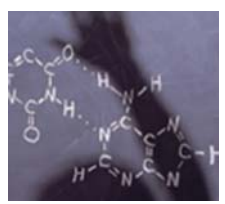
lead4ward

Grade 4 Science

STAAR Field Guide





STAAR

The State of Texas of Assessment of Academic Readiness (STAAR) is based on the Texas Essential Knowledge and Skills (TEKS). Most of the state standards, if they are eligible for assessment in a multiple choice/short answer format, will be assessed on STAAR.

STAAR is designed as a vertical system. Just as the TEKS are structured in a vertically aligned manner, so is STAAR. Learning from one grade level is aligned with learning at the next grade level. Some skills are developed over the course of a student's educational career from kindergarten through high school, while other skills and learning may begin at a particular grade level and serve as the foundation for later learning. STAAR is an assessment of academic readiness. In other words, we can sum up the variation between the current assessment program (TAKS) and STAAR by reframing the questions we are asking.

TAKS: TAKS was designed to help teachers answer this question:

- Did students learn what they were supposed to learn in the current year's grade?

STAAR: STAAR is designed to ensure that teachers answer these questions:

- Did students learn what they were supposed to learn in the current year's grade?
- Are students ready for the next grade?
- And are they also ready for the grade after that?

So what's the big deal about that shift? Fundamentally, it requires that teachers relook at curriculum and instruction in a very different way than they have under previous assessment systems (TABS, TEAMS, TAAS, TAKS). Not only are teachers required to have a deep understanding of the content of the grade level they are teaching, but they must also be firmly grounded in how the content of that current grade level prepares students for subsequent grade levels. Overemphasis on grade level attainment ONLY may create a context where teachers in subsequent grade levels have to reteach foundational skills to accommodate for the gap created by the lack of appropriate emphasis earlier. It may require students "unlearn" previous ways of conceptualizing content and essentially start all over.

STAAR: focus, clarity, depth

[The TEKS] are designed to prepare students to succeed in college, in careers and to compete globally. However, consistent with a growing national consensus regarding the need to provide a more clearly articulated K–16 education program that focuses on fewer skills and addresses those skills in a deeper manner (TEA).

STAAR is designed around three concepts: focus, clarity, and depth:

Focus: STAAR will focus on grade level standards that are critical for that grade level and the ones to follow.

Clarity: STAAR will assess the eligible TEKS at a level of specificity that allow students to demonstrate mastery.

Depth: STAAR will assess the eligible TEKS at a higher cognitive level and in novel contexts.

STAAR: the assessed curriculum – readiness, supporting, and process standards

A key concept that underpins the design of STAAR is that all standards (TEKS) do not play the same role in student learning. Simply stated, some standards (TEKS) have greater priority than others – they are so vital to the current grade level or content area that they must be learned to a level of mastery to ensure readiness (success) in the next grade levels. Other standards are important in helping to support learning, to maintain a previously learned standard, or to prepare students for a more complex standard taught at a later grade.

By assessing the TEKS that are most critical to the content area in a more rigorous ways, STAAR will better measure the academic performance of students as they progress from elementary to middle to high school. Based on educator committee recommendations, for each grade level or course, TEA has identified a set of readiness standards - the TEKS which help students develop deep and enduring understanding of the concepts in each content area. The remaining knowledge and skills are considered supporting standards and will be assessed less frequently, but still play a very important role in learning.

Readiness standards have the following characteristics:

- They are essential for success in the current grade or course.
- They are important for preparedness for the next grade or course.
- They support college and career readiness.
- They necessitate in-depth instruction.
- They address broad and deep ideas.

Supporting standards have the following characteristics:

- Although introduced in the current grade or course, they may be emphasized in a subsequent year.
- Although reinforced in the current grade or course, they may be emphasized in a previous year.
- They play a role in preparing students for the next grade or course but not a central role.
- They address more narrowly defined ideas.

STAAR assesses the eligible TEKS at the level at which the TEKS were written.

STAAR is a more rigorous assessment than TAKS (and TAAS, TEAMS, TABS before that). The level of rigor is connected with the cognitive level identified in the TEKS themselves. Simply stated, STAAR will measure the eligible TEKS at the level at which they are written.

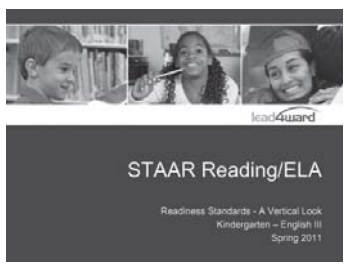
The rigor of items will be increased by
- assessing content and skills at a greater depth and higher level of cognitive complexity
- assessing more than one student expectation in a test item

The rigor of the tests will be increased by
- assessing fewer, yet more focused student expectations and assessing them multiple times and in more complex ways
- including a greater number of rigorous items on the test, thereby increasing the overall test difficulty

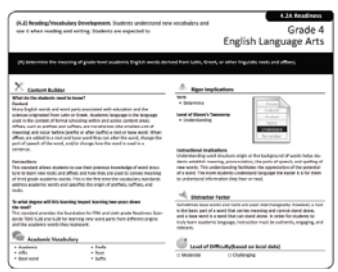
About the STAAR Field Guide

The STAAR Field Guide for Teachers is designed as a tool to help teachers prepare for instruction. The tools and resources in this guide are designed to supplement local curriculum documents by helping teachers understand how the design and components of STAAR are connected to the scope and sequence of instruction. In order to help students attain even higher levels of learning as assessed on STAAR, teachers need to plan for increasing levels of rigor. This guide contains the following components:

STAAR Grade Level Snapshot – one page overview of the standards assessed on STAAR, how those standards are classified (readiness, supporting, or process), the reporting categories around which those standards are clustered, and the number of items that will be on the test from each reporting category and from each type of standard.



