. In addition to referencing previous state content standards, these current state standards reference the National Science Education Standards, Project 2061, National Science Teachers Association Pathways guides, and exemplary standards documents from other states.

The standards in this document provide clear, concise, and measurable expectations in science for all students. The standards set targets and expectations for what teachers need to teach and students need to learn by the end of each grade level. Parents, community members, and state and local policy makers play an integral part in helping students attain these expectations. This document is a useful resource for school districts as they align their science curriculum to meet mandatory state assessments that are aligned to these content and achievement standards.

The standards focus on essential content for all students. Maintaining high expectations for all students is a component of equity in education. "All students" include those with diverse cultural backgrounds, limited English proficiency, or disabilities; those who have high intellectual ability; and those from advantaged or disadvantaged socioeconomic backgrounds. It includes students who, after high school, choose to enter the workforce, pursue technical career preparation, or attend college.

This document is organized around a core of fundamental science standards for all students in the State of North Dakota. Grade level expectations are identified for every classroom, kindergarten through senior high school. These statements reflect what every student should know and be able to do at the end of each specified grade level.

Definitions and Document Components

The *North Dakota Science Content and Achievement Standards* contains the following organizational components:

- **Content standard**: A broad description of what students should know and be able to do within science.

- **Topic**: A category within a content standard that associates or aids in the organization of related benchmark expectations and that may carry across grade levels.

- **Grade-level benchmark expectation**: A statement of what students should know and be able to do at specified grade levels. It clearly specifies and itemizes the content of a standard at a specific grade level. When found within a benchmark, "i.e." means "these specific items, these and no other, namely," and "e.g." means "for example, for instance." Grade level expectations are benchmarked to indicate a higher level of knowledge and skills as the student progresses through the curriculum.

- **Achievement standard:** A description of what a student knows and can do to demonstrate a level of achievement on a content standard. Descriptors for achievement are set at four levels and are defined as follows:

  - ***Advanced Proficient***: Demonstrates exemplary understanding or skill and exceeds expected level of performance.

  - ***Proficient*****:** Demonstrates understanding or skill and meets expected level of performance.

  - ***Partially Proficient*****:** Demonstrates an emerging or developing level of understanding and performance.

- ***Novice*:** Attempt made; however, lack of understanding and performance is evident.

State Content Standards Format

Each content standard is presented according the following format.

- ***Heading***. A standard is introduced by an overall page heading that identifies the standard's number within the subject and a short descriptive title (e.g., *"Standard 1: Unifying Concepts"*).

- ***Content Standards Description***. The standard is defined succinctly in terms of students' expected knowledge or skill (e.g., *"Standard 1: Students understand the unifying concepts and processes of science"*).

- ***Numbering.*** The numerical order of the content standards does not imply any particular judgments regarding their relative importance or teaching priority. Each standard conforms to the following prescribed numbering system.

  1. *Content Standard.* A standard is identified uniquely by a prescribed two-digit nomenclature (e.g., *"6.3"*). The first digit refers to the grade level (e.g., *grade 6*). The second digit refers to the standard's listing within the subject (e.g., *standard #3*).

  2. *Grade-level benchmark expectation.* A benchmark expectation is identified uniquely by a prescribed three-digit nomenclature (e.g., *"6.3.2"*). The first digit refers to the grade level (e.g., *grade 6*). The second digit refers to the standard's listing within the subject (e.g., *standard #3*). The third digit refers to the benchmark's listing within the standard (e.g., *the second benchmark within the third standard*).

  3. *Topics.* Since topics only organize benchmark expectations within a standard and identify no specific knowledge or skill, topics will carry no uniquely identifiable number.

State Achievement Standards Format

State achievement standards have been developed for all content standards. An achievement standard is a description of what a student knows and can do to demonstrate a level of achievement on a content standard.

Achievement standards guide one's interpretation regarding "how well a student demonstrates knowledge or skill within a content standard." As such, achievement standards aid in defining performance and in establishing "grading" parameters. Achievement standards identify four categories or levels of student achievement: (1) *novice*, (2) *partially proficient*, (3) *proficient*, and (4) *advanced*. The *proficient* level represents how well a student should minimally demonstrate achievement within science at a particular grade level.

All State assessments will report overall student achievement, school achievement, district achievement, and statewide achievement in terms of the four achievement levels.

The State achievement descriptors express the characteristics of each of the four achievement levels for all content standards. In many instances, achievement descriptors are presented for individual benchmark expectations. In some instances, where benchmark expectations show a closer association to each other, achievement descriptors are presented for the entire topic.
To develop an achievement standard, the writing team first identified the focus of student performance for that benchmark. The focus of performance reflects the nature of the benchmark. A focus of performance might be related to the degree of error in the performance, the speed or fluency of the performance, the variety of examples provided, the quality of the performance, the significance of details provided, or the consistency of the performance. For example, the focus of performance for benchmarks that require students to explain a concept, principle, or generalization generally might be expressed through the significance of details or the degree of error. For consistency, writers used a limited set of descriptors for each focus to describe the levels of performance (i.e., advanced, proficient, partially proficient, novice). For example, for the "quality" focus, descriptors for the four levels included, among others, insightful, relevant, obvious, and irrelevant, respectively.

Teachers in a school or district should come to consensus on the meaning of these terms, perhaps through professional dialogue and examination of student work. Teachers also will need to help

students understand what is meant by these terms by providing examples of student work at each performance level.

State Standards and Local Curriculum Development

State content standards broadly define what a student should know and be able to do. State content standards become the basis upon which local school districts define their local curriculum. School districts choose those instructional materials and practices that will ensure a rich science curriculum for all students. And clear content standards define all that will be assessed at a grade level. Quality education begins with and springs from challenging content standards.
Science instruction should reflect what both educational research and best practice reveal about the teaching and learning of science. It should include hands-on experiences, use of manipulatives and labs, student inquiry, and integrated and regular use of appropriate technologies. Graphing utilities, spreadsheets, calculators, computers, and other forms of electronic information technology are now standard tools for science problem-solving used in pure science, engineering, business and industry, government, and practical affairs.

However, facility in the use of technology shall not be regarded as a substitute for a student's understanding of quantitative concepts and relationships or for proficiency in basic understanding. The teaching of computer/technology skill should be the shared responsibility of teachers of all disciplines. Readers should reference the State's *Library and Technology Content Standards, and Mathematics Standards,* among other sources, to ensure a well-rounded science curriculum.

Integrating Science Standards Across the Curriculum

Individuals encounter science in a wide variety of settings in daily living. Scientific inquiry engages the physical sciences, the social sciences, the arts, language arts, technology, and most other disciplines. Accordingly, the instruction of science should be integrated throughout the curriculum and not be restricted to the instruction that occurs during the confines of a science course. Science constitutes foundational knowledge and carries content that touches on a wide variety of other disciplines.

In the development of a school's overall curriculum, attention should be given to ensure that content linkages are designed across disciplines. Students will optimize their learning whenever direct connections are made within the wider curriculum.

Science As Content and Process

Advancements in science and technology have affected every aspect of our society, increasing the need for developing a more scientifically literate society. Science provides information and develops problem-solving skills. It helps us make informed decisions, understand processes in nature, appreciate and respect the natural world, and use technology comfortably. It helps develop a skilled, competent work force. Science affects everyone's quality of life.

Successful science instruction encourages problem solving, methodical reasoning and investigation, representation and communication of scientific ideas, and making connections across the various areas within science and between science and other disciplines. These processes are embedded within the *North Dakota Science Content and Achievement Standards* to ensure that science content and science processes are taught in tandem and by design. This means that, in science, content implies process. This marks the nature of the scientific method.

Inquiry enables students to construct their own knowledge. Students should be encouraged to safely conduct investigations, thus enriching their knowledge of science. Science inquiry guides the process of challenging accepted ideas and gaining new information through research and investigation.

A well-rounded science education will enable students to

- experience the richness and excitement of knowing about and understanding the natural and technological world.
- inquire about and investigate the natural and technological world;
- develop an understanding of and ability to use processes of science;
- communicate intelligently on topics of science and technology;
- use creativity, problem solving skills, and decision-making strategies to make personal and professional decisions;

- increase their economic productivity through the use of knowledge, understanding, and skills of the scientifically literate person in their careers; and
- develop an appreciation and respect for the natural world.

Districts should use the *North Dakota Science Content and Achievement Standards* to design science programs that provide students with opportunities to spend time on a regular basis solving real-world problems and generating, discussing, and writing about scientific ideas. By doing so, districts will help students develop the science literacy they need to meet the challenges of the twenty-first century.

Personalizing Education: Differentiated Instruction and Alternate Assessment

All students are to be taught to the State's challenging standards. This is a fundamental principle to ensure that every student will be offered a comparable and equitable opportunity for a quality education. In the course of instruction, it is appropriate to personalize or differentiate instruction for students based on their individual programming. All students should be introduced to the content, including the language or vocabulary inherent in the standards. Students should be allowed to explore new or unique expressions of the standards that better allow them access to the breadth and depth of the standards. Students should be encouraged to internalize and rearticulate the standards in a manner that advances each student's appreciation, integration, and generalization of the standards' meaning. Students should understand that their education is an ongoing, rich exploration and incorporation of the standards.

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In the course of instruction of students with significant cognitive disabilities, it will be appropriate, indeed necessary, to personalize or differentiate instruction to meet their unique needs. Teachers, other educational support staff, and parents of a student with a significant cognitive disability may, within the context of an individualized education program (IEP) team, determine it necessary to interpret a standard to meet the needs of the learner. Educators might consider what a given grade level benchmark expectation would look like for a given student with a significant disability. Highly qualified special educators will realize that the scientific method, for example, can be taught, but with different teaching strategies and modified expectations. Any such instructional strategies and modified expectations should be referenced within the student's individualized education program. The North Dakota Alternate Assessment for students with significant cognitive disabilities will accept and incorporate appropriate expectation modifications as an element of the student's standards-based Alternate Assessment.

As a matter of policy, no State content or achievement standards document may develop, reference, or otherwise encourage modified benchmark expectations that alter, in any manner, the breadth or depth of the State's challenging standards. The differentiation of any instruction is limited solely to a local individualized education program team and allowed only for students with significant cognitive disabilities. Educators and parents are encouraged to consult the State's guidance on the development of a student's individualized education program. Refer to the following website for additional information concerning the development of individualized education programs: http://www.dpi.state.nd.us/speced/guide/iep/index.shtm

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Standard 1: Unifying Concepts

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Models				
K.1.1. Identify models (e.g., dolls, stuffed animals, toy vehicles) that are not real	Students identify an extensive variety of models that are not real.	Students identify a variety of models that are not real.	Students identify some different models that are not real.	Students identify very few models that are not real.
Constancy and Change				
K.1.2. Identify things that can change (e.g., weather, people, water)	Students identify an extensive variety of things that can change.	Students identify a variety of things that can change.	Students identify some different things that can change.	Students identify very few things that can change.
Grade 1				
Models				
1.1.1. Identify models that represent real objects (e.g., globe represents the Earth, doll represents a real baby)	Students identify an extensive variety of models that represent real objects.	Students identify a variety of models that represent real objects.	Students identify some different models that represent real objects.	Students identify very few models that represent real objects.
Systems				
1.1.2. Identify objects (e.g., toy vehicles, dolls, human body, plants) that are made of parts	Students identify an extensive variety of objects that are made of parts.	Students identify a variety of objects that are made of parts.	Students identify some different objects that are made of parts.	Students identify a limited variety of objects that are made of parts.
Constancy and Change				
1.1.3. Describe different ways that things can change (e.g., size, mass, color, movement)	Students describe an extensive variety of different ways things can change.	Students describe a variety of different ways things can change.	Students describe some different ways things can change.	Students describe very few ways things can change.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 2				
Models				
2.1.1. Explain ways models are like (e.g., globe and Earth are both round) and unlike (e.g., different sizes, missing details and functions) real things	Students explain an extensive variety of ways models are like and unlike real things.	Students explain a variety of ways models are like and unlike real things.	Students explain some different ways models are like and unlike real things.	Students explain a few ways models are like and unlike real things.
Systems				
2.1.2. Identify some things that may not work if some of their parts are missing, broken, or assembled incorrectly (e.g., batteries are necessary for some toys to operate, wheels are necessary for a car to function)	Students identify with no errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with no significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with a few significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.	Students identify with many significant errors some things that may not work if some of their parts are missing, broken, or assembled incorrectly.
Constancy and Change				
2.1.3 Identify changes that are slow (e.g., human development) or fast (e.g., plant growth)	Students identify, with no errors, some changes that are slow or fast.	Students identify, with no significant errors, some changes that are slow or fast.	Students identify, with a few significant errors, some changes that are slow or fast.	Students identify, with many significant errors, some changes that are slow or fast.
Grade 3				
Models *No benchmark expectations at this level*				
Systems *No benchmark expectations at this level*				
Constancy and Change				
3.1.1. Identify changes that are repetitive (e.g., seasons, day and night, water cycle)	Students identify an extensive variety of changes that are repetitive.	Students identify a variety of changes that are repetitive.	Students identify some changes that are repetitive.	Students identify very few changes that are repetitive.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 4				
MODELS				
4.1.1. Explain changes in the real world using a model (e.g., erosion, volcano, stream table, wing designs for airplanes)	Students provide an insightful explanation for changes in the real world using a model.	Students provide a reasonable explanation for changes in the real world using a model.	Students provide an obvious explanation for changes in the real world using a model.	Students provide an unreasonable explanation for changes in the real world using a mode.
SYSTEMS *No benchmark expectations at this level*				
CONSTANCY AND CHANGE				
4.1.2. Identify changes that can be steady or irregular (e.g., floods, earthquakes, erosion, tooth decay)	Students identify an extensive variety of changes that can be steady or irregular.	Students identify a variety of changes that can be steady or irregular.	Students identify some changes that can be steady or irregular.	Students identify very few changes that can be steady or irregular.
Grade 5				
MODELS				
5.1.1. Use an appropriate model (e.g., drawing, equation, computer program, diagram, or 3-D device) to convey scientific information	Students convey scientific information, with no errors, using an appropriate model	Students convey scientific information, with no significant errors, using an appropriate model.	Students convey scientific information, with few significant errors, using an appropriate model.	Students convey scientific information, with many significant errors, using an appropriate model.
SYSTEMS *No benchmark expectations at this level*				
CONSTANCY AND CHANGE				
5.1.2. Explain how changes alter the balance within a system (e.g., the effects of limited resources on populations, global climate change, flood, drought)	Students provide an insightful explanation of how changes alter the balance within a system.	Students provide a reasonable explanation of how changes alter the balance within a system.	Students provide an obvious explanation of how changes alter the balance within a system.	Students provide an unreasonable explanation of how changes alter the balance within a system.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Form And Function 5.1.3. Identify details of an object's form which determine its function (e.g., webbed feet for use in water, human feet for walking, shovel for scooping dirt, a rake for collecting leaves, tape measure and ruler to measure distance)	Students identify all of the significant details of an object's form which determine its function.	Students identify most of the significant details of an object's form which determine its function.	Students identify some of the significant details of an object's form which determine its function.	Students identify few of the significant details of an object's form which determine its function.
Grade 6				
Models 6.1.1. Construct a model to represent concepts, features, or phenomena in the real world (e.g., solar system, earth's interior)	Students construct a model with no errors.	Students construct a model with no significant errors.	Students construct a model with a few significant errors.	Students construct a model with many significant errors.
Systems 6.1.2. Identify systems that are composed of subsystems (e.g., solar system, cell, ecosystems.)	Students identify an extensive variety of systems and subsystems.	Students identify many different systems and subsystems.	Students identify some different systems and subsystems.	Students identify very few systems and subsystems.
Constancy and Change 6.1.3. Explain the connection between cause and effect in a system	Students give an insightful explanation of the connection between cause and effect in a system.	Students give a reasonable explanation of the connection between cause and effect in a system.	Students give an obvious explanation of the connection between cause and effect in a system.	Students give an unreasonable explanation of the connection between cause and effect in a system.
Form and Function *No benchmark expectations at this level*				

