



UNDERSTANDING THE
ALTERNATE ELIGIBLE CONTENT
IN SCIENCE

2015

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Introduction

In an attempt to increase access to the general education curriculum for all students in the state of Pennsylvania, the *PASA-Science Project Team* along with special education teachers, general education teachers, science teachers, university faculty and other community members across the state engaged in a collaborative effort to revise the alternate eligible content for science.

Students receiving instruction guided by these Alternate Eligible Content represent approximately 1% of the total student population across the state of Pennsylvania and are assessed using the Pennsylvania Alternate System of Assessment (PASA).

While the Alternate Eligible Content do not replace the academic content standards in science, they do serve as guidelines for teachers as they plan academic content instruction for students with significant cognitive disabilities. These content standards do not specify the accommodations that may be necessary for the unique learning needs of this student population and do not preclude the instruction of non-academic skills (life skills). They are meant to help teachers plan instruction that is aligned to the state academic standards and complement the teaching of functional life skills.

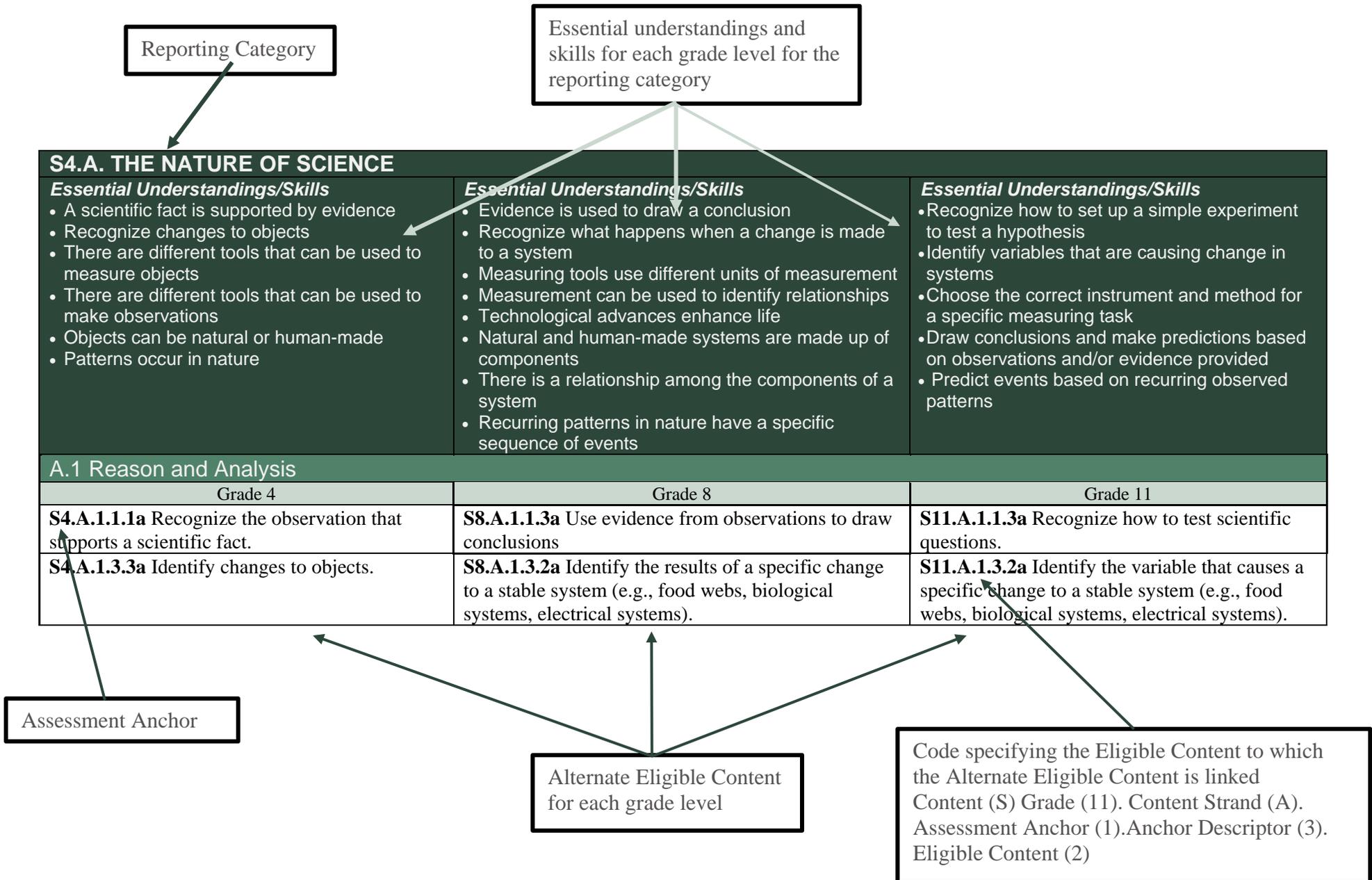
Guide to Reading Alternate Eligible Content Tables