STAAR Readiness Standards: A Vertical Look – a vertical look at the readiness standards in grade bands to show the progression of the assessment between grade levels



STAAR Readiness and Supporting Standards Analysis Sheets– overviews of the nature of each readiness and supporting standard assessed on STAAR, designed to be used in planning to build teacher content knowledge and ensure that current grade level instruction reinforces previous learning and prepares students for future grade levels.

STAAR-Curriculum Planning Worksheet – a tool to organize the pages in this guide to be used in planning and professional development

Steps to Success

1. Download the TEA Documents to add to your STAAR Teacher Field Guide
   - STAAR Blueprint
   - Assessed Curriculum Documents
   - STAAR Test Design
   - STAAR Reference Materials

2. Review the STAAR Snapshot for your course/grade level and content area
   - Note the readiness standards
   - With your team, explore why those TEKS are classified as readiness standards – which criteria do they meet
   - Review the supporting standards and note any that may have played a larger role on TAKS

3. Review the STAAR Readiness Standards: A Vertical Look
   - Discuss how the readiness standards connect between grade levels
   - Explore the specific differences between the aligned readiness standards at each grade level

4. Review the components of the STAAR Readiness and Supporting Standards Analysis Sheets
   - Use the samples on pages 6 and 7 to explore the analysis sheets
   - Add additional information based on the discussion on the team

5. Create STAAR-Curriculum Planning Packets for each unit or grading period
   - Collect either the Scope and Sequence document (if it includes the TEKS standards for each unit of instruction) OR Unit Plan documents (where the TEKS standards are bundled together into units of instruction)
   - The STAAR Field Guide is arranged by standard type (readiness or supporting) in numeric order of the standards. You may need to photocopy certain pages/standards if they are repeated throughout multiple units.
   - Use the scope and sequence or unit plan documents to identify the TEKS taught in each unit/grading period
   - Compile the STAAR Readiness and Supporting Standards Analysis Sheets that correspond to the TEKS each unit/grading period
   - After the pages/standards are sorted into their appropriate unit, create a method of organizing the documents (binder, folder, file, etc).

6. Plan for instruction
   - Collect the curriculum documents used for planning
   - Use the STAAR- Curriculum Planning Worksheet as you plan each unit. The worksheet provides guiding questions and reflection opportunities to aide you in maximizing the material in the STAAR Field Guide.
   - Determine where the team needs additional learning
   - Evaluate instructional materials
   - Review the plan for appropriate levels of rigor

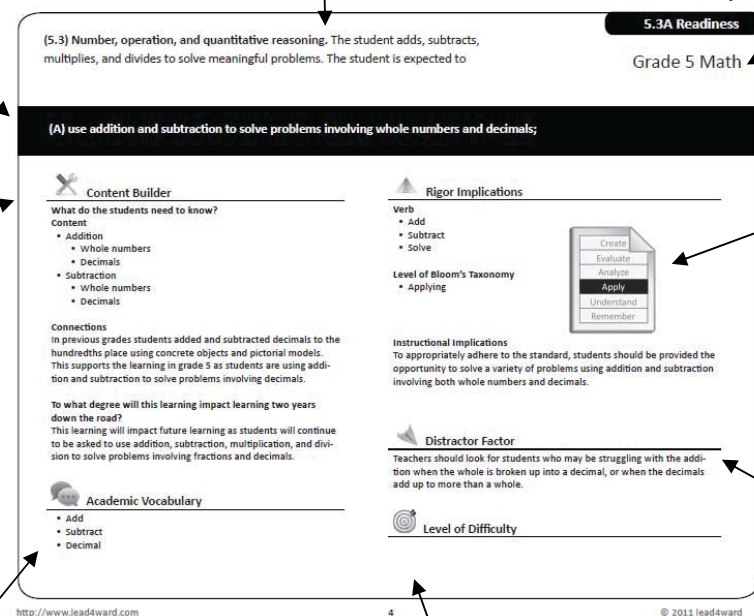
How to read
STAAR Readiness Standards analysis pages

Standard and Indication of "Readiness" or "Supporting"

Texas Essential Knowledge and Skills Statement

Student Expectation

Grade and Subject



Content Builder- The basics of the content within the standard are extracted in a bulleted list. Connections to prior learning/other standards are explained. Future implications of mastery of this standard are described to assist in understanding the impact of this learning in the future.

Rigor Implications- Uses the verb(s) from the Student Expectation to indicate the cognitive complexity of the standard and which level of Bloom's Taxonomy should be addressed during instruction, Instructional implications are also highlighted.