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 7				
Models				
7.1.1. Explain how models can be used to illustrate scientific principles (e.g., osmosis, cell division)	Students give an insightful explanation of how models can be used to illustrate scientific principles.	Students give a reasonable explanation of how models can be used to illustrate scientific principles.	Students give an obvious explanation of how models can be used to illustrate scientific principles.	Students give an unreasonable explanation of how models can be used to illustrate scientific principles.
Systems				
7.1.2. Identify the components (e.g., tissues, organs, living and nonliving things) within a system (e.g., body systems, ecosystems)	Students identify all of the significant components within a system.	Students identify most of the significant components within a system.	Students identify some of the significant components within a system.	Students identify few of the significant components within a system.
Constancy And Change				
7.1.3. Identify examples of feedback mechanisms (e.g., hunger, perspiring)	Students identify an extensive variety of feedback mechanisms.	Students identify a variety of feedback mechanisms.	Students identify some different examples of feedback mechanisms.	Students identify few feedback mechanisms.
Form And Function				
7.1.4. Identify the relationship between form and function (e.g., wings, fins and feet)	Students identify an extensive variety of relationships between form and function.	Students identify a variety of relationships between form and function.	Students identify some diverse relationships between form and function.	Students identify few relationships between form and function.
Grade 8				
MODELS *No benchmark expectations at this level*				
Systems				
8.1.1. Organize changes (e.g., patterns, cycles) that occur sequentially in systems	Students organize sequentially the significant changes that occur in systems with no errors.	Students organize sequentially the significant changes that occur in systems with no significant errors.	Students organize sequentially the significant changes that occur in systems with a few significant errors.	Students organize sequentially the significant changes that occur in systems with many significant errors.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Constancy And Change *No benchmark expectations at this level* Form and Function *No benchmark expectations at this level*				
Grade 9-10				
Models 9-10.1.1. Explain how models can be used to illustrate scientific principles	Students give an insightful explanation of how models can be used to illustrate scientific principles.	Students give a reasonable explanation of how models can be used to illustrate scientific principles.	Students give an obvious explanation of how models can be used to illustrate scientific principles.	Students give an unreasonable explanation of how models can be used to illustrate scientific principles.
Systems 9-10.1.2. Describe the interaction of components within a system (e.g., interactions between living and nonliving components of an ecosystem, interaction between organelles of a cell)	Students describe all of the significant details of the interaction of components within a system.	Students describe most of the significant details of the interaction of components within a system.	Students describe some of the significant details of the interaction of components within a system.	Students describe few of the significant details of the interaction of components within a system.
Constancy and Change 9-10.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., water cycle, rock cycle, population)	Students explain how a system can be dynamic yet may remain in equilibrium with no errors.	Students explain how a system can be dynamic yet may remain in equilibrium with no significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with a few significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with many significant errors.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Form And Function				
9-10.1.4. Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics)	Students describe all of the significant details relating form and function.	Students describe most of the significant details relating form and function.	Students describe some of the significant details relating form and function.	Students describe very few of the significant details relating form and function.
9-10.1.5. Explain how classification can be based on the relationship between form and function (e.g., elements and compounds, biological classifications, types of clouds)	Students explain how classification can be based on the relationship between form and function with no errors.	Students explain how classification can be based on the relationship between form and function with no significant errors.	Students explain how classification can be based on the relationship between form and function with a few significant errors.	Students explain how classification can be based on the relationship between form and function with many significant errors.
Evolution And Equilibrium				
9-10.1.6. Identify principles governing evolution and equilibrium within systems (e.g., cause and effect, positive and negative feedback)	Students identify all of the significant principles governing evolution and equilibrium within systems.	Students identify most of the significant principles governing evolution and equilibrium within systems.	Students identify some of the significant principles governing evolution and equilibrium within systems.	Students identify few of the significant principles governing evolution and equilibrium within systems.
Grade 11-12				
Models				
11-12.1.1. Explain how scientists create and use models to address scientific knowledge	Students explain all of the significant details of how scientists create and use models to address scientific knowledge.	Students explain most of the significant details of how scientists create and use models to address scientific knowledge.	Students explain some of the significant details of how scientists create and use models to address scientific knowledge.	Students explain few of the significant details of how scientists create and use models to address scientific knowledge.
Systems				
11-12.1.2. Identify the structure, organization, and dynamics of components within a system (e.g., cells, tissues, organs, organ systems, reactants and products in chemical equilibrium)	Students identify all of the significant details of the structure, organization, and dynamics of components within a system.	Students identify most of the significant details of the structure, organization, and dynamics of components within a system.	Students identify some of the significant details of the structure, organization, and dynamics of components within a system.	Students identify few of the significant details of the structure, organization, and dynamics of components within a system.

Standard 1: Students understand the unifying concepts and processes of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Constancy and Change				
11-12.1.3. Explain how a system can be dynamic yet may remain in equilibrium (e.g., balance of forces, Le Chatelier's Principle, acid base systems)	Students explain how a system can be dynamic yet may remain in equilibrium with no errors.	Students explain how a system can be dynamic yet may remain in equilibrium with no significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with a few significant errors.	Students explain how a system can be dynamic yet may remain in equilibrium with many significant errors.
Form and Function				
11-12.1.4. Explain the relationship between form and function (e.g., atoms and ions, enzymes, aerodynamics)	Students explain all of the significant details relating form and function.	Students explain most of the significant details relating form and function.	Students explain some of the significant details relating form and function.	Students explain few of the significant details relating form and function.
11-12.1.5. Explain how classification can be based on the relationship between form and function (e.g., polar vs. nonpolar molecules, structure of periodic table , DNA vs. RNA)	Students explain how classification can be based on the relationship between form and function with no errors.	Students explain how classification can be based on the relationship between form and function with no significant errors.	Students explain how classification can be based on the relationship between form and function with a few significant errors.	Students explain how classification can be based on the relationship between form and function with many significant errors.
Evolution and Equilibrium *No benchmark expectations at this level*				

Standard 2: Science Inquiry

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Abilities Necessary To Do Scientific Inquiry				
K.2.1. Use senses (i.e., sight, hearing, touch, smell, taste) to make observations about the world around them	Students use senses to make insightful observations about the world around them.	Students use senses to make reasonable observations about the world around them.	Students use senses to make obvious observations about the world around them.	Students use senses to make unreasonable observations about the world around them.
K.2.2. Use simple tools (e.g., hand lens, balance, funnel, strainer) to extend the senses	Students use simple tools with ease to extend the senses.	Students use simple tools with minimal difficulty to extend the senses.	Students use simple tools with difficulty to extend the senses.	Students use simple tools with great difficulty to extend the senses.
Grade 1				
Abilities Necessary To Do Scientific Inquiry				
1.2.1. Record and describe observations with pictures, numbers, or words	Students record and describe an extensive variety of observations with pictures, numbers, or words.	Students record and describe a variety of observations with pictures, numbers, or words.	Students record and describe some observations with pictures, numbers, or words.	Students record and describe few observations with pictures, numbers, or words.
Grade 2				
Abilities Necessary To Do Scientific Inquiry				
2.2.1. Ask questions and seek answers about the world (e.g., Why do we have seasons?)	Students ask insightful questions and seek answers about the world.	Students ask reasonable questions and seek answers about the world.	Students ask obvious questions and seek answers about the world.	Students ask unreasonable questions and seek answers about the world.
2.2.2. Communicate (e.g., verbal, written, graphic) observations to others	Students communicate observations with accuracy.	Students communicate observations with no significant errors.	Students communicate observations with few significant errors.	Students communicate observations with many significant errors.

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 3				
Abilities Necessary to do Scientific Inquiry				
3.2.1. Select appropriate scientific tools (i.e., magnifiers, thermometers, rulers, balances) for investigations	Students always select appropriate scientific tools for investigations.	Students generally select appropriate scientific tools for investigations.	Students sometimes select appropriate scientific tools for investigations.	Students rarely select appropriate scientific tools for investigations.
3.2.2. Ask questions directly related to a scientific investigation	Students ask insightful questions directly related to a scientific investigation.	Students ask reasonable questions directly related to a scientific investigation.	Students ask obvious questions directly related to a scientific investigation.	Students ask unreasonable questions directly related to a scientific investigation.
3.2.3. Record observations (e.g., journals, drawings, charts) based on simple investigations	Students record all significant details of observations based on simple investigations.	Students record most of the significant details of observations based on simple investigations.	Students record some of the significant details of observations based on simple investigations.	Students record few of the details of observations based on simple investigations.
Grade 4				
Abilities Necessary to do Scientific Inquiry				
4.2.1. Review and ask questions about the scientific investigations of others	Students review and ask insightful questions about the scientific investigations of others.	Students review and ask reasonable questions about the scientific investigations of others.	Students review and ask obvious questions about the scientific investigations of others.	Students review and ask unreasonable questions about the scientific investigations of others.
4.2.2. Conduct simple investigations to answer questions based on observations	Students conduct simple investigations with ease.	Students conduct simple investigations with minimal difficulty.	Students conduct simple investigations with difficulty.	Students conduct simple investigations with great difficulty.
4.2.3. Use scientific tools (i.e., thermometers, rulers, balances) during simple investigations	Students use scientific tools with no errors during simple investigations.	Students use scientific tools with no significant errors during simple investigations.	Students use scientific tools with few significant errors during simple investigations.	Students use scientific tools with many significant errors during simple investigations.

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 5				
Abilities Necessary to do Scientific Inquiry				
5.2.1. Communicate scientific procedures (e.g. visual display, graph, journal, oral presentation) that enable others to repeat the investigation	Students communicate all of the significant details as well as subtleties of scientific procedures that enable others to repeat the investigation.	Students communicate most of the significant details of scientific procedures that enable others to repeat the investigation.	Students communicate some of the significant details of scientific procedures that enable others to repeat the investigation.	Students communicate very few details of scientific procedures that enable others to repeat the investigation.
5.2.2. Formulate an explanation supported by data	Students formulate an insightful explanation supported by data.	Students formulate a reasonable explanation supported by data.	Students formulate an obvious explanation supported by data.	Students formulate an unreasonable explanation supported by data.
Grade 6				
Understandings About Scientific Inquiry				
6.2.1. Explain the components of a scientific investigation (e.g., hypothesis, observation, data collection, data interpretation, communication of results, replicable)	Students explain all of the significant components of a scientific investigation as well as the subtleties.	Students explain most of the significant components of a scientific investigation.	Students explain some of the significant components of a scientific investigation.	Students explain very few components of a scientific investigation.
6.2.2. Select alternative methods of scientific investigations (e.g., library, internet, field work) to address different kinds of questions.	Students select the method of scientific investigation to answer a question with no errors.	Students select the method of scientific investigation to answer a question with no significant errors.	Students select the method of scientific investigation to answer a question with a few significant errors.	Students select the method of scientific investigation to answer a question with many significant errors.
6.2.3. Identify biases that may affect data collection and analysis (e.g., gender, race, religion, economic, generational.)	Students identify, with no errors, biases that may affect data collection.	Students identify, with no significant errors, biases that may affect data collection.	Students identify, with few significant errors, biases that may affect data collection.	Students identify, with many significant errors, biases that may affect data collection.

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Abilities Necessary to Do Scientific Inquiry				
6.2.4. Use appropriate tools and techniques to gather and analyze data	Students use appropriate tools and techniques with ease to gather and analyze data.	Students use appropriate tools and techniques with minimal difficulty to gather and analyze data.	Students use appropriate tools and techniques with difficulty to gather and analyze data.	Students use appropriate tools and techniques with great difficulty to gather and analyze data.
6.2.5. Use data from scientific investigations to determine relationships and patterns	Students interpret data from scientific investigations to determine insightful relationships and patterns.	Students interpret data from scientific investigations to determine reasonable relationships and patterns.	Students interpret data from scientific investigations to determine obvious relationships and patterns.	Students interpret data from scientific investigations to determine unreasonable relationships and patterns.
Grade 7				
Understandings About Scientific Inquiry *No benchmark expectations at this level*				
Abilities Necessary to Do Scientific Inquiry				
7.2.1. Communicate the results of scientific investigations using an appropriate format (e.g., journals, lab reports, diagrams, presentations, discussions)	Students always communicate the results of scientific investigations using appropriate format.	Students generally communicate the results of scientific investigations using appropriate format.	Students sometimes communicate the results of scientific investigations using appropriate format.	Students rarely communicate the results of scientific investigations using appropriate format.
Grade 8				
Understandings About Scientific Inquiry				
8.2.1. Explain how science advances through legitimate skepticism	Students provide an insightful explanation of how science advances through legitimate skepticism.	Students provide a relevant explanation of how science advances through legitimate skepticism.	Students provide an obvious explanation of how science advances through legitimate skepticism.	Students provide an irrelevant explanation of how science advances through legitimate skepticism.
Abilities Necessary to Do Scientific Inquiry				
8.2.2. Use evidence to generate descriptions, explanations, predictions, and models	Students use evidence to generate insightful descriptions, explanations, predictions, and models.	Students use evidence to generate reasonable descriptions, explanations, predictions, and models.	Students use evidence to generate typical descriptions, explanations, predictions, and models.	Students use evidence to generate unreasonable descriptions, explanations, predictions, and models.

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
8.2.3. Use basic mathematics and statistics (e.g., operations, mean, median, mode, range, and estimation) to interpret quantitative data	Students use basic mathematics and statistics with no errors to interpret quantitative data.	Students use basic mathematics and statistics with no significant errors to interpret quantitative data.	Students use basic mathematics and statistics with a few significant errors to interpret quantitative data.	Students use basic mathematics and statistics with many significant errors to interpret quantitative data.
8.2.4. Design and conduct a scientific investigation (e.g., making systematic observations, making accurate measurements, identifying and controlling variables)	Students design and conduct an innovative scientific investigation.	Students design and conduct a reasonable scientific investigation.	Students design and conduct an obvious scientific investigation.	Students design and conduct a superficial scientific investigation.
Grade 9-10				
Understandings about Scientific Inquiry				
9-10.2.1. Explain how scientific investigations can result in new ideas	Students provide an insightful explanation of how scientific investigations can result in new ideas.	Students provide a reasonable explanation of how scientific investigations can result in new ideas.	Students provide an obvious explanation of how scientific investigations can result in new ideas.	Students provide an unreasonable explanation of how scientific can sometimes result in new ideas.
Abilities Necessary to Do Scientific Inquiry				
9-10.2.2. Use appropriate safety equipment and precautions during investigations (e.g., goggles, apron, eye wash station)	Students always use appropriate safety equipment and precautions during investigations.	Students consistently use appropriate safety equipment and precautions during investigations.	Students occasionally use appropriate safety equipment and precautions during investigations.	Students rarely use appropriate safety equipment and precautions during investigations.
9-10.2.3. Identify questions and concepts that guide scientific investigations	Students identify, with no errors, questions and concepts that guide scientific investigations.	Students identify , with no significant errors, questions and concepts that guide scientific investigations.	Students identify, with few significant errors, questions and concepts that guide scientific investigations.	Students identify, with many significant errors, questions and concepts that guide scientific investigations.
9-10.2.4. Formulate a testable hypothesis for a simple investigation	Students always formulate a testable hypothesis for a simple investigation.	Students generally formulate a testable hypothesis for a simple investigation.	Students sometimes formulate a testable hypothesis for a simple investigation.	Students rarely formulate a testable hypothesis for a simple investigation.