The *Reporting Category* is the first level of organization for the collection of assessment anchors and associated eligible content related to the academic standards in science. There are four reporting categories in science:

1. The Nature of Science
2. Biological Sciences
3. Physical Sciences
4. Earth and Space Sciences

Each reporting category has a set of 3 *Assessment Anchors* which further subdivides the larger category. In addition, all assessment anchors have a set of *Anchor Descriptors* which are general statements about what students should know and be able to do related to the reporting categories and assessment anchors after instruction. For each anchor descriptor, several *Eligible Content* statements provide a more detailed description of specific skills and knowledge that, when achieved, allow students to demonstrate proficiency on the state's academic standards in science.

The *Alternate Eligible Content* is a reduction in breadth, depth, and level of complexity of the eligible content such that it is appropriate for the students with the most severe cognitive disabilities while still ensuring access to the general education curriculum. Thus, not all assessment anchors and anchor descriptors have associated Alternate Eligible Content.



Cross-Grade Level Progression

Generally, within each reporting category across grade levels, Alternate Eligible Content is developed in a specific sequence:

1. introduce basic scientific knowledge or vocabulary or a basic skill or principle,
2. build a deeper understanding of the scientific knowledge, vocabulary, or principle by requiring the application of the acquired skill or knowledge to solve a simple 1- or 2-step problem, then
3. develop a more sophisticated understanding of the scientific knowledge, vocabulary, or principle by requiring the interpretation of data to draw a conclusion.

This is not to say that students in grades 4 or 8 should not be asked to interpret information or draw conclusions or that students in grade 4 should not be asked to apply knowledge and skills they have learned. However, they should be asked to perform these skills within the level that is consistent with the knowledge and skills being taught in order to demonstrate their understanding.

The Biological, Physical, and Earth and Space Sciences reporting categories focus on content in their respective domains while The Nature of Science focuses on skills used in the scientific inquiry process. The skills and principles learned in the 3 content focus areas necessarily will be used to illustrate principles for The Nature of Science reporting category. In most cases, this ‘overlap’ is noted in parentheses as examples to clarify the scope of the Alternate Eligible Content.

The tables which follow outline the alterative eligible content across grade levels. Essential understandings are located by grade level under each reporting category. These essential understandings and skills are derived from the *PA Academic Content Standards* as well as conversations with science content specialists. Showing grade levels side-by-side highlight the progression of development from least complex to more sophisticated understandings and skills across the grade levels.

Following the side-by-side trajectory is the Alternate Eligible Content, by grade level, aligned with the Eligible Content.