Distractor Factor - Alerts teachers to areas where students traditionally struggle, have misconceptions, or may need reinforcement.

Academic Vocabulary- Vocabulary words are extracted directly from the standard and/or associated with the instruction of the content within the standard.

Level of Difficulty- Standards are labeled either Challenging or Moderate. This determination is made by the campus using previous year data.

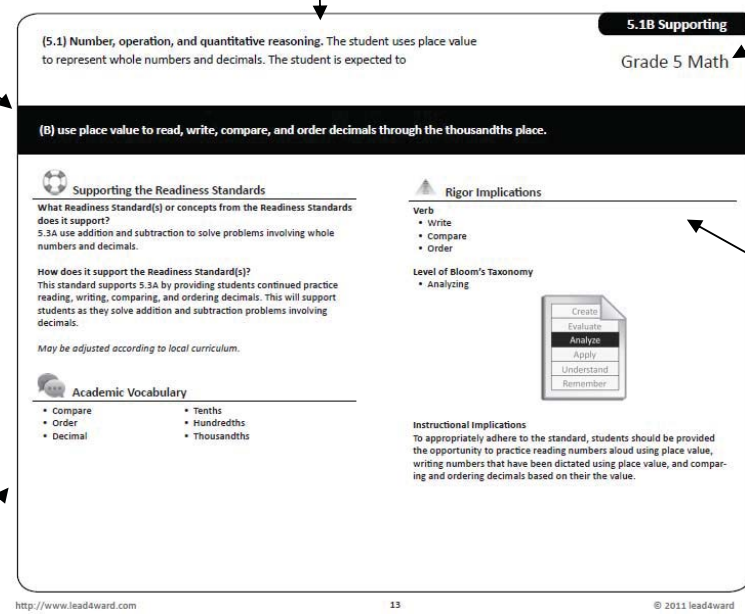
How to read
STAAR Supporting Standards analysis pages

Standard and Indication of "Readiness" or "Supporting"

Texas Essential Knowledge and Skills Statement

Student Expectation

Grade and Subject



Supporting the Readiness Standards - Most supporting standards support a readiness standard in the current grade level. This section discusses the relationships of the standards that are often taught together.

Rigor Implications- Uses the verb(s) from the Student Expectation to indicate the cognitive complexity of the standard and which level of Bloom's Taxonomy should be addressed during instruction, Instructional implications are also highlighted.

Academic Vocabulary- Words are extracted directly from the standard and/or associated with the instruction of the content within the standard.

Curriculum – STAAR Planning Worksheet

Course/Grade Level _____

Content Area _____

Grading Period/Unit _____

Readiness Standards	

Supporting Standards	

Action Steps	Guiding Questions & Notes
Read each analysis page.	What stands out? How many of the standards are a "Challenging" level of difficulty? How many of the standards are a high level of rigor (above apply on Bloom's Taxonomy)?
Content Builder (Readiness Standards only)	What other connections could you add to this section? Write them on your analysis pages! This content important for students' future learning. How will you assess retention?
Supporting the Readiness Standards (Supporting Standards only)	How can you use this information as you plan lessons? Do the supporting standards match with the readiness standards in your unit bundle? If not, arrange them according to your curriculum. Address the questions again "Which Readiness Standards does it support? How does it support the Readiness Standard(s)?"

Curriculum – STAAR Planning Worksheet

Action Steps	Guiding Questions & Notes
Vocabulary	What strategies will you use to ensure mastery of the vocabulary for each standard in this unit? What is your plan if students do not master the vocabulary?
Use the *Distractor Factor*	How can you address the information in the Distractor Factor section? From your teaching experience, is there anything you would add to this? Write it on your analysis pages!
Reflection	How have you taught this content in the past? How will you teach it differently this year? How will you utilize the readiness and supporting standards for formative and summative assessment?

Reporting Category	Readiness Standards	Supporting Standards
1 Matter and Energy	4.5.A measure, compare, and contrast physical properties of matter, including size, mass, volume, states (solid, liquid, and gas), temperature, magnetism, and the ability to sink or float*	4.5.B predict the changes caused by heating and cooling such as ice becoming liquid water and condensation forming on the outside of a glass of ice water* 4.5.C compare and contrast a variety of mixtures and solutions such as rocks in sand, sand in water, or sugar in water*
2 Force, Motion, and Energy	4.6.A differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal*	4.6.B differentiate between conductors and insulators 4.6.C demonstrate that electricity travels in a closed path, creating an electrical circuit, and explore an electromagnetic field* 4.6.D design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism*
3 Earth and Space	4.7.A examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants^ 4.7.C identify and classify earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation^* 4.8.A measure and record changes in weather and make predictions using weather maps, weather symbols, and a map key^	4.7.B observe and identify slow changes to earth's surface caused by weathering, erosion, and deposition from water, wind, and ice 4.8.B describe and illustrate the continuous movement of water above and on the surface of earth through the water cycle and explain the role of the sun as a major source of energy in this process^ 4.8.C collect and analyze data to identify sequences and predict patterns of change in shadows, tides, seasons, and the observable appearance of the moon over time^
4 Organisms and Environments	4.9.B describe the flow of energy through food webs, beginning with the sun, and predict how changes in the ecosystem affect the food web such as a fire in a forest* 4.10.A explore how adaptations enable organisms to survive in their environment such as comparing birds' beaks and leaves on plants*	4.9.A investigate that most producers need sunlight, water, and carbon dioxide to make their own food, while consumers are dependent on other organisms for food* 4.10.B demonstrate that some likenesses between parents and offspring are inherited, passed from generation to generation such as eye color in humans or shapes of leaves in plants and other likenesses are learned such as table manners or reading a book and seals balancing balls on their noses* 4.10.C explore, illustrate, and compare life cycles in living organisms such as butterflies, beetles, radishes, or lima beans*