Standard 2: Students use the process of science inquiry.					
Benchmark Expectations		Proficiency Descriptor			
		Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
9-10.2.5.	Identify the independent and dependent variables, the control, and the constants when conducting an experiment	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with no errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with no significant errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment with a few significant errors.	Students identify the independent and dependent variables, the control and the constants when conducting an experiment many significant errors.
9-10.2.6.	Design and conduct a guided investigation	Students design and conduct a substantive guided investigation.	Students design and conduct a relevant guided investigation.	Students design and conduct a typical guided investigation.	Students design and conduct a superficial guided investigation.
9-10.2.7.	Maintain clear and accurate records of scientific investigations	Students always maintain clear and accurate records of scientific investigations.	Students generally maintain clear and accurate records of scientific investigations.	Students sometimes maintain clear and accurate records of scientific investigations.	Students rarely maintain clear and accurate records of scientific investigations.
9-10.2.8.	Analyze data found in tables, charts, and graphs to formulate conclusions	Students analyze data found in tables, charts, and graphs to formulate insightful conclusions.	Students analyze data found in tables, charts, and graphs to formulate reasonable conclusions.	Students analyze data found in tables, charts, and graphs to formulate obvious conclusions.	Students analyze data found in tables, charts, and graphs to formulate unreasonable conclusions.
Grade 11-12					
Understandings About Scientific Inquiry					
11-12.2.1.	Explain how new knowledge and methods emerge from different types of investigations and public communication among scientists	Students provide an insightful explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide a reasonable explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide an obvious explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.	Students provide an unreasonable explanation of how new knowledge and methods emerge from different types of investigations and public communication among scientists.

Standard 2: Students use the process of science inquiry.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Abilities Necessary to Do Scientific Inquiry				
11-12.2.2. Select and use appropriate instruments, measuring tools, and units of measure to improve scientific investigations	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with no errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with no significant errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with a few significant errors.	Students select and use instruments, measuring tools, and units of measure to improve scientific investigations with many significant errors.
11-12.2.3. Use data from scientific investigations to accept or reject a hypothesis	Students use data from scientific investigations in an insightful way to accept or reject a hypothesis.	Students use data from scientific investigations in a reasonable way to accept or reject a hypothesis.	Students use data from scientific investigations in a superficial way to accept or reject a hypothesis.	Students use data from scientific investigations in an unreasonable way to accept or reject a hypothesis.
11-12.2.4. Formulate and revise explanations based upon scientific knowledge and experimental data	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in an insightful way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in a reasonable way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in a superficial way.	Students formulate and revise scientific explanations based upon scientific knowledge and experimental data in an unreasonable way.
11-12.2.5. Use technology and mathematics to improve investigations and communications	Students use technology and mathematics in insightful ways to improve investigations and communications.	Students use technology and mathematics in relevant ways to improve investigations and communications.	Students use technology and mathematics in typical ways to improve investigations and communications.	Students use technology and mathematics in superficial ways to improve investigations and communications.
11-12.2.6. Analyze data using appropriate strategies (e.g., interpolation, and extrapolation of data, significant figures, dimensional analysis)	Students analyze data using appropriate strategies in an insightful way.	Students analyze data using appropriate strategies in a reasonable way.	Students analyze data using appropriate strategies in a superficial way.	Students analyze data using appropriate strategies in an unreasonable way.
11-12.2.7. Design and conduct an independent investigation	Students design and conduct an insightful independent investigation.	Students design and conduct a reasonable independent investigation.	Students design and conduct a superficial independent investigation.	Students design and conduct an unreasonable independent investigation.
11-12.2.8. Communicate and defend a scientific argument	Students communicate and defend a scientific argument using almost all of the significant details.	Students communicate and defend a scientific argument using most of the significant details.	Students communicate and defend a scientific argument using some of the significant details.	Students communicate and defend a scientific argument using few details.

Standard 3: Physical Science

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Properties Of Matter				
K.3.1. Identify the materials that make up an object. (e.g., desk is made up of wood and metal, bike is made up of metal, rubber, and plastic)	Students always identify the materials that make up an object.	Students generally identify the materials that make up an object.	Students sometimes identify the materials that make up an object.	Students rarely identify the materials that make up an object.
Grade 1				
Properties Of Matter				
1.3.1. Identify matter that can be a liquid or solid (e.g., water)	Students identify with accuracy matter that can be a liquid or solid.	Students identify with no significant errors matter that can be a liquid or solid.	Students identify with a few significant errors matter that can be a liquid or solid.	Students identify with many significant errors matter that can be a liquid or solid.
1.3.2. Identify observable properties (e.g., size, weight, shape, color, movement) of objects	Students identify an extensive variety of observable properties of objects.	Students identify a variety of observable properties of objects.	Students identify some different observable properties of objects.	Students identify few observable properties of objects.
Force And Motion				
1.3.3. Identify different kinds of motion (e.g., straight, circular, back-and-forth) that objects can have	Students identify an extensive variety of motions that objects can have.	Students identify a variety of motions that objects can have.	Students identify some different motions that objects can have.	Students identify a limited variety of motions that objects can have.
Grade 2				
Properties Of Matter				
2.3.1. Identify ways (e.g., mixing, heating, cooling, cutting) to make changes in matter	Students identify an extensive variety of ways to make changes in matter.	Students identify a variety of ways to make changes in matter.	Students identify some different ways to make changes in matter.	Students identify few ways to make changes in matter.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
2.3.2. Explain why water left in an open container disappears, but water in a closed container does not disappear	Students provide an insightful explanation why water left in an open container disappears, but water in a closed container does not disappear.	Students provide a reasonable explanation why water left in an open container disappears, but water in a closed container does not disappear.	Students provide a superficial explanation why water left in an open container disappears, but water in a closed container does not disappear.	Students provide an unreasonable explanation why water left in an open container disappears, but water in a closed container does not disappear.
2.3.3. Sort matter by observable properties (e.g., size, shape, texture, color)	Students sort matter by observable properties with no errors.	Students sort matter by observable properties with no significant errors.	Students sort matter by observable properties with few significant errors.	Students sort matter by observable properties with many significant errors.
Force And Motion				
2.3.4. Describe an object's location (e.g., further than, beside, under, over) relative to another object	Students describe an object's location relative to another object with no errors.	Students describe an object's location relative to another object with no significant errors.	Students describe an object's location relative to another object with few significant errors.	Students describe an object's location relative to another object with many significant errors.
2.3.5. Describe how objects fall unless something holds them up (e.g., apple on a tree, coat on a hook, pencil rolling off a desk)	Students always describe how objects fall unless something holds them up.	Students consistently describe how objects fall unless something holds them up.	Students sometimes describe how objects fall unless something holds them up.	Students rarely describe how objects fall unless something holds them up.
Forms Of Energy				
2.3.6. Identify whether sources of heat and light are natural or human-made (e.g., sunlight, light bulb)	Students identify with no errors whether sources of heat and light are natural or human-made.	Students identify with no significant errors whether sources of heat and light are natural or human-made.	Students identify with few significant errors whether sources of heat and light are natural or human-made.	Students identify with many significant errors whether sources of heat and light are natural or human-made.
Grade 3				
Properties Of Matter				
3.3.1. Identify the physical properties of solids and liquids	Students identify all of the properties of solids and liquids.	Students identify most of the properties of solids and liquids.	Students identify some of the properties of solids and liquids.	Students identify few of the properties of solids and liquids.
Force And Motion				
3.3.2. Identify a force as push or pull	Students always identify a force as push or pull.	Students consistently identify a force as push or pull.	Students sometimes identify a force as push or pull.	Students rarely identify a force as push or pull.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
3.3.3. Describe how magnets attract iron and repel or attract other magnets	Students describe how, with no errors, magnets attract iron and repel or attract other magnets.	Students describe how, with no significant errors, magnets attract iron and repel or attract other magnets.	Students describe how, with few significant errors, magnets attract iron and repel or attract other magnets.	Students describe how, with many significant errors, magnets attract iron and repel or attract other magnets.
Forms Of Energy				
3.3.4. Explain how sound is produced by vibration	Students explain how, with no errors, sound is produced by vibration.	Students explain how, with no significant errors, sound is produced by vibration.	Students explain how, with few significant errors, sound is produced by vibration.	Students explain how, with many significant errors, sound is produced by vibration.
3.3.5. Describe how the path of light tends to maintain its direction and motion until it encounters an object	Students always describe how the path of light tends to maintain its direction and motion until it encounters an object.	Students generally describe how the path of light tends to maintain its direction and motion until it encounters an object.	Students sometimes describe how the path of light tends to maintain its direction and motion until it encounters an object.	Students rarely describe how the path of light tends to maintain its direction and motion until it encounters an object.
Grade 4				
Properties Of Matter				
4.3.1. Identify the forms in which water appears when heated and cooled (i.e., water vapor, liquid, solid)	Students identify, with no errors, the forms in which water appears when heated and cooled.	Students identify, with no significant errors, the forms in which water appears when heated and cooled.	Students identify, with few significant errors, the forms in which water appears when heated and cooled.	Students identify, with many significant errors, the forms in which water appears when heated and cooled.
4.3.2. Explain the relationship between the mass of an object and the sum of its parts.	Students explain, with no errors, the relationship between the mass of an object and the sum of its parts.	Students explain, with no significant errors,-the relationship between the mass of an object and the sum of its parts.	Students explain, with few significant errors, the relationship between the mass of an object and the sum of its parts.	Students explain, with many significant errors,-the relationship between the mass of an object and the sum of its parts.
4.3.3. Explain that matter is made up of parts that are too small to see without magnification	Students explain, with no errors, that matter is made up of parts that are too small to see without magnification.	Students explain, with no significant errors, that matter is made up of parts that are too small to see without magnification.	Students explain, with few significant errors, that matter is made up of parts that are too small to see without magnification.	Students explain with many significant errors, hat matter is made up of parts that are too small to see without magnification.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Force And Motion				
4.3.4. Identify the effects forces may have when applied to objects (i.e., start, stop, change direction)	Students identify, with no errors, the effects forces may have when applied to objects	Students identify, with no significant errors, the effects forces may have when applied to objects.	Students identify, with few significant errors, the effects forces may have when applied to objects.	Students identify, with many significant errors, the effects forces may have when applied to objects.
Forms Of Energy				
4.3.5. Describe how the path of light changes (i.e., reflected, absorbed, or allowed to pass through) when it encounters a variety of objects	Students describe, with no errors, how the path of light changes when it encounters a variety of objects.	Students describe, with no significant errors, how the path of light changes when it encounters a variety of objects.	Students describe, with few significant errors, how the path of light changes when it encounters a variety of objects.	Students describe, with many significant errors, how the path of light changes when it encounters a variety of objects.
4.3.6. Explain how the pitch of a sound is related to the rate of vibrations.	Students explain, with no errors, how the pitch of a sound is related to the rate of vibrations.	Students explain, with no significant errors, how the pitch of a sound is related to the rate of vibrations.	Students explain, with few errors, how the pitch of a sound is related to the rate of vibrations.	Students explain, with significant errors, how the pitch of a sound is related to the rate of vibrations.
4.3.7. Identify ways friction or burning produces heat (e.g., magnifying glass, carpet burn, sunburn)	Students identify an extensive variety of ways that heat can be produced by friction or burning.	Students identify many different ways that heat can be produced by friction or burning.	Students identify some different ways that heat can be produced by friction or burning.	Students identify very few ways that heat can be produced by friction or burning.
Grade 5				
Properties Of Matter				
5.3.1. Identify physical properties of substances before and after they are combined	Students identify all the physical properties before and after substances are combined.	Students identify most of the physical properties before and after substances are combined.	Students identify some of the physical properties before and after substances are combined.	Students identify very few of the physical properties before and after substances are combined.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
5.3.2. Identify new substances formed in a chemical change (i.e., rusting, burning)	Students identify new substances formed in a chemical change with no errors.	Students identify new substances formed in a chemical change with no significant errors.	Students identify new substances formed in a chemical change with few significant errors.	Students identify new substances formed in a chemical change with many significant errors.
5.3.3. Compare and contrast properties of solids, liquids, and gases	Students compare and contrast properties of a variety of solids, liquids, and gases with no errors.	Students compare and contrast properties of a variety of solids, liquids, and gases with no significant errors.	Students compare and contrast properties of a variety solids, liquids, and gases with few significant errors.	Students compare and contrast properties of a variety of solids, liquids, and gases.
Force And Motion				
5.3.4. Identify the effects force and mass have on the motion of an object	Students identify, with no errors, the effects force and mass have on the motion of an object.	Students identify, with no significant errors, the effects force and mass have on the motion of an object.	Students identify, with few significant errors, the effects force and mass have on the motion of an object.	Students identify, with many significant errors, the effects force and mass have on the motion of an object.
5.3.5. Explain why gravity is called an attracting force.	Students explain why, with no errors, gravity is an attracting force.	Students explain why, with no significant errors, gravity is an attracting force.	Students explain why, with few significant errors, gravity is an attracting force.	Students explain why, with many significant errors, gravity is an attracting force.
Forms Of Energy				
5.3.6. Demonstrate a simple electrical circuit by completing a continuous loop (i.e., battery, light, wire)	Students demonstrate a simple electrical circuit by completing a continuous loop with no errors.	Students demonstrate a simple electrical circuit by completing a continuous loop with no significant errors.	Students demonstrate a simple electrical circuit by completing a continuous loop with few significant errors.	Students demonstrate a simple electrical circuit by completing a continuous loop with many significant errors.
5.3.7. Identify materials that are good conductors of heat	Students identify an extensive variety of materials that are good conductors of heat.	Students identify a variety of materials that are good conductors of heat.	Students identify some materials that are good conductors of heat.	Students identify few materials that are good conductors of heat.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 6				
Properties Of Matter				
6.3.1. Organize materials according to similar properties (e.g., physical, chemical)	Students group materials with similar properties with no errors.	Students group materials with similar properties with no significant errors.	Students group materials with similar properties with few significant errors.	Students group materials with similar properties with many significant errors.
Force And Motion				
6.3.2. Use simple machines to change forces	Students use simple machines in innovative ways to change forces.	Students use simple machines in reasonable ways to change forces.	Students use simple machines in superficial ways to change forces.	Students use simple machines in unreasonable ways to change forces.
Forms Of Energy				
6.3.3. Identify different forms of energy (e.g., chemical, mechanical, heat, sound)	Students identify energy in an extensive variety of forms.	Students identify energy in many different forms.	Students identify energy in some different forms.	Students identify energy in a limited variety of forms.
6.3.4. Identify sources of energy (e.g., sun, wind, moving water, nuclear, fossil fuels, food)	Students identify an extensive variety of energy sources.	Students identify many different energy sources.	Students identify some different energy sources.	Students identify a limited variety of energy sources.
Vibrations And Waves				
6.3.5. Explain how vibrations create wavelike disturbances that spread out from the source	Students give a substantive explanation of how vibrations create wavelike disturbances that spread out from the source.	Students give a reasonable explanation of how vibrations create wavelike disturbances that spread out from the source.	Students give a superficial explanation of how vibrations create wavelike disturbances that spread out from the source.	Students give an unreasonable explanation of how vibrations create wavelike disturbances that spread out from the source.
Grade 7				
Properties Of Matter *No benchmark expectations at this level*				