A. THE NATURE OF SCIENCE

Essential Understandings/Skills

- A scientific fact is supported by evidence
- Recognize changes to objects
- There are different tools that can be used to measure objects
- There are different tools that can be used to make observations
- Objects can be natural or human-made
- Patterns occur in nature

Essential Understandings/Skills

- Evidence is used to draw a conclusion
- Recognize what happens when a change is made to a system
- Measuring tools use different units of measurement
- Measurement can be used to identify relationships
- Natural and human-made systems are made up of components
- There is a relationship among the components of a system
- Recurring patterns in nature have a specific sequence of events
- Technological advances enhance life

Essential Understandings/Skills

- Recognize how to set up a simple experiment to test a hypothesis
- Identify variables that are causing change in systems
- Choose the correct instrument and method for a specific measuring task
- Draw conclusions and make predictions based on observations and/or evidence provided
- Predict events based on recurring observed patterns

A.1 Reason and Analysis

Grade 4	Grade 8	Grade 11
S4.A.1.1.2a Identify common technologies that benefit society		
S4.A.1.3.1a Identify changes to objects and living things.	S8.A.1.3.2a Identify the results of a specific change to a stable system (e.g., food webs, biological systems, electrical systems)	S11.A.1.3.2a Identify the variable that causes a specific change to a stable system (e.g., human body, food webs)

A.2 Processes, Procedures and Tools of Scientific Investigations

Grade 4	Grade 8	Grade 11
S4.A.2.1.4a Recognize the observation that supports a scientific fact	S8.A.2.1.1a Use observations (limited to duration, weight, volume, distance, or temperature) to identify relationships (e.g., bigger/smaller, faster/slower, higher/lower)	S11.A.1.1a Identify the experimental design that tests a specific scientific question S11A2.1.3a Interpret graphs or charts to make inferences or predictions or to draw conclusions (limited to line graph, bar graph, pie chart and tables)

<p>S4.A.2.2.1a Select appropriate tools to perform basic measurement tasks (limited to length, weight, volume, and temperature)</p> <p>S4.A.2.2.1b Select appropriate tools for making observations (limited to hand lens, binoculars, microscope, and telescope)</p>	<p>S8.A.2.2.1a Identify the appropriate instrument and unit of measure to accurately record time, weight, distance, volume, or temperature</p>	<p>S11.A.2.2.1a Choose the appropriate method, instrument, and scale for precise quantitative or qualitative observations</p> <p>S11.A.2.2.2a Identify how a specific technology extends human abilities and enhances precision (limited to GPS, x-ray, microscope, telescope)</p>
	<p>S8.A.2.2.3a Identify ways a specific technology enhances human abilities or senses (e.g., computer, microwave)</p>	
A.3 Systems, Models, and Patterns		
Grade 4	Grade 8	Grade 11
<p>S4.A.3.1.1a Identify whether a system is natural or human-made (e.g., plants vs. electrical systems)</p>	<p>S8.A.3.1.5a Identify the components of a simple human-made system based on function (e.g., electrical system, transportation system)</p> <p>S8.A.3.1.5b Identify how the components or processes of natural systems affect one another (e.g., water cycle, weather systems, organ systems)</p>	<p>S11A3.1.2a Predict the results of a specific change to one part of a system on the system as a whole (e.g., organ systems, ecosystems, electrical systems)</p>
<p>S4.A.3.3.1a Identify patterns, cycles or trends seen in nature (e.g., seasonal, day/night, life cycles)</p>	<p>S8.A.3.3.2a Sequence recurring patterns, cycles or trends found in nature (e.g., water cycle, lunar phases, organ systems)</p>	<p>S11.A.3.3.3a Use observations about recurring patterns, cycles or trends in nature to make predictions or draw conclusions (e.g., solar system, weather systems, organ systems)</p>

B. BIOLOGICAL SCIENCES

Essential Understandings/Skills

- Living things have basic needs to survive
- Living things have specific characteristics and those characteristics have specific functions
- Living things have a life cycle
- Living things live in specific ecosystems
- Ecosystems have living and non-living components
- Seasons affect the daily life of plants, animals, and humans
- Human activities impact the environment – pollution only

Essential Understandings/Skills

- The characteristic structures of plants and animals allow classification
- Organs and organ systems function to provide basic needs
- Plants and animals have characteristics and behaviors that impact survival in their biomes
- Living things have a role in their local ecosystem
- Plant and animal parents and their offspring have many similar characteristics
- Human activities impact the environment in various ways