Process Standards (Scientific investigation and Reasoning Skills)

4.1.A	demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations
4.1.B	make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans, and plastic
4.2.A	plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions
4.2.B	collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals such as labeled drawings, writing, and concept maps
4.2.C	construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data
4.2.D	analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured
4.2.E	perform repeated investigations to increase the reliability of results
4.2.F	communicate valid oral and written results supported by data
4.3.A	in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student
4.3.B	draw inferences and evaluate accuracy of services and product claims found in advertisements and labels such as toys, food, and sunscreen
4.3.C	represent the natural world using models such as rivers, stream tables, or fossils and identify their limitations, including accuracy and size
4.3.D	connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists
4.4.A	collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, pan balances, triple beam balances, graduated cylinders, beakers, hotplates, meter sticks, compasses, magnets, collecting nets, and notebooks, timing devices including clocks and stop watches; and materials to support observation of habitats of organisms such as terrariums and aquariums
4.4.B	use safety equipment as appropriate, including safety goggles and gloves.

*** = Aligned with STAAR Assessed Curriculum at Grade 5**

^ = Student Expectation specifically included in STAAR Assessed Curriculum at Grade 5 (classified as a Readiness or Supporting Standard in Grade 4 based on its characteristics as part of the Grade 4 Science curriculum)

NOTE: ***The classification of standards on this TEKS Snapshot represents the reviewed and synthesized input of a sample of Texas Science teachers. This TEKS Snapshot DOES NOT represent a publication of the Texas Education Agency. District curriculum materials may reflect other classifications.***

(4.5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:

Grade 4 Science

(A) Measure, compare, and contrast physical properties of matter, including size, mass, volume, states (solid, liquid, and gas), temperature, magnetism, and the ability to sink or float.

Content Builder

What do the students need to know?

Content

Students will measure, test, and record the physical properties of matter.

- Size
- Mass
- Volume
- Physical states (solid, liquid, gas)
- Temperature
- Magnetism
- Ability to sink or float

Connections

In third grade, students began to test materials based on their physical properties. They also learned about the basic ways to classify matter (solids, liquids, gases). The importance of this fourth grade standard is that, for the first time, students will use the states of matter to describe objects.

To what degree will this learning impact learning two years down the road?

This standard directly supports Readiness standard 5.5A, where students will be classifying matter based on physical properties. In sixth grade, students will use this background knowledge for 6.5D, where students will identify new substances.

Academic Vocabulary

- Physical properties
- Mass
- Volume
- Meter
- Centimeter
- Gram
- Kilogram
- Milliliter
- Liter
- States of matter
- Particles
- Molecules
- Celsius

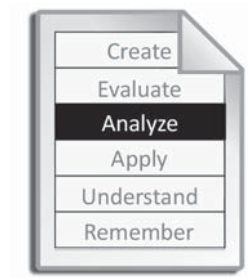
Rigor Implications

Verb

- Measure, Compare, Contrast

Level of Bloom's Taxonomy

- Analyzing



Instructional Implications

Provide students will hands on investigations where students can sort and classify matter in different ways.

Distractor Factor

Students may come with misconceptions about the states of matter, particularly with liquids and gases. Take time to review the basic information from third grade to ensure students will be able to use their knowledge of the states of matter to describe objects.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.6) Force, motion and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns and systems. The student is expected to:

Grade 4 Science

(A) Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

Content Builder

What do the students need to know?
Content
Students will need to know the different forms of energy and how to differentiate among them:

- Mechanical
- Sound
- Electrical
- Light
- Heat/thermal

Connections
In fourth grade, students will build on their understanding of forms of energy by learning how to differentiate among the forms.

To what degree will this learning impact learning two years down the road?
This standard directly supports the fifth grade Readiness Standard 5.6A, and continues on in sixth grade with TEKS 6.8A, where students will compare and contrast potential and kinetic energy and 6.8C, where they will explore energy transformations.

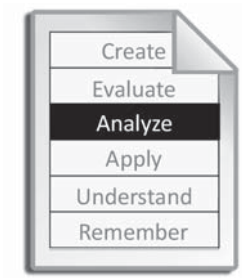
Academic Vocabulary

- Energy
- Sound energy
- Light energy
- Thermal energy
- Electrical energy
- Vibration

Rigor Implications

Verb
- Differentiate

Level of Bloom's Taxonomy
- Analyzing



Instructional Implications
The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. They will not need to know potential and kinetic energy; these concepts will be covered in 6th grade.