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Force And Motion *No benchmark expectations at this level*				
Forms Of Energy *No benchmark expectations at this level*				
Energy Transfer And Transformation				
7.3.1. Explain how forms of energy can be transferred. (e.g., photosynthesis, metabolism, battery)	Students explain an extensive variety of energy transfers.	Students explain a variety of energy transfers.	Students explain some different energy transfers.	Students explain a limited variety of energy transfers.
Vibrations And Waves *No benchmark expectations at this level*				
Grade 8				
Properties Of Matter				
8.3.1. Identify elements and compounds	Students identify elements and compounds with no errors.	Students identify elements and compounds with no significant errors.	Students identify elements and compounds with few significant errors.	Students identify elements and compounds with many significant errors.
8.3.2. Explain the relationship between phases of matter and temperature	Students explain the relationship between phases of matter and temperature with no errors.	Students explain the relationship between phases of matter and temperature with no significant errors.	Students explain the relationship between phases of matter and temperature with few significant errors.	Students explain the relationship between phases of matter and temperature with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Force and Motion				
8.3.3. Interpret the effect of balanced and unbalanced forces on the motion of an object (e.g., convection currents, orbital motion, tides)	Students interpret the effect of balanced and unbalanced forces with no errors.	Students interpret the effect of balanced and unbalanced forces with no significant errors.	Students interpret the effect of balanced and unbalanced forces with few significant errors.	Students interpret the effect of balanced and unbalanced forces with many significant errors.
8.3.4. Explain how all objects exert gravitational force and this force is affected by the distance between the masses of the objects	Students explain, with no errors, the relationship among gravitational force, mass, and distance.	Students explain, with no significant errors, the relationship among gravitational force, mass, and distance.	Students explain, with few significant errors, the relationship among gravitational force, mass, and distance.	Students explain, with many significant errors, the relationship among gravitational force, mass, and distance.
Energy Transfer and Transformation				
8.3.5. Identify when heat can be transferred by conduction, convection, or radiation.	Students identify with no errors when heat can be transferred by conduction, convection, or radiation.	Students identify with no significant errors when heat can be transferred by conduction, convection, or radiation.	Students identify with few significant errors when heat can be transferred by conduction, convection, or radiation.	Students identify with significant errors when heat can be transferred by conduction, convection, or radiation..
Vibrations And Waves				
8.3.6. Explain the characteristic properties (e.g., wavelength, frequency) and behaviors (e.g., reflection, refraction) of waves	Students explain an extensive variety of wave properties and behaviors.	Students explain many different wave properties and behaviors.	Students explain some different wave properties and behaviors.	Students explain limited variety of wave properties and behaviors.
Grade 9-10				
Properties Of Matter				
9-10.3.1. Classify elements according to similar properties. (e.g., metal, nonmetal, solids, liquids, gases)	Students classify elements according to similar properties with no errors.	Students classify elements according to similar properties with no significant errors.	Students classify elements according to similar properties with few significant errors.	Students classify elements according to similar properties with many significant errors.
9-10.3.2. Classify changes in matter as physical or chemical	Students classify changes in matter as physical or chemical with no errors.	Students classify changes in matter as physical or chemical with no significant errors.	Students classify changes in matter as physical or chemical with few significant errors.	Students classify changes in matter as physical or chemical with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
9-10.3.3. Identify the Law of Conservation of Matter in physical and chemical changes	Students identify the Law of Conservation of Matter in an extensive variety of physical and chemical changes.	Students identify the Law of Conservation of Matter in many different physical and chemical changes.	Students identify the Law of Conservation of Matter in some different physical and chemical changes.	Students identify the Law of Conservation of Matter in a limited variety of physical and chemical changes.
Atoms And Molecules				
9-10.3.4. Construct a model of an atom (e.g., protons, neutrons, electrons, nucleus, electron cloud)	Students construct a model of an atom identifying all of the significant details.	Students construct a model of an atom identifying most of the significant details.	Students construct a model of an atom identifying some of the significant details.	Students construct a model of an atom identifying very few of the significant details.
Chemical Reactions				
9-10.3.5. Identify the reactants and products in a chemical reaction	Students identify the reactants and products in a chemical reaction with no errors.	Students identify the reactants and products in a chemical reaction with no significant errors.	Students identify the reactants and products in a chemical reaction with few significant errors.	Students identify the reactants and products in a chemical reaction with many significant errors.
9-10.3.6. Distinguish between balanced and unbalanced chemical equations	Students distinguish between balanced and unbalanced chemical equations with no errors.	Students distinguish between balanced and unbalanced chemical equations with no significant errors.	Students distinguish between balanced and unbalanced chemical equations with few significant errors.	Students distinguish between balanced and unbalanced chemical equations with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Force And Motion				
9-10.3.7. Use Newton's Laws to describe the motion of an object	Students use Newton's laws to provide a description of the motion of an object with no errors.	Students use Newton's laws to provide a description of the motion of an object with no significant errors.	Students use Newton's laws to provide a description of the motion of an object with few significant errors.	Students use Newton's laws to provide a description of the motion of an object with many significant errors.
Energy Transfer And Transformation				
9-10.3.8. Describe the relationships between kinetic and potential energy in basic transformations (e.g., physical and chemical changes)	Students describe the relationships between kinetic and potential energy in an extensive variety of basic transformations.	Students describe the relationships between kinetic and potential energy in a variety of basic transformations.	Students describe the relationships between kinetic and potential energy in some different basic transformations.	Students describe the relationships between kinetic and potential energy in few basic transformations.
Vibrations And Waves				
9-10.3.9. Compare and contrast electromagnetic and mechanical waves (i.e. energy, energy transfer, medium)	Students compare and contrast electromagnetic and mechanical waves identifying all of the significant details.	Students compare and contrast electromagnetic and mechanical waves identifying most of the significant details.	Students compare and contrast electromagnetic and mechanical waves identifying some of the significant details.	Students compare and contrast electromagnetic and mechanical waves identifying few of the significant details.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Electricity And Magnetism				
9-10.3.10. Describe the differences between series and parallel circuits	Students describe the differences between series and parallel circuits with no errors.	Students describe the differences between series and parallel circuits with no significant errors.	Students describe the differences between series and parallel circuits with few significant errors.	Students describe the differences between series and parallel circuits with many significant errors.
Grade 11-12				
Properties of Matter *No benchmark expectations at this level*				
Atomic Structure and Properties				
11-12.3.1. Explain how the structure of an atom, isotope, or ion relates to its properties	Students explain how the structure of an atom, isotope, or ion relates to its properties with no errors.	Students explain how the structure of an atom, isotope, or ion relates to its properties with no significant errors.	Students explain how the structure of an atom, isotope, or ion relates to its properties with few significant errors.	Students explain how the structure of an atom, isotope, or ion relates to its properties with many significant errors.
11-12.3.2. Identify the basic organization of the periodic table (e.g., elements are listed according to the number of protons [atomic number]; repeating patterns of physical and chemical properties	Students identify the organization of the periodic table with no errors.	Students identify the organization of the periodic table with no significant errors.	Students identify the organization of the periodic table with few significant errors.	Students identify the organization of the periodic table with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Atoms And Molecules				
11-12.3.3. Compare and contrast the role of electrons in ionic and covalent bonding	Students compare and contrast the role of electrons in ionic and covalent bonding with no errors.	Students compare and contrast the role of electrons in ionic and covalent bonding with no significant errors.	Students compare and contrast the role of electrons in ionic and covalent bonding with few significant errors.	Students compare and contrast the role of electrons in ionic and covalent bonding with many significant errors.
11-12.3.4. Identify the basic bonding characteristics of carbon which lead to a large variety of structures	Students identify the basic bonding characteristics of carbon which lead to a large variety of structures with no errors.	Students identify the basic bonding characteristics of carbon which lead to a large variety of structures with no significant errors.	Students identify the basic bonding characteristics of carbon which lead to a large variety of structures with few significant errors.	Students identify the basic bonding characteristics of carbon which lead to a large variety of structures with many significant errors.
Chemical Reactions				
11-12.3.5. Identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory.	Students identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory with no errors.	Students identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory with no significant errors.	Students identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory with few significant errors.	Students identify the effect of concentration, temperature, surface area, pressure, and catalysts on reaction rates as it relates to the Kinetic Theory with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
11-12.3.6. Write the chemical formula and name for compounds using a table of element names, symbols, and oxidation numbers	Students write the chemical formula and name for an extensive variety of compounds using a table of element names, symbols, and oxidation numbers.	Students write the chemical formula and name for many different compounds using a table of element names, symbols, and oxidation numbers.	Students write the chemical formula and name for some different compounds using a table of element names, symbols, and oxidation numbers.	Students write the chemical formula and name for very few compounds using a table of element names, symbols, and oxidation numbers.
11-12.3.7. Balance chemical equations	Students balance chemical equations with no errors.	Students balance chemical equations with no significant errors.	Students balance chemical equations with few significant errors.	Students balance chemical equations with many significant errors.
Force And Motion				
11-12.3.8. Identify the principles and relationships influencing forces and motion (e.g., gravitational force, vectors, velocity, friction)	Students identify an extensive variety of principles and relationships influencing forces and motion.	Students identify a variety of principles and relationships influencing forces and motion.	Students identify some different principles and relationships influencing forces and motion.	Students identify very few principles and relationships influencing forces and motion.
Forms Of Energy				
11-12.3.9. Explain the relationship among thermal energy, temperature, and the motion of particles	Students explain the relationship among thermal energy, temperature, and the motion of particles with no errors.	Students explain the relationship among thermal energy, temperature, and the motion of particles with no significant errors.	Students explain the relationship among thermal energy, temperature, and the motion of particles with few significant errors.	Students explain the relationship among thermal energy, temperature, and the motion of particles with many significant errors.

Standard 3: Students understand the basic concepts and principles of physical science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Energy Transfer And Transformation				
11-12.3.10. Apply the law of conservation of energy to a variety of situations	Students apply the law of conservation of energy to an extensive variety of situations.	Students apply the law of conservation of energy to a variety of situations.	Students apply the law of conservation of energy to some different situations.	Students apply the law of conservation of energy to very few situations.
11-12.3.11. Explain how energy is related to physical changes of matter (e.g., phase changes, temperature changes)	Students explain all of the significant details relating energy to physical changes.	Students explain most of the significant details relating energy to physical changes.	Students explain some of the significant details relating energy to physical changes.	Students explain very few of the significant details relating energy to physical changes.
Vibrations And Waves				
11-12.3.12. Relate wave energy to wavelength and frequency	Students relate wave energy to wavelength and frequency with no errors.	Students relate wave energy to wavelength and frequency with no significant errors.	Students relate wave energy to wavelength and frequency with few significant errors.	Students relate wave energy to wavelength and frequency with many significant errors.
Electricity And Magnetism				
11-12.3.13. Explain how magnetic forces relate to electric forces	Students explain how magnetic forces relate to electric forces with no errors.	Students explain how magnetic forces relate to electric forces with no significant errors.	Students explain how magnetic forces relate to electric forces with few significant errors.	Students explain how magnetic forces relate to electric forces with many significant errors.

Standard 4: Life Science

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Characteristics Of Organisms				
K.4.1. Identify animals eat plants or other animals for food	Students identify animals that eat plants or other animals for food with no errors.	Students identify animals that eat plants or other animals for food with no significant errors.	Students identify animals that eat plants or other animals for food with few significant errors.	Students identify animals that eat plants or other animals for food with many significant errors.
Grade 1				
Characteristics Of Organisms				
1.4.1. Identify plants and animals that closely resemble their parents and one another	Students identify plants and animals that closely resemble their parents and one another with no errors.	Students identify plants and animals that closely resemble their parents and one another with no significant errors.	Students identify plants and animals that closely resemble their parents and one another with few significant errors.	Students identify plants and animals that closely resemble their parents and one another with many significant errors.
Life Cycles				
1.4.2. Identify characteristics of living things (e.g., grow, sometimes reproduce, change, and die over time)	Students identify characteristics of living things with no errors.	Students identify characteristics of living things with no significant errors.	Students identify characteristics of living things with few significant errors.	Students identify characteristics of living with many significant errors.
Grade 2				
Characteristics Of Organisms				
2.4.1. Identify how plants and animals are alike and different (e.g., in the way they look, in their behaviors)	Students identify an extensive variety of ways in which plants and animals are alike and different.	Students identify a variety of ways in which plants and animals are alike and different.	Students identify some different ways in which plants and animals are alike and different.	Students identify few ways in which plants and animals are alike and different.
COMPARE THE SIMILARITIES AND DIFFERENCES				
Life Cycles *No benchmark expectations at this level*				
Organisms And Their Environments				
2.4.2. Identify various things that are found in different environments (e.g., cactus, lizard – desert; shark, coral- ocean)	Students identify an extensive variety of living things that are found in different environments.	Students identify a variety of living things that are found in different environments.	Students identify some different living things that are found in different environments.	Students identify few living things that are found in different environments.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 3				
Characteristics Of Organisms *No benchmark expectations at this level*				
Structure And Function				
3.4.1. Identify parts of an organism that have specific functions (e.g., roots absorb water, heart pumps blood)	Students , identify with no errors, parts of an organism that have specific functions.	Students identify, with no significant errors, parts of an organism that have specific functions.	Students identify, with few significant errors, parts of an organism that have specific functions.	Students identify, with many significant errors, parts of an organism that have specific functions.
Life Cycles				
3.4.2. Describe the life cycles of plants and animals (e.g., birds, mammals, grasses, trees, insects, flowers)	Students describe the life cycles of an extensive variety of plants and animals.	Students describe the life cycles of a variety of plants and animals.	Students describe the life cycles of some plants and animals.	Students describe the life cycles of few plants and animals.
Organisms And Their Environments				
3.4.3. Identify the needs of living things (e.g., food, shelter, soil, space, water)	Students identify, with no errors, the needs of living things.	Students identify, with no significant errors, the needs of living things.	Students identify, with few significant errors, the needs of living things.	Students identify, with many significant errors, the needs of living things.
Grade 4				
Structure And Function				
4.4.1. Classify plants and animals according to common physical characteristics	Students classify, with no errors, plants and animals according to common physical characteristics.	Students classify, with no significant errors, plants and animals according to common physical characteristics.	Students classify, with few significant errors, plants and animals according to common physical characteristics.	Students classify, with many significant errors, plants and animals according to common physical characteristics.
4.4.2. Identify adaptations that help plants and animals survive and grow in their environment	Students identify an extensive variety of adaptations that help plants and animals survive in their environment.	Students identify a variety of adaptations that help plants and animals survive in their environment.	Students identify some adaptations that help plants and animals survive in their environment.	Students identify very few adaptations that help plants and animals survive in their environment.
Life Cycles *No benchmark expectations at this level*				