Essential Understandings/Skills

- Different plants and animals have different structures that perform the same function
- Sequence the flow through organ systems
- Living and non-living things within an ecosystem interact in specific ways
- There are similarities and differences among living things across ecosystems
- Plant and animal parents transmit characteristics to their offspring
- Natural disasters impact ecosystems in various ways

B.1 Structure and Function of Organisms

Grade 4	Grade 8	Grade 11
<p>S4.B.1.1.3a Identify basic needs of plants or animals (limited to air, water, nutrients, sun, and shelter)</p> <p>S4.B.1.1.4a Identify how parts of plants or animals work together to meet basic needs (e.g., roots and leaves or appendages and coverings)</p> <p>S4.B.1.1.5a Recognize the stages of development of an organism (limited to butterfly, ladybug, frog, grasshopper, and seed-producing plant)</p>	<p>S8.B.1.1.3a Categorize plants or animals based on characteristic structures (e.g., seeds, leaves, fruits or mammals, invertebrates, birds)</p>	<p>S11.B.1.1.2a Compare how different animals use different structures for the same or similar functions</p>

B.2 Continuity of Life

Grade 4	Grade 8	Grade 11
<p>S4.B.2.1.1a Identify plants or animals that live in different environments (limited to grasslands, tundra, desert, aquatic, forest, and rainforest)</p>	<p>S8.B.2.1.1a Identify structures or behaviors that enable plants or animals to survive in their environment (e.g., size of plant, leaf shape or appendages, coverings, nocturnal behavior)</p>	

B.3 Ecological Behavior and Systems

Grade 4	Grade 8	Grade 11
<p>S4.B.3.1.1a Categorize the parts of an ecosystem as either living or non-living (e.g., forest, city, park)</p>	<p>S8.B.3.1.1a Sequence the flow of energy through a food chain or a food web</p> <p>S8.B.3.1.2a Recognize the association between different environments and their characteristics (e.g., climate, precipitation, vegetation)</p> <p>S8.B.3.1.3a Identify the role of different organisms in an ecosystem (limited to producers, consumers, predator, and prey)</p>	<p>S11.B.3.1.3a Identify the interactions among living components of an ecosystem (limited to competition, predation, and mutualism)</p> <p>S11.B.3.1.4a Compare the similarities and differences in the Earth’s major biomes (e.g., tropical rain forest vs. tundra, tundra vs. desert)</p> <p>S11B3.1.4b Identify the similarities and differences in animals or plants that inhabit the major biomes (e.g., tropical rain forest, tundra, desert)</p>
<p>S4.B.3.2.3a Identify how seasons affect trees or animals (e.g., temperature, migration, hibernation)</p>	<p>S8.B.3.2.1a Recognize the impact that humans have on habitats and the animals or plants living there (e.g., deforestation and deer habitats)</p>	<p>S11.B.3.2.3a Recognize the result of catastrophic events on habitats and the animals or plants living there (e.g., forest fire, volcanic eruption, tornado)</p>
<p>S4.B.3.3.5a Identify the impact of one type of pollution on a community.</p>	<p>S8.B.3.3.3a Identify ways to reduce pollution through waste management (e.g., recycling, composting)</p>	

C. PHYSICAL SCIENCES

Essential Understandings/Skills

- There are different states of matter
- Everyday objects have properties that can be used to describe them

- Objects occupy a position relative to one another
- Weight and slope impact the amount of force needed to move an object

Essential Understandings/Skills

- Different substances have different characteristic properties
- Energy sources are renewable and non-renewable

- Forces have magnitude and direction

Essential Understandings/Skills

- Characteristic properties can be used to identify substances
- Renewable and non-renewable energy sources have impacts on the environment

- Forces have magnitude and direction and control the motion of objects
- Speed is determined by the distance an object travels in a specified amount of time