Distractor Factor

There are many possible misconceptions that students have about energy. Students may think: energy can be made, used, and lost; energy sources are the same as the energy; gravity is the same as energy; a force and energy are the same thing; energy from gravity depends only on the height of the fall; objects use up energy instead of transforming energy; and that energy can be used up.

Make the necessary plans to address these misconceptions throughout instruction.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:

Grade 4 Science

(A) Examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants.

Content Builder

What do the students need to know?

Content

- Examining properties of soil and the amount of water it can retain; recognize that soil helps plants grow because it retains water and contains nutrients.
- Know components of soil (sand, silt, clay, humus)
- Know effect of particle size on porosity.

Connections

In third grade, students explored how soil was formed. In fourth grade, they will build on this understanding through examining the properties of soil. This standard is a TEA Supporting/Lead4ward Readiness standard. It will be tested on STAAR.

To what degree will this learning impact learning two years down the road?

This standard is important because the concept of soil formation and the properties of soil will not be revisited. The Earth science strand will begin to focus on the formation and kinds of rocks in fifth and sixth grades.

Academic Vocabulary

- Soil
- Nutrient
- Texture
- Absorption
- Decomposition

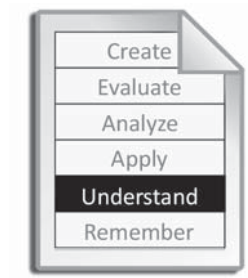
Rigor Implications

Verb

- Examine

Level of Bloom's Taxonomy

- Understanding



Instructional Implications

Students will need opportunities to examine different types of soil. Provide hands-on experiences where students can examine the types of soil by their properties. Be sure to include that soil texture is determined by the size of particles in the soil. When discussing texture, be sure to use terms such as rough, fine, coarse, and smooth.

Distractor Factor

Humus is not a type of soil. It's the broken down parts of plants and animals (rich organic matter) found in soil.

Students may have the misconception that all soils are the same, or that the only thing that differentiates them from one another is the color.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:

Grade 4 Science

(C) Identify and classify the Earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation.

Content Builder

What do the students need to know?

Content

- Identify and differentiate between renewable and nonrenewable resources.
- Know the importance of conservation

Connections

This standard is a TEA Supporting/Lead4ward Readiness standard, which directly supports fifth grade Readiness Standard 5.7C.

To what degree will this learning impact learning two years down the road?

This standard supports and builds to readiness standard 5.7C. In sixth grade, students will learn that energy resources are available on a renewable, nonrenewable, or indefinite basis.

Academic Vocabulary

- Natural resource
- Conservation
- Renewable resource
- Nonrenewable resource
- Recycle

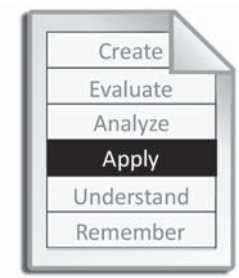
Rigor Implications

Verb

- Identify, Classify

Level of Bloom's Taxonomy

- Applying



Instructional Implications

Resources are classified as either renewable or nonrenewable. Students must make a connection to conservation and how it is important in their daily lives. Provide opportunities in instruction for students to identify these resources.

Distractor Factor

Students may have the misconception that all resources can be replenished. Spend time exploring the differences between renewable resources and nonrenewable resources.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to:

Grade 4 Science

(A) Measure and record changes in weather and make predictions using weather maps, weather symbols, and a map key.

Content Builder

What do the students need to know?

Content

- Use appropriate tools, including Celsius thermometers, wind vanes, and rain gauges and record this data on graphs, tables, and weather charts
- Recognize and use a weather map key to identify weather systems on a map and over a period of time to recognize patterns
- A weather map contains symbols and a map key indicating weather conditions
- We use the information on weather maps to make predictions about weather changes

Connections

In third grade, students measured, observed, and recorded day-to-day weather phenomena. Standard 4.8A is a TEA Supporting/Lead4ward Readiness standard that directly supports fifth grade supporting standard 5.8A, where students will differentiate between weather and climate.

To what degree will this learning impact learning two years down the road?

This standard aligns to fifth grade supporting standard 5.8A, where students differentiate between weather and climate. This standard does not align to a middle school standard, however it plays an important role in the building of conceptual understandings of Earth science.

Academic Vocabulary

- Weather
- Weather map
- Weather symbol
- Map key
- Meteorologist
- Air pressure
- Humidity
- Precipitation

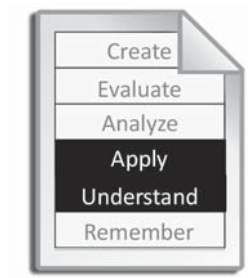
Rigor Implications

Verb

- Measure, Record, Predict

Level of Bloom's Taxonomy

- Understanding
- Applying



Instructional Implications

This is the student's first introduction to weather maps, weather symbols, and map keys in science.

Distractor Factor

Students may need support in understanding temperature and humidity. Provide opportunities and discussions for vocabulary development of these concepts.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.9) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:

Grade 4 Science

(B) Describe the flow of energy through food webs, beginning with the Sun, and predict how changes in the ecosystem affect the food web such as a fire in a forest.