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Characteristics of Organisms				
4.4.3. Identify behaviors of animals as instinctive or learned	Students identify, with no errors, behaviors of animals as instinctive or learned.	Students identify, with no significant errors, behaviors of animals as instinctive or learned.	Students identify, with few significant errors, behaviors of animals as instinctive or learned.	Students identify, with many significant errors, behaviors of animals as instinctive or learned.
Organisms And Their Environments				
4.4.4. Identify ways that an organism's pattern of behavior is related to the nature of the organism's environment (e.g., the availability of food, space, and resources)	Students identify an extensive variety of ways that an organism's pattern of behavior is related to the nature of the organism's environment.	Students identify a variety of ways that an organism's pattern of behavior is related to the nature of the organism's environment.	Students identify some ways that an organism's pattern of behavior is related to the nature of the organism's environment.	Students identify a limited variety of ways that an organism's pattern of behavior is related to the nature of the organism's environment.
Grade 5				
Structure And Function				
5.4.1. Identify components of a human organ system (e.g., digestive system, respiratory system, circulatory system, muscular system, skeletal system)	Students identify all of the significant components of a human organ system.	Students identify most of the significant components of a human organ system.	Students identify some of the significant components of a human organ system.	Students identify few of the significant components of a human organ system.
5.4.2. Explain the function of a human organ system (e.g., digestive system, respiratory system, circulatory system, muscular system, skeletal system)	Students explain, with no errors, the function of a human organ system.	Students explain, with no significant errors, the function of a human organ system.	Students explain, with few significant errors, the function of a human organ system.	Students explain, with many significant errors, the function of a human organ system.
Characteristics Of Organisms *No benchmark expectations at this level*				
Organisms And Their Environments				
5.4.3. Identify the producers, consumers, and decomposers in a food web.	Students identify, with no errors, the producers, consumers, and decomposers in a food web	Students identify, with no significant errors, the producers, consumers, and decomposers in a food web.	Students identify, with few significant errors, the producers, consumers, and decomposers in a food web.	Students identify, with many errors, the producers, consumers, and decomposers in a food web.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 6				
Structure And Function				
6.4.1. Identify single- or multi-celled organisms.	Students identify unicellular and multi-cellular organisms with no errors.	Students identify unicellular and multi-cellular organisms with no significant errors.	Students identify unicellular and multi-cellular organisms with few significant errors.	Students identify unicellular and multi-cellular organisms with many significant errors.
Organisms And Their Environments *No benchmark expectations at this level*				
Genetics And Reproduction				
6.4.2. Explain why reproduction is necessary for the continuation of the species (e.g., asexual, sexual)	Students give an insightful explanation for the necessity of reproduction for the continuation of the species.	Students give a reasonable explanation for the necessity of reproduction for the continuation of the species.	Students give a superficial explanation for the necessity of reproduction for the continuation of the species.	Students give an unreasonable explanation for the necessity of reproduction for the continuation of the species.
Grade 7				
Structure And Function				
7.4.1. Explain the functions of the cell (e.g., growth, metabolism, reproduction, photosynthesis, response)	Students explain all of the significant details of the functions of a cell.	Students explain most of the significant details of the functions of a cell.	Students explain some of the significant details of the functions of a cell.	Students explain few of the significant details of the functions of a cell.
7.4.2. Identify levels of organization in living systems (e.g., cells, tissues, organs, organ systems, organisms, ecosystems)	Students identify all of the significant details of the levels of organization in living systems.	Students identify most of the significant details of the levels of organization in living systems.	Students identify some of the significant details of the levels of organization in living systems.	Students identify few of the significant details of the levels of organization in living systems.
Genetics And Reproduction				
7.4.3. Identify the characteristics of reproduction (e.g., sexual, asexual)	Students identify all of the significant characteristics of reproduction.	Students identify most of the significant characteristics of reproduction.	Students identify some of the significant characteristics of reproduction.	Students identify few of the significant characteristics of reproduction.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Interdependence Among Organisms				
7.4.4. Identify interactions among organisms and their environment (e.g., competition, mutualism, predator/prey, consumers, producers)	Students identify all of the significant details of interactions among organisms and their environment.	Students identify most significant details of interactions among organisms and their environment .	Students identify some significant details of interactions among organisms and their environment .	Students identify few details of interactions among organisms and their environment .
Diversity And Unity Among Organisms				
7.4.5. Classify organisms (e.g., taxonomic groups)	Students classify organisms with accuracy.	Students classify organisms with no significant errors.	Students classify organisms with few significant errors.	Students classify organisms with many significant errors.
7.4.6. Explain how different adaptations help organisms survive	Students explain an extensive variety of adaptations that help an organism survive.	Students explain many different adaptations that help an organism survive.	Students explain some different adaptations that help an organism survive.	Students explain few adaptations that help an organism survive.
Grade 8				
Structure And Function *No benchmark expectations at this level*				
Genetics And Reproduction *No benchmark expectations at this level*				
Interdependence Among Organisms *No benchmark expectations at this level*				
Diversity And Unity Among Organisms *No benchmark expectations at this level*				
Natural Selection And Biological Evolution				
8.4.1. Identify the evidence of biological evolution. (e.g., adaptation, radiation, extinction) as found in the fossil record	Students identify all of the significant details of the evidence of biological evolution as found in the fossil record.	Students identify most of the significant details of the evidence of biological evolution as found in the fossil record.	Students identify some of the significant details of the evidence of biological evolution as found in the fossil record.	Students identify few of the significant details of the evidence of biological evolution as found in the fossil record.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 9-10				
Structure And Function				
9-10.4.1. Relate cell function to cell structure (i.e., cell wall, cell membrane, nucleus, mitochondria, chloroplast)	Students relate cell functions to cell structures with no errors.	Students relate cell functions to cell structures with no significant errors.	Students relate cell functions to cell structures with few significant errors.	Students relate cell functions to cell structures with many significant errors.
9-10.4.2. Relate the functions of cells in multi-cellular organisms to their cell type (e.g., nerve cells, blood cells, guard cells)	Students relate the functions of cells in multi-cellular organisms to their cell type with no errors.	Students relate the functions of cells in multi-cellular organisms to their cell type with no significant errors.	Students relate the functions of cells in multi-cellular organisms to their cell type with few significant errors.	Students relate the functions of cells in multi-cellular organisms to their cell type with many significant errors.
9-10.4.3. Explain the relationship between protein structure and function	Students explain the relationship between protein structure and function with no errors.	Students explain the relationship between protein structure and function with no significant errors.	Students explain the relationship between protein structure and function with few significant errors.	Students explain the relationship between protein structure and with many significant errors.
Genetics And Reproduction				
9-10.4.4. Relate DNA, genes, and chromosomes	Students relate DNA, genes, and chromosomes with no errors.	Students relate DNA, genes, and chromosomes with no significant errors.	Students relate DNA, genes, and chromosomes with few significant errors.	Students relate DNA, genes, and chromosomes with many significant errors.
9-10.4.5. Explain the relationship between spontaneous changes in DNA and a source of genetic variation	Students explain the relationship between spontaneous changes in DNA and genetic variation with no errors.	Students explain the relationship between spontaneous changes in DNA and genetic variation with no significant errors.	Students explain the relationship between spontaneous changes in DNA and genetic variation with few significant errors.	Students explain the relationship between spontaneous changes in DNA and genetic variation with many significant errors.
9-10.4.6. Compare and contrast the results of mitosis and meiosis (i.e., mitosis involves a nuclear division that results in two daughter nuclei that are identical to the parent nucleus; meiosis involves two nuclear divisions that result in gametes cells containing half the number of chromosomes)	Students compare and contrast the results of mitosis and meiosis with no errors.	Students compare and contrast the results of mitosis and meiosis with no significant errors.	Students compare and contrast the results of mitosis and meiosis with few significant errors.	Students compare and contrast the results of mitosis and meiosis with many significant errors.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
9-10.4.7. Apply the basic concepts of genetics to predict inherited traits (i.e., segregation, independent assortment, dominant and recessive traits)	Students apply the basic concepts of genetics to predict inherited traits with no errors.	Students apply the basic concepts of genetics to predict inherited traits with no significant errors.	Students apply the basic concepts of genetics to predict inherited traits with few significant errors.	Students apply the basic concepts of genetics to predict inherited traits with many significant errors.
Natural Selection And Biological Evolution				
9-10.4.8. Relate the concept of natural selection to its evolutionary consequences	Students identify all of the significant details relating the concept of natural selection to its evolutionary consequence.	Students identify most of the significant details relating the concept of natural selection to its evolutionary consequence.	Students identify some of the significant details relating the concept of natural selection to its evolutionary consequence.	Students identify few of the significant details relating the concept of natural selection to its evolutionary consequence.
9-10.4.9. Identify evidence for evolution (e.g., fossil records, vestigial structures, similarities between organisms, and DNA)	Students identify an extensive variety of evidence for evolution.	Students identify many different types of evidence for evolution.	Students identify some different types of evidence for evolution.	Students identify few different types of evidence for evolution.
Interdependence Among Organisms				
9-10.4.10. Explain the energy and organization related to trophic pyramids	Students explain all of the significant details explaining the energy and organization related to trophic pyramids.	Students explain most of the significant details explaining the energy and organization related to trophic pyramids.	Students explain some of the significant details explaining the energy and organization related to trophic pyramids.	Students explain few of the significant details explaining the energy and organization related to trophic pyramids.
Matter And Energy In Living Systems				
9-10.4.11. Explain how matter and energy flow through living and nonliving components in an ecosystem (e.g., carbon cycle, water cycle, nitrogen cycle)	Students explain all of the significant details of how matter and energy flow through components in an ecosystem.	Students explain most of the significant details of how matter and energy flow through components in an ecosystem.	Students explain some of the significant details of how matter and energy flow through components in an ecosystem.	Students explain few of the significant details of how matter and energy flow through components in an ecosystem.

Standard 4: Students understand the basic concepts and principles of life science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
9-10.4.12. Compare and contrast photosynthesis and cellular respiration	Students identify all of the significant similarities and differences between photosynthesis and cellular respiration.	Students identify most of the significant similarities and differences between photosynthesis and cellular respiration.	Students identify some of the significant similarities and differences between photosynthesis and cellular respiration.	Students identify few of the significant similarities and differences between photosynthesis and cellular respiration.
Grade 11-12				
Structure And Function				
11-12.4.1. Explain the importance of cell differentiation in the development of tissues, organs, organ systems, and multi-cellular organisms.	Students explain, with no errors, the importance of cell differentiation in the development of multi-cellular organisms.	Students explain, with no significant errors, the importance of cell differentiation in the development of multi-cellular organisms.	Students explain, with few significant errors, the importance of cell differentiation in the development of multi-cellular organisms.	Students explain, with many significant errors, the importance of cell differentiation in the development of multi-cellular organisms.
Genetics And Reproduction				
11-12.4.2. Explain how types of DNA technology (e.g., genetic engineering, forensic science, cloning) may impact society now and in the future.	Students provide an insightful explanation how types of DNA technology may impact society.	Students provide a reasonable explanation how types of DNA technology may impact society.	Students provide a superficial explanation how types of DNA technology may impact society.	Students provide an unreasonable explanation how types of DNA technology may impact society.
Natural Selection And Biological Evolution				
11-12.4.3. Explain how change through time has ensured adaptation to changing environments	Students explain all of the significant details of how change through time has ensured adaptation to changing environments.	Students explain most of the significant details of how change through time has ensured adaptation to changing environments.	Students explain some of the significant details of how change through time has ensured adaptation to changing environments.	Students explain few of the significant details how of change through time has ensured adaptation to changing environments.
Interdependence Among Organisms *No benchmark expectations at this level*				
Matter And Energy In Living Systems *No benchmark expectations at this level*				