C.1 Structure, Properties, and Interactions of Matter and Energy

Grade 4	Grade 8	Grade 11
<p>S4.C.1.1.1a Identify solid or liquid states of matter</p> <p>S4.C.1.1.2a Compare objects by shape, size, weight, or texture</p>	<p>S8.C.1.1.2a Use physical observations or measurements to compare density or phase changes of substances (limited to sinking/floating or freezing, melting or boiling points)</p>	<p>S11.C.1.1.1a Recognize that matter is made of particles</p>

C.2 Forms, Sources, Conversion, and Transfer of Energy

Grade 4	Grade 8	Grade 11
	<p>S8.C.2.2.3a Identify energy sources as either renewable (limited to wind, solar, and hydroelectric) or non-renewable (limited to coal, oil, and natural gas)</p>	<p>S11.C.2.2.3a Identify the impact of using renewable or non-renewable energy sources on the environment (e.g., impact of solar power, coal)</p>

C.3 Principles of Motion and Force

Grade 4	Grade 8	Grade 11
<p>S4.C.3.1.1a Identify the relationship between force and motion (limited to push and pull)</p> <p>S4.C.3.1.3a Identify the position of an object relative to another object (limited to in front of, behind, above, below, to the right, and to the left)</p>	<p>S8.C.3.1.1a Compare the impact of one or more forces acting on an object (limited to friction, gravity, balanced, and unbalanced)</p>	<p>S11.C.3.1.1a Identify the outcome in a common, real-world situation based on an understanding of forces (limited to push, pull, friction, and gravity)</p> <p>S11.C.3.1.3a Determine the relative speed, distance, or time an object travels</p>

D. EARTH AND SPACE SCIENCES

Essential Understandings/Skills

- The Earth's surface has many different types of features
- Some products we use are made from plants and animals
- Some products we use can be recycled
- Water undergoes phase changes
- Weather conditions vary from day to day
- Weather is measured with special instruments

Essential Understandings/Skills

- There are natural processes that change the Earth's surface
- The products we use are made from renewable, non-renewable, and reusable resources
- Water undergoes phase changes as it moves through the water cycle
- Read weather maps to make predictions about future events at the local or regional level

Essential Understandings/Skills

- The natural processes that change Earth's surface result in changes to its features
- Human-made processes have an impact on the Earth's resources
- Interpret data to make predictions about future weather events at the national or global level

D.1 Earth Features and Processes that Change Earth and its Resources

Grade 4	Grade 8	Grade 11
S4.D.1.1.1a Identify prominent Earth features (limited to mountains, valleys, beaches, oceans, lakes, and rivers)	S8.D.1.1.2a Identify natural processes that change the Earth's surface (e.g., landslides, earthquakes, weathering)	S11.D.1.1.3a Recognize the relationship between natural processes and the resulting changes to the Earth's surface (e.g., volcanic eruptions and mountain building, erosion and coastline changes)
S4.D.1.2.1a Identify food or clothing products that come from plants or animals S4.D.1.2.2a Identify products that can be recycled or reused (e.g., paper, plastic, cans, fabrics, lumber)	S8.D.1.2.1a Identify products that are made from different renewable or non-renewable sources (e.g., lumber from trees, cans from metal, gasoline from oil)	S11.D.1.2.2a Identify the impact of human-made processes on the Earth's resources (e.g., manufacturing and pollution)
	S8.D.1.3.1a Recognize processes in the water cycle (limited to evaporation, condensation, precipitation, transpiration, runoff, and infiltration)	

D.2 Weather, Climate, and Atmospheric Processes

Grade 4	Grade 8	Grade 11
S4.D.2.1.2a Identify weather conditions using symbols or pictures (limited to temperature, types of precipitation, visibility, and sunlight) S4.D.2.1.3a Select the appropriate tool to measure the weather (limited to temperature, wind direction, and precipitation)	S8.D.2.1.3a Identify how wind direction or cloud types (limited to cumulus, cirrus, stratus, nimbostratus, cumulonimbus) are associated with weather patterns	S11.D.2.1.4a Interpret weather data and predict weather events (e.g., temperature, wind direction, precipitation)