Content Builder

What do the students need to know?

Content

- Flow of energy through food webs begins with the Sun
- Changes in an ecosystem can affect food webs

Connections

In third grade TEKS 3.9B, students learned about energy flow and the consequences of the removal of a part of the food chain. In fourth grade, students will continue to learn about the flow of energy through food webs, and make connections to how events in the environment can affect food webs.

To what degree will this learning impact learning two years down the road?

This standard directly supports fifth grade Readiness Standard 5.9B, where students will build on their understanding of food webs through energy transfer. This concept will be revisited in eighth grade TEKS 8.11A.

Academic Vocabulary

- Producers
- Prey
- Predator
- Food chain
- Consumer
- Food web
- Dependent

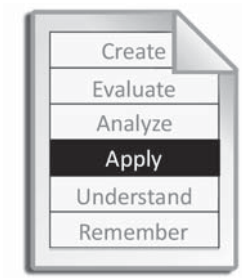
Rigor Implications

Verb

- Investigate

Level of Bloom's Taxonomy

- Applying



Instructional Implications

Provide opportunities in instructional activities for students to build their own food chains and webs to understand the dependence of each organism. Have students create a change to their web and predict how this change will affect all the organisms within the web.

Distractor Factor

Students may think that energy in food chains begin with producers. Address this misconception and help students understand that the original source of energy in food chains begins with the Sun.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment. The student is expected to:

Grade 4 Science

(A) Explore how adaptations enable organisms to survive in their environment such as comparing birds' beaks and leaves on plants.

Content Builder

What do the students need to know?

Content

- Adaptations in animals that help in finding food, the unique function of a bird's beak, adaptations that help the movement of the animal, and adaptations that help in the protection and survival of the animal.
- Adaptations in plants that help in the protection of the plant from the elements and predators, adaptations that help support the plant, and structures of the plant, such as leaves, that help it survive.

Connections

In third grade TEKS 3.10A, students explored how structures and functions of plants and animals allow them to survive in a particular environment. Fourth grade extended the exploration to the way in which adaptations enable organisms to survive in their environment, such as comparing birds' beaks and leaves on plants. This will help students in sixth grade as they compare the structures and functions of different species and how this helps them to survive.

To what degree will this learning impact learning two years down the road?

This standard directly supports Readiness Standard 5.10A, where students will compare special structures and functions of different species and how they contribute to their survival. In sixth grade, students will be looking at taxonomic classification, where the recognition of an organism's structures and functions will be necessary. As students move into seventh grade, they will be looking at structure and function at the cellular level.

Academic Vocabulary

- Physical adaptation
- Camouflage
- Mimicry
- Coloration

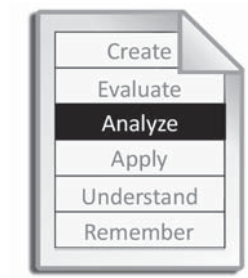
Rigor Implications

Verb

- Explore, Compare

Level of Bloom's Taxonomy

- Analyzing



Instructional Implications

Students should be provided with opportunities to learn the adaptations in both plants and animals. For animals, focus on adaptations that help them find food, with movement, and with protection. To adhere to the standard, students will need to explore the unique adaptation of a bird's beak. For plants, focus instruction on how some adaptations allow for protection, structure, or support. Focus on the adaptations of leaves on plants.

Distractor Factor

Students may think that there are only physical adaptations. Students will also need to know that there are behavioral adaptations.

Level of Difficulty (based on local data)

☐ Moderate ☐ Challenging

(4.5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:

Grade 4 Science

(B) Predict the changes caused by heating and cooling such as ice becoming liquid water and condensation forming on the outside of a glass of ice water.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard aligns with 5.5B, a supporting fifth grade standard, which directly supports readiness standard 5.5A.

How does it support the Readiness Standard(s)?
In third grade, students predicted, observed, and recorded changes in the state of matter by the heating and cooling of an object. Fourth graders will continue to learn about changes in the states of matter, but with more specificity. The background knowledge from third and fourth grade is important for the conceptual development in fifth grade.

May be adjusted according to local curriculum.

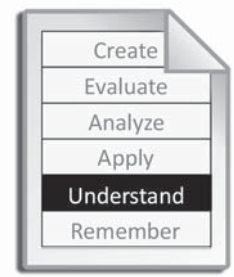
Academic Vocabulary

- Heat
- Freezing
- Melting
- Evaporation
- Condensation
- Thermal Energy

Rigor Implications

Verb
- Predict

Level of Bloom's Taxonomy
- Understanding



Instructional Implications
Heating and cooling can cause changes in the properties of materials, but not all materials respond the same way to being heated and cooled. Students will need to participate in hands-on investigations to explore this concept.

(4.5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:

Grade 4 Science

(C) Compare and contrast a variety of mixtures and solutions such as rocks in sand, sand in water, or sugar in water.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard does not directly support a readiness standard; however it does provide support for fifth grade supporting standard 5.5C.

How does it support the Readiness Standard(s)?
In third grade, students were introduced to mixtures. In fourth grade, students build on the concept of mixtures by comparing and contrasting a variety of mixtures and solutions. This conceptual understanding provides support for fifth grade supporting standard 5.5C and will also help with foundational knowledge for middle school science.