Standard 5: Earth and Space Science

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Weather, Seasons, and Climate				
K.5.1. Describe day-to-day weather changes (e.g., sunny, rainy, cloudy, snowy)	Students describe day-to-day weather changes with accuracy.	Students describe day-to-day weather changes with no significant errors.	Students describe day-to-day weather changes with a few significant errors.	Students describe day-to-day weather changes with many significant errors.
Earth's Surface *No benchmark expectations at this level*				
Objects In The Sky				
K.5.2. Identify objects (e.g., sun, birds, airplanes, moon) in the sky	Students identify objects in the sky with accuracy.	Students identify objects in the sky with no significant errors.	Students identify objects in the sky with few significant errors.	Students identify objects in the sky with many significant errors.
Grade 1				
Weather, Seasons, and Climate				
1.5.1. Explain that short-term weather conditions can change daily, and how weather affects people's daily activities	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in an extensive variety of ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in many different ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in some different ways.	Students explain that short-term weather conditions can change daily, and how weather affects people's daily activities in few ways.
Earth's Surface *No benchmark expectations at this level*				
Objects In The Sky				
1.5.2. Explain why the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night	Students explain why, with no errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with no significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with few significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.	Students explain why, with many significant errors, the sun can only be seen in the daytime, but the moon can be seen sometimes during the day and sometimes at night.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 2				
Weather, Seasons, And Climate				
2.5.1. Describe the patterns and characteristics of the four seasons, and how these changes in weather influence plant, animal, and human activities.	Students describe, with no errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with no significant errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with few significant errors. the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.	Students describe, with many significant errors, the patterns and characteristics of the four seasons and how these changes in weather influence plant, animal, and human activities.
Earth's Surface				
2.5.2. Identify different physical properties (e.g., size, shape, texture) of earth materials (e.g., rocks, sand, water)	Students identify extensive physical properties of earth materials.	Students identify most physical properties of earth materials.	Students identify some physical properties of earth materials.	Students identify few physical properties of earth materials.
2.5.3. Explain how fossils provide evidence about plants and animals and their environments that lived long ago (e.g., wooly mammoth, fern, ice age).	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with no errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with no significant errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with few significant errors.	Students explain how fossils provide evidence about plants and animals and their environments that lived long ago with many significant errors.
Objects In The Sky				
2.5.4. Describe how the sun provides light and heat to warm the earth (e.g., land, air, and water)	Students describe how, with no errors, the sun provides light and heat to warm the earth.	Students describe how, with no significant errors, the sun provides light and heat to warm the earth.	Students describe how, with few significant errors, the sun provides light and heat to warm the earth.	Students describe how, with many significant errors, the sun provides light and heat to warm the earth.
2.5.5. Explain how the moon appears slightly different every day, but looks nearly the same every four weeks	Students explain how, with no errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with no significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with few significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.	Students explain how, with many significant errors, the moon appears slightly different every day, but looks nearly the same every four weeks.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 3				
Weather, Seasons, And Climate				
3.5.1. Identify weather conditions that can be measured (e.g., temperature, wind direction and speed, and precipitation)	Students identify an extensive variety of weather conditions that can be measured.	Students identify a variety of weather conditions that can be measured.	Students identify some different weather conditions that can be measured.	Students identify few weather conditions that can be measured.
Earth's Surface				
3.5.2. Identify different uses (e.g., building materials, sources of fuel) of Earth's materials based on their properties	Students identify an extensive variety of uses of Earth's materials based on their properties.	Students identify a variety of uses of Earth's materials based on their properties.	Students identify some uses of Earth's materials based on their properties.	Students identify few uses of Earth's materials based on their properties.
3.5.3. Identify ways (e.g., wind, rain, people) that larger rocks break down into smaller rocks	Students identify, with no errors, ways that larger rocks break down into smaller rocks.	Students identify, with no significant errors, ways that larger rocks break down into smaller rocks.	Students identify, with few significant errors, ways that larger rocks break down into smaller rocks.	Students identify, with many significant errors, ways that larger rocks break down into smaller rocks.
3.5.4. Identify the properties of soil (e.g., color, texture, ability to support plant growth, capacity to retain water)	Students identify an extensive variety of properties of soil.	Students identify a variety of properties of soil.	Students identify some properties of soil.	Students identify few properties of soil.
Objects in the Sky				
3.5.5. Explain how stars are like the Sun, but because they are at a great distance, they look like small points of light	Students explain how, with no errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with no significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with few significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.	Students explain how, with many significant errors, stars are like the Sun, but because they are at a great distance, they look like small points of light.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 4				
Weather, Seasons, And Climate				
4.5.1. Describe how as water condenses small droplets of water form clouds and fog	Students describe how, with no errors, as water condenses small droplets form clouds and fog	Students describe how, with no significant errors, as water condenses small droplets form clouds and fog	Students describe how, with few significant errors, as water condenses small droplets form clouds and fog	Students describe how, with many significant errors, as water condensers small droplets form clouds and fog.
Earth's Surface				
4.5.2. Identify slow and rapid processes (e.g., wind, water, waves, ice, volcano, earthquake) that are constantly changing Earth's surface	Students identify an extensive variety of slow and rapid processes that are constantly changing Earth's surface.	Students identify a variety of slow and rapid processes that are constantly changing Earth's surface.	Students identify some slow and rapid processes that are constantly changing Earth's surface.	Students identify few slow and rapid processes that are constantly changing Earth's surface.
4.5.3. Use characteristics to classify Earth's materials (i.e. rocks, soil)	Students use an extensive variety of characteristics to classify Earth's materials.	Students use a variety of characteristics to classify Earth's materials.	Students use some different characteristics to classify Earth's materials.	Students use few characteristics to classify Earth's materials.
4.5.4. Compare fossil evidence to existing organisms	Students compare all of the significant details of fossil evidence to existing organisms.	Students compare most of the significant details of fossil evidence to existing organisms.	Students compare some of the significant details of fossil evidence to existing organisms.	Students compare few of the significant details of fossil evidence to existing organisms.
Solar System				
4.5.5. Identify components of our solar system (e.g., planets, moons, Sun)	Students identify all of the components of our solar system.	Students identify most of the components of our solar system.	Students identify some of the components of our solar system.	Students identify few of the components of our solar system.
The Universe				
4.5.6. Identify tools that are used to study the universe (e.g., telescopes, space probes, satellites, space craft)	Students identify, with no errors, tools that are used to study the universe.	Students identify, with no significant errors, tools that are used to study the universe.	Students identify, with few significant errors, tools that are used to study the universe.	Students identify, with many significant errors, tools that are used to study the universe.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 5				
Weather, Seasons, And Climate				
5.5.1. Measure weather conditions (i.e., temperature, wind direction and speed, and precipitation)	Students measure weather conditions with no errors.	Students measure weather conditions with no significant errors.	Students measure weather conditions with few significant errors.	Students measure weather conditions with many significant errors.
5.5.2. Identify characteristics of different clouds (i.e., cumulus, stratus, cirrus)	Students identify all of the significant characteristics of different clouds.	Students identify most of the significant characteristics of different clouds.	Students identify some of the significant characteristics of different clouds.	Students identify few of the significant characteristics of different clouds.
Earth's Surface				
5.5.3. Identify how the components of soil (e.g., plant roots, bacteria, weathered rock) influence the properties of soil (e.g., texture, fertility, capacity to hold water)	Students identify, with extensive detail, how the components of soil influence the properties of soil.	Students identify, with significant detail, how the components of soil influence the properties of soil.	Students identify, with some significant detail, how the components of soil influence the properties of soil.	Students identify, with little significant detail, how the components of soil influence the properties of soil.
The Universe				
5.5.4. Identify the characteristics of the Earth (i.e., spherical in shape, orbits the Sun, rotates on tilted axis)	Students identify, with no errors, the characteristics of the Earth.	Students identify, with no significant errors, the characteristics of the Earth.	Students identify, with few significant errors, the characteristics of the Earth.	Students identify, with many significant errors, the characteristics of the Earth.
5.5.5. Identify the objects in the sky that have predictable patterns of movement (e.g., sun, planets, moons, stars)	Students identify, with no errors, the objects in the sky that have predictable patterns of movement.	Students identify, with no significant errors, the objects in the sky that have predictable patterns of movement.	Students identify, with few significant errors, the objects in the sky that have predictable patterns of movement.	Students identify, with many significant errors, the objects in the sky that have predictable patterns of movement.
Grade 6				
Weather, Seasons, And Climate				
6.5.1. Identify adverse weather conditions and how humans prepare for them	Students identify adverse weather conditions and how to prepare for them with no errors.	Students identify adverse weather conditions and how to prepare for them with no significant errors.	Students identify adverse weather conditions and how to prepare for them with few significant errors.	Students identify adverse weather conditions and how to prepare for them with many significant errors.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Characteristics Of The Earth				
6.5.2. Explain how rocks are formed (e.g., melting, cooling, metamorphism, combinations of minerals)	Students explain an extensive variety of ways rocks form.	Students explain many different ways rocks form.	Students explain some different ways rocks form.	Students explain a limited variety of ways rocks form.
6.5.3. Describe the characteristics of the layers of the Earth (i.e., crust, mantle, core)	Students describe the characteristics of the layers of the Earth with accuracy.	Students describe the characteristics of the layers of the Earth with no significant errors.	Students describe the characteristics of the layers of the Earth with few significant errors.	Students describe the characteristics of the layers of the Earth with many significant errors.
The Solar System				
6.5.4. Identify the basic characteristics (e.g., composition, rings) of objects (e.g., planets, sun, small bodies) in the solar system	Students identify all of the significant details as well as subtleties of objects in the solar system.	Students identify most of the significant details of objects in the solar system.	Students identify some of the significant details of objects in the solar system.	Students identify few of the significant details of objects in the solar system.
Grade 7				
Weather, Seasons, And Climate				
7.5.1. Identify the factors (e.g., latitude, altitude, mountains, bodies of water) that affect the Earth's climate	Students identify all of the significant factors that affect the Earth's climate.	Students identity most of the significant factors that affect the Earth's climate.	Students identify some of the significant factors that affect the Earth's climate.	Students identify few of the significant factors that affect the Earth's climate.
7.5.2. Explain how seasons affect organisms (e.g., hibernation, photoperiodism, migration)	Students explain an extensive variety of ways that seasons affect organisms.	Students explain many different ways that seasons affect organisms.	Students explain some different ways that seasons affect organisms.	Students explain a limited variety of ways that seasons affect organisms.
Characteristics Of The Earth				
7.5.3. Identify the Earth's renewable and nonrenewable resources (e.g., solar, wind, fossil fuels, water, soil, metals)	Students identify an extensive variety of examples of Earth's renewable and nonrenewable resources.	Students identify many different examples of Earth's renewable and nonrenewable resources.	Students identify some different examples of Earth's renewable and nonrenewable resources.	Students identify a limited variety of examples of Earth's renewable and nonrenewable resources.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 8				
Weather, Seasons, And Climate				
8.5.1. Explain how factors (i.e., fronts, winds, air masses, air pressure, humidity, temperature, location) affect weather	Students explain how an extensive variety of factors that affect weather.	Students explain how many different factors that affect weather.	Students explain how some different factors that affect weather.	Students explain how a limited variety of factors that affect weather.
Geologic Processes				
8.5.2. Understand the rock cycle	Students explain all of the significant details of the rock cycle.	Students explain most of the significant details of the rock cycle.	Students explain some of the significant details of the rock cycle.	Students explain few of the significant details of the rock cycle.
8.5.3. Explain the water cycle	Students explain the water cycle with no errors.	Students explain the water cycle with no significant errors.	Students explain the water cycle with few significant errors.	Students explain the water cycle with many significant errors.
8.5.4. Explain how landforms are changed (e.g., crustal deformation, volcanic eruption, deposition, weathering, erosion)	Students explain, with no errors, how landforms are changed.	Students explain, with no significant errors, how landforms are changed.	Students explain, with few significant errors, how landforms are changed.	Students explain, with many significant errors, how landforms are changed.
8.5.5. Identify evidence for plate tectonics theory (e.g., fit of continents, location of earthquakes, volcanoes, mid-ocean ridge, plate boundaries)	Students identify an extensive variety of evidence for plate tectonics theory.	Students identify a variety of evidence for plate tectonics theory.	Students identify some different evidence for plate tectonics theory.	Students identify a limited variety of evidence for plate tectonics theory.
8.5.6. Identify a variety of methods (e.g., rock sequences, fossil correlation, radiometric dating) used to determine geologic time	Students identify an extensive variety of methods used to determine geologic time.	Students identify a variety of methods used to determine geologic time.	Students identify some different methods used to determine geologic time.	Students identify a limited variety of methods used to determine geologic time.
8.5.7. Explain the changes Earth has undergone over geologic time (e.g., fossil record, plate tectonics, climate change, glaciation)	Students explain all of the significant details of the changes Earth has undergone over geologic time.	Students explain most of the significant details of the changes Earth has undergone over geologic time.	Students explain some of the significant details of the changes Earth has undergone over geologic time.	Students explain few of the significant details of the changes Earth has undergone over geologic time.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Characteristics Of The Earth				
8.5.8. Explain how phenomena on Earth (i.e., day, year, seasons, lunar phases, eclipses, tides) are related to the position and motion of the Sun, Moon, and Earth	Students explain, with no errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.	Students explain, with no significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.	Students explain, with few significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon and Earth.	Students explain, with many significant errors, how phenomena on Earth are related to the position and motion of the Sun, Moon, and Earth.
The Universe				
8.5.9. Identify characteristics of stars (e.g., color, size, temperature, life cycle)	Students identify an extensive variety of characteristics of stars.	Students identify many different characteristics of stars.	Students identify some different characteristics of stars.	Students identify a limited variety of characteristics of stars.
8.5.10. Identify the composition (e.g., stars, galaxies) and scale of the universe	Students identify all of the significant details of the composition and scale of the universe.	Students identify most of the significant details of the composition and scale of the universe.	Students identify some of the significant details of the composition and scale of the universe.	Students identify few of the significant details of the composition and scale of the universe.
Grade 9-10				
The Universe				
9-10.5.1. Explain the relationship between the Big Bang Theory and the origin and evolution of the universe	Students provide an insightful explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide a reasonable explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide a superficial explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.	Students provide an unreasonable explanation of the relationship between the Big Bang Theory and the origin and evolution of the universe.
Earth's History				
9-10.5.2. Relate the changes in the Earth's atmosphere to the evolution of photosynthetic life forms	Students identify all of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify most of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify some of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.	Students identify few of the significant details relating the changes in the Earth's atmosphere to the evolution of photosynthetic life forms.

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Energy In The Earth System				
9-10.5.3. Explain how energy in the Earth system is governed by convection, conduction, and radiation (e.g., heat moves in the Earth's mantle by convection, conduction occurs along the mid-oceanic ridges, energy from the Sun reaches the Earth through radiation)	Students explain, with no errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with no significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with few significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.	Students explain, with many significant errors, how energy in the Earth system is governed by convection, conduction, and radiation.
Geologic Processes, Human Activities, And The Environment				
9-10.5.4. Identify the short-term and long-term effects of physical processes (e.g., plate tectonics, extreme weather phenomenon) on the environment and society	Students identify all of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify most of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify some of the significant details relating short and long term effects of physical processes on the environment and society.	Students identify few of the significant details relating short and long term effects of physical processes on the environment and society.
9-10.5.5. Analyze how evidence of past natural hazards and geologic events has predicted subsequent hazards and events (e.g. Gap time method to predict earthquakes and tsunamis)	Students provide insightful analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide reasonable analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide superficial analysis how evidence of past natural hazards and geologic events has predicted subsequent hazards and events.	Students provide unreasonable analysis how past evidence of past natural hazards and geologic events has predicted subsequent hazards and events.
9-10.5.6. Explain the effects of human activities (e.g., dams, levees, farming practices, deforestation, land-use practices, land-management strategies) on the environment	Students explain an extensive variety of effects of human activities on the environment.	Students explain a variety of effects of human activities on the environment.	Students explain some different effects of human activities on the environment.	Students explain few effects of human activities on the environment.
Grade 11-12				
The Universe				
11-12.5.1. Explain how the Sun and other stars are powered by nuclear reactions (e.g., the fusion of hydrogen to form helium, formation of elements)	Students explain how the Sun and other stars are powered by nuclear reactions with few, if any, errors.	Students explain how the Sun and other stars are powered by nuclear reactions with no significant errors.	Students explain how the Sun and other stars are powered by nuclear reactions with few significant errors	Students explain how the Sun and other stars are powered by nuclear reactions with many significant errors

Standard 5: Students understand the basic concepts and principles of earth and space science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Earth's History *No benchmark expectations at this level*				
Energy In The Earth System				
11-12.5.2. Explain how Earth systems are in dynamic equilibrium (e.g., cycling of energy and matter through the atmosphere, hydrosphere, and lithosphere)	Students explain all of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain most of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain some of the significant details that show how Earth systems are in dynamic equilibrium.	Students explain few of the significant details that show how Earth systems are in dynamic equilibrium.
Cycles In The Earth System *No benchmark expectations at this level*				
Geologic Processes, Human Activities, And The Environment				
11-12.5.3. Explain the short-term and long-term effects of chemical processes (e.g., acid rain, CO2 emissions, ozone depletion, run-off) on the environment and society	Students explain an extensive variety of short-term and long-term effects of chemical processes on the environment and society.	Students explain a variety of short-term and long-term effects of chemical processes on the environment and society.	Students explain some different short-term and long-term effects of chemical processes on the environment and society.	Students explain few short-term and long-term effects of chemical processes on the environment and society.

Standard 6: Science and Technology

Standard 6: Students understand relations between science and technology.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Forms Of Technology				
K.6.1. Identify natural objects that differ from those made by humans (e.g., rock-brick, sun-light bulb)	Students identify natural objects that differ from those made by humans with no errors.	Students identify natural objects that differ from those made by humans with no significant errors.	Students identify natural objects that differ from those made by humans with few significant errors.	Students identify natural objects that differ from those made by humans with many significant errors.
K.6.2. Identify tools (e.g., scissors, pencil, hammer) that can be helpful or harmful	Students identify, with no errors, tools that can be helpful or harmful.	Students identify, with no significant errors, tools that can be helpful or harmful.	Students identify, with few significant errors, tools that can be helpful or harmful.	Students identify, with many significant errors, tools that can be helpful or harmful.
Grade 1				
Forms Of Technology				
1.6.1. Identify tools/inventions (e.g., computer, car, cell phone) that impact the way we live	Students identify an extensive variety of tools/inventions that impact the way we live.	Students identify a variety of tools/inventions that impact the way we live.	Students identify some different tools/inventions that impact the way we live.	Students identify few tools/inventions that impact the way we live.
Technological Design				
1.6.2. Use several steps to complete a task (e.g., building blocks, art project, group investigation)	Students use several steps to complete a task with accuracy.	Students use several steps to complete a task with no significant errors.	Students use several steps to complete a task with few significant errors.	Students use several steps to complete a task with many significant errors.
Grade 2				
Forms Of Technology				
2.6.1. Identify tools (e.g., ruler, hand lens, thermometer, balance) that are used to observe, measure, and investigate things they could not otherwise see, measure and do	Students identify an extensive variety of tools that are used to observe, measure, and investigate things they could not otherwise see, measure, and do.	Students identify a variety of tools that are used to observe, measure, and investigate things they could not otherwise see, measure, and do.	Students identify some different tools that are used to observe, measure, and investigate things they could not otherwise see, measure, and do.	Students identify few tools that are used to observe, measure, and investigate things they could not otherwise see, measure, and do.