May be adjusted according to local curriculum.

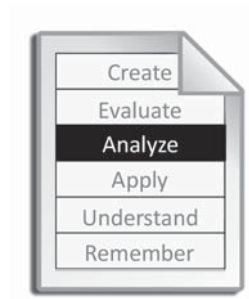
Academic Vocabulary

- Mixture
- Solution
- Filtration
- Settling
- Evaporation
- Magnetism

Rigor Implications

Verb
- Compare, Contrast

Level of Bloom's Taxonomy
- Analyzing



Instructional Implications
It is important for students to understand that a solution is a special type of mixture and that there are a variety of mixtures and solutions that can be created. It is also important to provide hands-on investigations where students can separate mixtures by filtration, settling, evaporation, and magnetism.

(4.6) Force, motion and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns and systems. The student is expected to:

Grade 4 Science

(B) Differentiate between conductors and insulators

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

This standard indirectly supports readiness standard 5.6B, where students will demonstrate that the flow of electricity in circuits requires a complete path through which an electric current can pass and can produce light, heat, and sound.

How does it support the Readiness Standard(s)?

In third grade, students simply explored different forms of energy whereas in second grade they investigated the effects of increasing or decreasing the amounts of light, heat and sound energy on an object. These are all foundations for understanding how different types of energy move which will help students to better understand the types of materials that would support or inhibit the movement of each type of energy. Students will need to be able to recognize and differentiate between conductors and insulators in order to successfully work with circuits for readiness standard 5.6B.

May be adjusted according to local curriculum.

Academic Vocabulary

- Conductor
- Insulator
- Energy
- Absorb
- Transfer

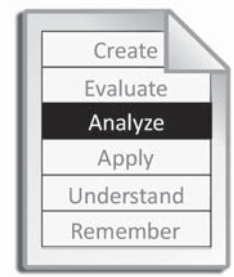
Rigor Implications

Verb

- Differentiate

Level of Bloom's Taxonomy

- Analyzing



Instructional Implications

It is important to spend time with students discussing how energy moves and is transferred. This will lead to a strong understanding about the types of materials that would be most conducive or most inhibitive of energy transfer. It is far less significant for students to know a list of conductors and insulators, than it is to know what makes good conductors and insulators.

(4.6) Force, motion and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns and systems. The student is expected to:

Grade 4 Science

(C) Demonstrate that electricity travels in a closed path, creating an electrical circuit, and explore an electromagnetic field.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
Although this is a Supporting Standard, this is the student's first introduction to electrical circuits. This directly supports Readiness Standard 5.6B.

How does it support the Readiness Standard(s)?
This is the first introduction to electrical circuits, and this standard directly supports Readiness Standard 5.6B.

May be adjusted according to local curriculum

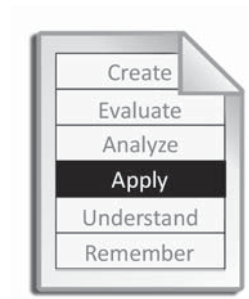
Academic Vocabulary

- Complete circuit
- Incomplete circuit
- Open circuit
- Closed circuit
- Conductor
- Insulator
- Electromagnet
- Electromagnetic field
- Switch
- Electrical current
- Interrupter

Rigor Implications

Verb
- Demonstrate

Level of Bloom's Taxonomy
- Applying



Instructional Implications
It is important for students to know the difference between open and closed circuits, the effect of conductors and insulators on electrical circuits, and what an electromagnetic field is.

(4.6) Force, motion and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns and systems. The student is expected to:

Grade 4 Science

(D) Design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard does not support a readiness standard, but it does align with supporting standard 5.6D, where students will design an experiment with force. It also supports sixth grade standards 6.8B, 6.8D, and 6.8E.

How does it support the Readiness Standard(s)?
In third grade, students demonstrated how position and motion can be changed by applied forces. They also observed forces such as magnetism and gravity acting on objects. In fourth grade, students will build on this understanding by designing experiments to test the effect of forces on objects.

May be adjusted according to local curriculum.

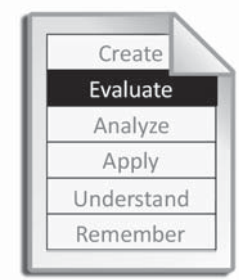
Academic Vocabulary

- Force
- Friction
- Gravity
- Magnetism

Rigor Implications

Verb
- Design

Level of Bloom's Taxonomy
- Evaluating



Instructional Implications
It is important to spend time teaching students the important steps of a descriptive investigation. Explain that a descriptive investigation includes a question, but no hypothesis. Observations are recorded, but no comparisons are made and no variables are manipulated.

(4.7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:

Grade 4 Science

(B) Observe and identify slow changes to the Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard directly supports fifth grade Readiness Standard 5.7B.

How does it support the Readiness Standard(s)?
This standard builds from third grade standard 3.6B, where students investigated rapid changes to the Earth's surface. In fourth grade, students will learn about slow changes to the Earth's surface caused by weathering and erosion from water, wind, and ice. These standards build the foundation for the fifth grade readiness standard 5.7B, where students learn about how landforms are created as a result of changes to the Earth's surface.