Standard 6: Students understand relations between science and technology.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
2.6.2. Explain how models (e.g., plastic animal figures, skeletal models) can be used to understand science	Students provide an insightful explanation how models can be used to understand science.	Students provide a reasonable explanation how models can be used to understand science.	Students provide a superficial explanation how models can be used to understand science.	Students provide an unreasonable explanation how models can be used to understand science.
Grade 3				
Forms of Technology *No benchmark expectations at this level* Technological Design				
3.6.1. Identify ways technology (e.g., zippers, Velcro, measuring instruments, computers) can be used to solve problems at home and school	Students identify an extensive variety of ways technology can be used to solve problems.	Students identify a variety of ways technology can be used to solve problems.	Students identify some different ways technology can be used to solve problems.	Students identify few ways technology can be used to solve problems.
Grade 4				
Technological Design				
4.6.1. Evaluate the effects of technology on people and the environment (e.g., new construction, oil drilling, electric cars)	Students give an insightful evaluation of the effects of technology on people and the environment.	Students give a reasonable evaluation of the effects of technology on people and the environment.	Students give a superficial evaluation of the effects of technology on people and the environment.	Students give an unreasonable evaluation of the effects of technology on people and the environment.
4.6.2. Explain how an invention may lead to other inventions	Students give an insightful explanation of how an invention may lead to other inventions.	Students give a reasonable explanation of how an invention may lead to other inventions.	Students give a superficial explanation of how an invention may lead to other inventions.	Students give an unreasonable explanation of how an invention may lead to other inventions.
Grade 5				
Technological Design				
5.6.1. Use technology to design a solution to a problem	Students use technology to design a creative solution to a problem.	Students use technology to design a reasonable solution to a problem.	Students use technology to design a superficial solution to a problem.	Students use technology to design an unreasonable solution to a problem.

Standard 6: Students understand relations between science and technology.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
5.6.2. Evaluate a product or design using established criteria	Students evaluate, with accuracy, a product or design using established criteria.	Students evaluate, with no significant errors, a product or design using established criteria.	Students evaluate, with few significant errors, a product or design using established criteria.	Students evaluate, with many significant errors, a product or design using established criteria.
Grade 6				
Technological Design				
6.6.1. Identify examples of how technologies have evolved	Students identify an extensive variety of examples of how technology has evolved.	Students identify many different examples of how technology has evolved.	Students identify some different examples of how technology has evolved.	Students identify few examples of how technology has evolved.
6.6.2. Design a product or solution to a problem given constraints (e.g., limits of time, costs, materials and environmental factors)	Students design a creative product or solution to a problem given constraints.	Students design a reasonable product or solution to a problem given constraints.	Students design a superficial product or solution to a problem given constraints.	Students design an unreasonable product or solution to a problem given constraints.
6.6.3. Explain the relationship between science and technology	Students explain, with no errors, the relationship between science and technology	Students explain, with no significant errors, the relationship between science and technology	Students explain, with few significant errors, the relationship between science and technology	Students explain, with many significant errors, the relationship between science and technology .
Grade 7				
Technological Design *No benchmark expectations at this level*				
Technology And Society				
7.6.1. Identify ways in which technology has influenced the course of history and improved the quality of life	Students identify an extensive variety of ways in which technology has influenced the course of history and improved the quality of life.	Students identify many different ways in which technology has influenced the course of history and improved the quality of life.	Students identify some different ways in which technology has influenced the course of history and improved the quality of life.	Students identify a limited variety of ways in which technology has influenced the course of history and improved the quality of life.
7.6.2. Identify technologies (e.g., communication, agriculture, information processing, transportation) that are influenced by societies	Students identify an extensive variety of technologies that are influenced by societies.	Students identify many different technologies that are influenced by societies.	Students identify some different technologies that are influenced by societies.	Students identify a limited variety of technologies that are influenced by societies.

Standard 6: Students understand relations between science and technology.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
7.6.3. Identify intended benefits and unintended consequences that result from the development and use of technologies	Students identify all of the significant details of the benefits and consequences resulting from technologies.	Students identify most of the significant details of the benefits and consequences resulting from technologies.	Students identify some of the significant details of the benefits and consequences resulting from technologies.	Students identify few of the significant details of the benefits and consequences resulting from technologies.
Grade 8				
Technology And Society *No benchmark expectations at this level*				
Grade 9-10				
Technological Design				
9-10.6.1. Use appropriate technologies and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills)	Students use an extensive variety of appropriate technologies and techniques to solve a problem.	Students use a variety of appropriate technologies and techniques to solve a problem.	Students use some different appropriate technologies and techniques to solve a problem.	Students use few appropriate technologies and techniques to solve a problem.
9-10.6.2. Explain how scientific principles have been used to create common technologies (e.g., household appliances, automotive parts, agricultural equipment, textiles, fabrics, computers, Internet resources, CD-ROMs)	Students explain how scientific principles have been used to create an extensive variety of common technologies.	Students explain how scientific principles have been used to create a variety of common technologies.	Students explain how scientific principles have been used to create some different common technologies.	Students explain how scientific principles have been used to create few common technologies.
Technology And Society				
9-10.6.3. Explain how emerging technologies (e.g., genetic manipulation, biofuels, and hydrogen fuels) may impact society and the environment	Students explain all of the significant details of how emerging technologies may impact society and the environment.	Students explain most of the significant details of how emerging technologies may impact society and the environment.	Students explain some of the significant details of how emerging technologies may impact society and the environment.	Students explain few of the significant details of how emerging technologies may impact society and the environment.

Standard 6: Students understand relations between science and technology.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 11-12				
Technological Design				
11-12.6.1 Select and use appropriate technologies, tools, and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills, CBL, graphing calculators)	Students select and use an extensive variety of appropriate technologies, tools, and techniques to solve a problem.	Students select and use a variety of appropriate technologies, tools, and techniques to solve a problem.	Students select and use some different appropriate technologies, tools, and techniques to solve a problem.	Students select and use very few appropriate technologies, tools, and techniques to solve a problem.
11-12.6.2 Identify examples of how new technologies advance science –	Students identify an extensive variety of examples of how new technologies have advanced science.	Students identify a variety of examples of how new technologies have advanced science.	Students identify some different examples of how new technologies have advanced science.	Students identify few examples of how new technologies have advanced science.
Technology And Society				
11-12.6.3 Explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment	Students provide all of the significant details that explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment.	Students provide most of the significant details that explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment.	Students provide some of the significant details that explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment.	Students provide few of the significant details that explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment.

Standard 7: Science and Other Areas

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
Science And Personal Health				
K.7.1. Identify safety rules for school and home	Students identify an extensive variety of safety rules for school and home.	Students identify a variety of safety rules for school and home.	Students identify some different safety rules for school and home.	Students identify few safety rules for school and home.
Grade 1				
Science And Personal Health				
1.7.1. Identify personal care practices (e.g., dental care, hand washing, exercise, nutrition) that contribute to a healthy life	Students identify an extensive variety of personal care practices that contribute to a healthy life.	Students identify many different personal care practices that contribute to a healthy life.	Students identify some different personal care practices that contribute to a healthy life.	Students identify few personal care practices that contribute to a healthy life.
Science And Environmental Issues				
1.7.2. Describe ways that humans influence their environment (e.g., littering, recycling, car pooling)	Students describe an extensive variety of ways that humans influence their environment.	Students describe a variety of ways that humans influence their environment.	Students describe some different ways that humans influence their environment.	Students describe few ways that humans influence their environment.
Grade 2				
Science And Personal Health				
2.7.1. Identify personal choices (e.g., personal hygiene, nutrition, fitness, safety) that contribute to individual wellness	Students identify an extensive variety of personal choices that contribute to individual wellness.	Students identify a variety of personal choices that contribute to individual wellness.	Students identify some different personal choices that contribute to individual wellness.	Students identify few personal choices that contribute to individual wellness.
2.7.2. Describe some things (e.g., UV Rays, second-hand smoke, pollution) from our environment that are harmful to people	Students describe an extensive variety of things from our environment that are harmful to people.	Students describe a variety of things from our environment that are harmful to people.	Students describe some different things from our environment that are harmful to people.	Students describe few things from our environment that are harmful to people.
Science And Environmental Issues *No benchmark expectations at this level.*				

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 3				
Science And Personal Health				
3.7.1. Identify ways to prevent the spread of germs.	Students identify an extensive variety of ways to prevent the spread of germs.	Students identify many different ways to prevent the spread of germs.	Students identify some different ways to prevent the spread of germs.	Students identify a limited variety of ways to prevent the spread of germs.
Science And Environmental Issues				
3.7.2. Identify the benefits of recycling, reusing, and reducing	Students identify an extensive variety of benefits of recycling, reusing, and reducing.	Students identify a variety of benefits of recycling, reusing, and reducing.	Students identify some of the benefits of recycling, reusing, and reducing.	Students identify few of the benefits of recycling, reusing, and reducing.
Science And Social Issues *No benchmark expectations at this level*				
Grade 4				
Science and Personal Health *No benchmark expectations at this level*				
Science And Environmental Issues				
4.7.1. Identify consequences of natural and human-induced environmental changes (e.g., erosion, tsunami, deforestation)	Students identify an extensive variety of consequences of natural and human-induced environmental changes.	Students identify many different consequences of natural and human-induced environmental changes.	Students identify some different consequences of natural and human-induced environmental changes.	Students identify few consequences of natural and human-induced environmental changes.
Science And Social Issues				
4.7.2. Identify ways in which science and technology have greatly improved human lives (e.g., food quality and quantity, transportation, health, sanitation, communication)	Students identify an extensive variety of ways in which science and technology have greatly improved human lives.	Students identify many different ways in which science and technology have greatly improved human lives.	Students identify some different ways in which science and technology have greatly improved human lives.	Students identify few ways in which science and technology have greatly improved human lives.

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 5				
Science And Personal Health				
5.7.1. Identify risks or benefits of personal health choices (e.g., tobacco, alcohol, prescription and illegal drugs, fast foods)	Students identify all of the significant risks or benefits of personal health choices.	Students identify most of the significant risks or benefits of personal health choices.	Students identify some of the significant risks or benefits of personal health choices.	Students identify few of the significant risks or benefits of personal health choices.
Science And Environmental Issues				
5.7.2. Explain ways humans benefit from Earth's resources (e.g., air, water, soil, food, fuel, building materials)	Students explain an extensive variety of ways humans benefit from Earth's resources.	Students explain many different ways humans benefit from Earth's resources.	Students explain some different ways humans benefit from Earth's resources.	Students explain few ways humans benefit from Earth's resources.
Science And Social Issues *No benchmark expectations at this level*				
Grade 6				
Science And Environmental Issues				
6.7.1. Explain how natural hazards affect populations, resources, and the environment (e.g., floods, storms, hurricanes, volcanoes, earthquakes)	Students explain all of the significant details of how natural hazards affect populations, resources, and the environment.	Students explain most of the significant details of how natural hazards affect populations, resources, and the environment.	Students explain some of the significant details of how natural hazards affect populations, resources, and the environment.	Students explain few of the significant details of how natural hazards affect populations, resources, and the environment.
6.7.2. Explain how recycling and conservation affect populations, resources, and the environment	Students explain all of the significant details of how recycling and conservation affect populations, resources, and the environment.	Students explain most of the significant details of how recycling and conservation affect populations, resources, and the environment.	Students explain some of the significant details of how recycling and conservation affect populations, resources, and the environment.	Students explain few of the significant details of how recycling and conservation affect populations, resources, and the environment.
Grade 7				
Science And Personal Health				
7.7.1. Explain how science affects personal health (e.g., injury prevention, immunization, organ transplant, medical scanning devices)	Students explain an extensive variety of ways in which science affects personal health.	Students explain many different ways in which science affects personal health.	Students explain some different ways in which science affects personal health.	Students explain a limited variety of ways in which science affects personal health.

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
7.7.2. Identify the factors (e.g., pollution, heredity, diet, virus, bacteria, parasite) that may result in disease.	Students identify an extensive variety of factors that may result in disease.	Students identify many different factors that may result in disease.	Students identify some different factors that may result in disease.	Students identify a limited variety of factors that may result in disease.
Science And Environmental Issues				
7.7.3. Explain how overpopulation affects organisms, resources, and environments (e.g., depletion of food resources, habitat availability, increased loss due to disease, parasites and predators	Students provide an insightful explanation of how overpopulation affects organisms, resources, and environments.	Students provide a reasonable explanation of how overpopulation affects organisms, resources, and environments.	Students provide a superficial explanation of how overpopulation affects organisms, resources, and environments.	Students provide an unreasonable explanation of how overpopulation affects organisms, resources, and environments.
Science And Social Issues				
7.7.4. Explain the impact of science on food technology (e.g., preservatives, packaging, genetically modified organisms)	Students provide an insightful explanation of the impact of science on food technology.	Students provide a reasonable explanation of the impact of science on food technology.	Students provide a superficial explanation of the impact of science on food technology.	Students provide an unreasonable explanation of the impact of science on food technology.
Grade 8				
Science And Social Issues				
8.7.1. Explain the interaction of science and technology with social issues (e.g., mining, natural disasters)	Students provide an insightful explanation of the interaction of science and technology with social issues.	Students provide a reasonable explanation of the interaction of science and technology with social issues.	Students provide superficial explanation of the interaction of science and technology with social issues.	Students provide an unreasonable explanation of the interaction of science and technology with social issues.
Grade 9-10				
Science And Personal Health				
9-10.7.1. Explain how personal health is related to fitness, substance abuse, sexual activity, and nutrition	Students explain all of the significant details of how personal health is related to fitness, substance abuse, sexual activity, and nutrition.	Students explain most of the significant details of how personal health is related to fitness, substance abuse, sexual activity, and nutrition.	Students explain some of the significant details of how personal health is related to fitness, substance abuse, sexual activity, and nutrition.	Students explain few of the significant details of how personal health is related to fitness, substance abuse, sexual activity, and nutrition.

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Science And Environmental Issues				
9-10.7.2. Identify factors that affect populations (e.g., food webs, carrying capacity, overpopulation, disease, food supply, algal blooms, resources, conservation practices)	Students identify all of the significant details relating factors that affect populations.	Students identify most of the significant details relating factors that affect populations.	Students identify some of the significant details relating factors that affect populations.	Students identify few of the significant details relating factors that affect populations.
Science And Social Issues *No benchmark expectations at this level*				
Grade 11-12				
Science And Personal Health *No benchmark expectations at this level*				
Science and Environmental Issues				
11-12.7.1. Explain the impact of environmental laws and policies on the environment and society (e.g., waste/pollutants from industry, carbon dioxide emissions, location and number of animals in a feedlot versus water supply)	Students explain the impact of an extensive variety of environmental laws and policies on the environment and society.	Students explain the impact of a variety of environmental laws and policies on the environment and society.	Students explain the impact of some different environmental laws and policies on the environment and society.	Students explain the impact of few environmental laws and policies on the environment and society.
11-12.7.2. Explain ways renewable and nonrenewable resources are managed (e.g., land reclamation, forest management, CRP, hunting licenses, energy –conserving technologies)	Students explain, with extensive significant detail, ways renewable and nonrenewable resources are managed.	Students explain, with t significant detail, ways renewable and nonrenewable resources are managed.	Students explain, with some significant detail, ways renewable and nonrenewable resources are managed.	Students explain, with little significant detail, ways renewable and nonrenewable resources are managed.

Standard 7: Students understand relations between science and personal, social, and environmental issues.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
11-12.7.3. Explain the economic and social impact of using alternative energy resources	Students provide an insightful explanation of the economic and social impact of using alternative energy resources.	Students provide a reasonable explanation of the economic and social impact of using alternative energy resources.	Students provide a superficial explanation of the economic and social impact of using alternative energy resources.	Students provide an unreasonable explanation of the economic and social impact of using alternative energy recourses.
Science And Social Issues				
11-12.7.4. Explain how science and technology can influence personal, industrial, and cultural decision-making (e.g., organ transplants, cloning, stem cell research, genetic manipulation, use of genetic profile, archeological discoveries, land management, resource management)	Students explain an extensive variety of ways science and technology can influence personal, industrial, and cultural decision-making.	Students explain a variety of ways science and technology can influence personal, industrial, and cultural decision-making.	Students explain some different ways science and technology can influence personal, industrial, and cultural decision-making.	Students explain few ways science and technology can influence personal, industrial, and cultural decision-making.

Standard 8: History and Nature of Science

Standard 8: Students understand the history and nature of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Kindergarten				
People In Science				
K.8.1. Explain why anyone can be a scientist	Students provide an insightful explanation why anyone can be a scientist.	Students provide a reasonable explanation why anyone can be a scientist.	Students provide a superficial explanation why anyone can be a scientist.	Students provide an unreasonable explanation why anyone can be a scientist.
Grade 1				
People In Science				
1.8.1. Identify ways (e.g., create things, ask questions, make observations, figure things out) that everybody can do science	Students identify an extensive variety of ways that everybody can do science.	Students identify a variety of ways that everybody can do science.	Students identify some different ways that everybody can do science.	Students identify few ways that everybody can do science.
Grade 2				
People In Science				
2.8.1. Identify ways scientists work together to solve problems (e.g., share results, teamwork, investigate)	Students identify an extensive variety of ways scientists work together to solve problems.	Students identify a variety of ways scientists work together to solve problems.	Students identify some different ways scientists work together to solve problems.	Students identify few ways scientists work together to solve problems.
Grade 3				
People In Science				
3.8.1. Identify ways people of all ages, genders, and backgrounds use science in their careers and in daily life (e.g., children check temperature conditions to decide what to wear, farmer uses genetic grains, hikers use GPS, depth-finder in boat, hearing-aides for disabilities)	Students identify an extensive variety of ways people of all ages, genders, and backgrounds use science in their careers and in daily life.	Students identify many different ways people of all ages, genders, and backgrounds use science in their careers and in daily life.	Students identify some different ways people of all ages, genders, and backgrounds use science in their careers and in daily life.	Students identify few ways people of all ages, genders, and backgrounds use science in their careers and in daily life.

Standard 8: Students understand the history and nature of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 4				
People In Science				
4.8.1. Identify a variety of careers in the field of science	Students identify an extensive variety of careers in the field of science.	Students identify many different careers in the field of science.	Students identify some different careers in the field of science.	Students identify few careers in the field of science.
Scientific Knowledge				
4.8.2. Identify scientific advances that changed popular beliefs (e.g., Earth was center of universe, world was flat, man was incapable of flight)	Students identify an extensive variety of scientific advances that changed popular beliefs.	Students identify many different scientific advances that changed popular beliefs.	Students identify some different scientific advances that changed popular beliefs.	Students identify a limited variety of scientific advances that changed popular beliefs.
Grade 5				
People In Science *No benchmark expectations at this level*				
Scientific Knowledge				
5.8.1. Explain why results of similar scientific investigations may turn out differently (i.e., inconsistencies in methods, materials, and observations)	Students provide an insightful explanation why results of similar scientific investigations may turn out differently.	Students provide a reasonable explanation why results of similar scientific investigations may turn out differently.	Students provide a superficial explanation why results of similar scientific investigations may turn out differently.	Students provide an unreasonable explanation why results of similar scientific investigations may turn out differently.
Grade 6				
People In Science				
6.8.1. Identify various settings in which scientists may work alone or in a team (e.g., industries, laboratories, field work)	Students identify an extensive variety of settings for scientific work.	Students identify many different settings for scientific work.	Students identify some different settings for scientific work.	Students identify a limited variety of settings for scientific work.

Standard 8: Students understand the history and nature of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Scientific Knowledge 6.8.2. Identify scientific advances that have resulted in new ideas and further-advance	Students identify an extensive variety of scientific advances that result in new ideas and further advances.	Students identify a variety of scientific advances that result in new ideas and further advances.	Students identify some different scientific advances that result in new ideas and further advances.	Students identify few scientific advances that result in new ideas and further advances.
Grade 7				
People In Science 7.8.1. Explain how science is influenced by human qualities (e.g., reasoning, insightfulness, creativity, life-long learning)	Students provide an insightful explanation of how science is influenced by human qualities.	Students provide a reasonable explanation of how science is influenced by human qualities.	Students provide a superficial explanation of how science is influenced by human qualities.	Students provide an unreasonable explanation of how science is influenced by human qualities.
Scientific Knowledge 7.8.2. Explain the importance of keeping clear and accurate records of scientific investigations (e.g., Darwin's research, DaVinci's notebooks, Galileo's notes, Goodall's observations)	Students provide an insightful explanation of the importance of keeping clear and accurate records.	Students provide a reasonable explanation of the importance of keeping clear and accurate records.	Students provide a superficial explanation of the importance of keeping clear and accurate records.	Students provide an unreasonable explanation of the importance of keeping clear and accurate records.
Grade 8				
People In Science *No benchmark expectations at this level* Scientific Knowledge 8.8.1. Explain how many people from various cultures have made important contributions to the advancement of science and technology	Students provide an insightful explanation of how many people from various cultures have made important contributions to the advancement of science and technology.	Students provide a reasonable explanation of how many people from various cultures have made important contributions to the advancement of science and technology.	Students provide a superficial explanation of how many people from various cultures have made important contributions to the advancement of science and technology.	Students provide an unreasonable explanation of how many people from various cultures have made important contributions to the advancement of science and technology.

Standard 8: Students understand the history and nature of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 9-10				
People In Science				
9-10.8.1. Identify the role of scientists in theoretical and applied science (e.g., careers, employment possibilities)	Students identify all of the significant details of the role of scientists in theoretical and applied science.	Students identify most of the significant details of the role of scientists in theoretical and applied science.	Students identify some of the significant details of the role of scientists in theoretical and applied science.	Students identify few of the significant details of the role of scientists in theoretical and applied science.
9-10.8.2. Identify the human characteristics that influence scientific advancement (e.g., intellectual honesty, openness, objectivity, curiosity, skepticism, ethical conduct, cooperation)	Students identify an extensive variety of human characteristics that influence scientific advancement.	Students identify a variety of human characteristics that influence scientific advancement.	Students identify some different human characteristics that influence scientific advancement.	Students identify few human characteristics that influence scientific advancement.
9-10.8.3. Explain how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity	Students provide an insightful explanation how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity.	Students provide an unreasonable explanation how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity.	Students provide a superficial explanation how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity.	Students provide an unreasonable explanation how individuals and groups, from different disciplines in and outside of science, contribute to science at different levels of complexity.
Scientific Knowledge				
9-10.8.4. Identify theories that have changed over time (e.g., alchemy, atomic structure, model of the solar system)	Students identify an extensive variety of theories that have changed over time.	Students identify a variety of theories that have changed over time.	Students identify some different theories that have changed over time.	Students identify few theories that have changed over time.
Science And Society				
9-10.8.5. Explain how views and attitudes have influenced the development of science (e.g., religion, previous knowledge, cultural tradition, superstition, folklore, legends)	Students provide an insightful explanation of views and attitudes that have influenced the development of science.	Students provide a reasonable explanation of views and attitudes that have influenced the development of science.	Students provide a superficial explanation of views and attitudes that have influenced the development of science.	Students provide an unreasonable explanation of views and attitudes that have influenced the development of science.

Standard 8: Students understand the history and nature of science.				
Benchmark Expectations	Proficiency Descriptor			
	Advanced Proficient	**Proficient**	**Partially Proficient**	**Novice**
Grade 11-12				
People In Science *No benchmark expectations at this level*				
Scientific Knowledge				
11-12.8.1. Identify the criteria that scientific explanations must meet to be considered valid (e.g., must be based on consistent and repeatable data, be consistent with experimental and observational evidence about nature, make accurate predictions about systems being studied, be logical, report methods and results, be open to question and reexamination, respect rules of evidence)	Students identify an extensive variety of criteria that scientific explanations must meet to be considered valid.	Students identify a variety of criteria that scientific explanations must meet to be considered valid.	Students identify some different criteria that scientific explanations must meet to be considered valid.	Students identify a limited variety of criteria that scientific explanations must meet to be considered valid.
Science And Society *No benchmark expectations at this level*				

Glossary

Applied science: the discipline dealing with the art or science of applying scientific knowledge to practical problems

Big Bang Theory: The Big Bang Theory is the dominant scientific theory about the origin of the universe. According to this theory, the universe was created some time between 10 billion and 20 billion years ago from a cosmic explosion that hurled matter in all directions.
(http://liftoff.msfc.nasa.gov/academy/universe/b_bang.html)

Biological evolution: change in the genetic makeup of a population of a species in successive generations. If continued long enough, it can lead to the formation of a new species. Note that populations – not individuals – evolve. (Miller, 2000)

CBL: Calculator-based laboratory

Change: the process of becoming different

Climate: the generally prevailing weather conditions of a region (temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds throughout the year) averaged over a series of years. (Webster's Encyclopedic Unabridged Dictionary of the English Language, 1989)

Constancy: remains the same, such as the speed of light.

Control: a standard against which other conditions can be compared in a scientific experiment.

CRP: The Conservation Reserve Program is a voluntary program for agricultural landowners. Through CRP, agricultural landowners can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. (http://www.fsa.usda.gov/dafp/cepd/crp.htm)

Culture: the totality of manners, customs, and values of a given society, inclusive of its socioeconomic system, political structure, science, religion, education, art, and entertainment.

Cycles: a course or series of events or operations that recur regularly and usually lead back to the starting point.

Dependent variable: a variable in a scientific investigation whose value depends in the independent variable.

Dimensional analysis: a method for comparing the dimensions of the physical quantities occurring in a problem to find relationships between the quantities without having to solve the problem completely. *Random House Unabridged Dictionary,* Copyright © 1997, by Random House, Inc., at www.infoplease.com.

Dynamic equilibrium: a dynamic equilibrium will form if, at a given temperature, two reversible processes occur at the same rate. (http://www.answers.com/dynamic%20equilibrium)
e.g.: for example; for instance.

Electromagnetic wave (also called electric wave): a wave produced by the acceleration of an electric charge and propagated by the periodic variation of intensities of, usually, perpendicular electric and magnetic fields. *Random House Unabridged Dictionary,* Copyright © 1997, by Random House, Inc., at www.infoplease.com.

Equilibrium: A condition in which all acting influences are canceled by others, resulting in a stable, balanced, or unchanging system.

Evolution: series of changes that account for the present form and function of objects, organisms, and systems. (Commonly refers to biological evolution; also describes changes in the universe. See biological evolution.)

Experiment: the act of conducting a controlled test or investigation.

Extrapolate: to infer (an unknown) from something that is known; conjecture; to estimate (the value of a variable) outside the tabulated or observed range (statistics); to estimate a function that is known over a range of values of its independent variable to values outside the known range (math). *Random House Unabridged Dictionary,* Copyright © 1997, by Random House, Inc., at www.infoplease.com.

Fact: in science, an observation that has been repeatedly confirmed. (National Academy of Sciences, 1998).

Form and Function: Complimentary aspects of objects, organisms and systems in the natural and design world. The form or shape of an object of system is frequently related to use, operation, or function.

Fossil correlation (Also known as correlation by fossils)**:** matching rock units of similar age on a large scale by using index (or guide) fossils, which are fossils that were widespread geographically and lived only a short time. Allows widely separated rocks of different composition to be correlated. Overlapping time ranges of several sets of index fossils are typically used. (http://www.geo.ua.edu/intro03.html)

Fossil record: the history of life as recorded by fossils in rocks.

Genetic grains (also referred to as genetically modified grains): A genetically modified food is a food product containing some quantity of genetically modified organism (GMO) as an ingredient. (http://www.answers.com/topic/genetically-modified-food?gwp=19)

Genetic manipulation (Also called genetic engineering)**:** the use of various methods to manipulate the DNA (genetic material) of cells to change hereditary traits or produce biological products. (http:www.answers.com/genertic%20manipulation)

Genetically modified organism (GMO)**:** a genetically altered plant or animal.

Guided investigation: A structured type of teaching that develops students' abilities to inquire (National Research Council, 2000)

Hypothesis: A testable statement about the natural world that can be used to build more complex inferences and explanations (National Academy of Sciences, 1998)

i.e.: all inclusive; these and no others; namely

Independent variable: A variable whose value is specified first and determines the value of one or more other values in a scientific investigation

Inquiry: Asking simple questions, completing investigations, answering questions, and presenting results to others. (National Research Council, 2000)

Inquiry-based: an approach to instruction in which students ask researchable questions, formulate testable hypotheses, design and perform appropriate experiments, collect and analyze data to form conclusions, and present results in appropriate ways; investigations that involve asking and answering a question and comparing the answer with what scientists already know about the world.

Investigation: the work of inquiring into something thoroughly and systematically

Model: tentative schemes or structures that correspond to real objects, concepts, events, or classes of events and have explanatory power. Models help scientists and engineers understand how things work.

Nature of science: questioning and investigating (using the processes of science) with appropriate scientific attitudes, which results in scientific information (the products of science). The nature of science refers to what educators call the three aspects of science: scientific processes, scientific products, scientific attitudes (Carin, 1993; Gega, 1994)

Photoperiodism: a response of organisms to the length of day or night.

Plate tectonics theory: the theory that the Earth's surface is divided into moving plates.

Property: Something about an object, such as size, shape, color, or smell that you can observe with one or more of your senses.

Radiometric dating: using measurement of natural radioactive decay as a "clock" to date materials.

Science as inquiry: Inquiry is a multifaceted activity which includes asking questions, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments

Science: 1) a process which attempts to understand the order in nature and which uses that knowledge to make predictions about what might happen in nature; 2) knowledge resulting from scientific investigations.

Scientific attitudes: a way of thinking a person has, a frame of mind which incorporates certain intellectual and emotional attitudes. These attitudes are characterized by such attributes as curiosity, inventiveness, openness to new or differing ideas, objectivity, having a willingness to suspend judgment until enough facts are known, having a positive approach to failure, being skeptical (insisting on sufficient evidence before making judgments or conclusions) and being responsible in science decisions. However, all scientists do not necessarily exhibit this ideal (Brauner, 1994; Gauld, 1982). Also referred to as "scientific habits of mind" (e.g., intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas).

Scientific literacy: the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity.

Scientific processes: the mental and physical processes, the thinking and doing processes, which encompass the following: classifying data, identifying problems, manipulating science materials, observing, questioning, hypothesizing, gathering information, analyzing data, recording information, communicating thoughts/results, creating models, identifying variables, evaluating information, interpreting data, measuring, replicating experiments, making decisions, and generalizing science information (Brauner, 1994).

Seismic gap: the part of an active fault that has experienced little or no seismic activity for a long period, indicating the buildup of stresses that are useful in predicting earthquakes. *Random House Unabridged Dictionary,* Copyright © 1997, by Random House, Inc., at www.infoplease.com.

Small bodies: satellites, comets, meteors, and asteroids

System: An organized group of related objects or components that form a whole. For example, systems can consist of organisms, machines, fundamental particles, galaxies, ideas, numbers, transportation, and education. Systems have boundaries, components, resources flow (input and output), and feedback.

Technology: The application of science to solve practical problems, doing something more efficiently, or improving the quality of life.

Theoretical science: science that is concerned with theories rather than practical applications; theoretical physics. (http://www.answers.com/main/ntquery?method=4&dsid=502&deid=748333769&gwp=8&curtab=502_1&linktext=Meaning%20%232)

Theory (scientific theory): in science, a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses. [Differentiated from the popular definition of theory of a "guess" or "hunch"] "Cell theory says that all living things are composed of cells. The heliocentric theory says that the earth revolves around the sun rather than vice versa. Such concepts are supported by such abundant observational and experimental evidence that they are no longer questioned in science" (National Academy of Sciences, 1998).

Trophic pyramid: Organizational chart which shows the transfer of energy up the food chain

Weather: the state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. (Webster's Encyclopedic Unabridged Dictionary of the English Language, 1989

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