May be adjusted according to local curriculum

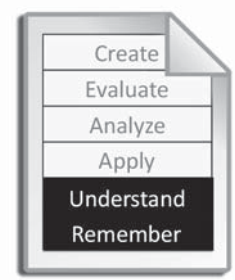
Academic Vocabulary

- Weathering
- Erosion
- Deposition

Rigor Implications

Verb
- Observe, Identify

Level of Bloom's Taxonomy
- Remembering
- Understanding



Instructional Implications
Students will need to understand that wind, water, and ice can cause the Earth's surface to change slowly over time. Weathering, erosion, and deposition are also contributing factors to changes to the Earth's surface. Investigations and activities that show the effects of these changes to the Earth's surface will help build foundational knowledge for success with fifth grade readiness standard 5.7B.

(4.8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to:

Grade 4 Science

(B) Describe and illustrate the continuous movement of water above and on the surface of the Earth through the water cycle and explain the role of the Sun as a major source of energy in this process.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard does not directly support a readiness standard.

How does it support the Readiness Standard(s)?
Although this standard does not directly support a readiness standard, it does support fifth grade supporting standard 5.8B, as students will be required to explain how the Sun and the ocean interact in the water cycle.

May be adjusted according to local curriculum.

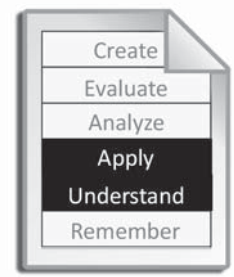
Academic Vocabulary

- Evaporation
- Precipitation
- Condensation
- Accumulation
- Solar energy
- Runoff

Rigor Implications

Verb
- Describe, Illustrate

Level of Bloom's Taxonomy
- Understanding
- Applying



Instructional Implications
Students should be able to describe and illustrate the processes of evaporation, condensation, and precipitation as related to the water cycle and explain the Sun's role as providing the energy that drives the water cycle. They should also be able to explain what happens to precipitation when it falls to the Earth (absorbed by the layers of soil and rock becoming groundwater or as runoff into streams, rivers, lakes or ponds).

(4.8) Earth and space. The student knows that there are recognizable patterns in the natural world and among the Sun, Earth, and Moon system. The student is expected to:

Grade 4 Science

(C) Collect and analyze data to identify sequences and predict patterns of change in shadows, tides, seasons, and the observable appearance of the Moon over time.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard does not directly support a readiness standard.

How does it support the Readiness Standard(s)?
This is an isolated student expectation; however, it does provide foundational knowledge for the conceptual understandings of Earth science.

May be adjusted according to local curriculum

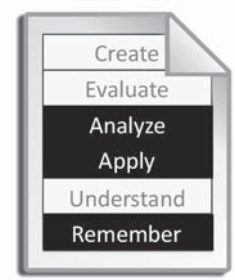
Academic Vocabulary

- Moon phases
- Tides
- Seasons
- Shadows
- Gravitational pull
- Cycle

Rigor Implications

Verb
- Collect, Analyze, Identify, Predict

Level of Bloom's Taxonomy
- Remembering
- Analyzing
- Applying



Instructional Implications
This is an important concept in that it lays foundational knowledge about patterns and change over time in Earth Science. The outcome of learning is that students understand that there are predictable patterns to tides and the lunar cycle.

(4.9) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:

Grade 4 Science

(A) Investigate that most producers need sunlight, water, and carbon dioxide to make their own food, while consumers are dependent on other organisms for food.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
The conceptual understanding of energy flow through a food chain and food web will help support fifth grade readiness standard 5.9B.

How does it support the Readiness Standard(s)?
This standard aligns to fifth grade 5.9D, which directly supports readiness standard 5.9B in helping with the understanding of energy flow through a food chain and food web.

May be adjusted according to local curriculum.

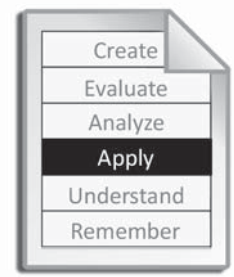
Academic Vocabulary

- Producers
- Consumers
- Predator
- Prey
- Food chain
- Food web

Rigor Implications

Verb
- Investigate

Level of Bloom's Taxonomy
- Applying



Instructional Implications
It is important that instruction centers around the understanding that the flow of energy through food webs begins with the Sun and that changes in an ecosystem can affect food webs.

(4.10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment. The student is expected to:

Grade 4 Science

(B) Demonstrate that some likenesses between parents and offspring are inherited, passed from generation to generation such as eye color in humans or shapes of leaves in plants. Other likenesses are learned such as table manners or reading a book and seals balancing balls on their noses.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard directly supports fifth grade Readiness Standard 5.10B.

How does it support the Readiness Standard(s)?
In third grade, students explored characteristics that are inherited and behaviors that are learned in response to living in a certain environment. In fourth grade, students demonstrated that some characteristics are inherited while behaviors are learned. This supports the fifth grade standard, which will have students differentiating between inherited and learned behaviors.

May be adjusted according to local curriculum

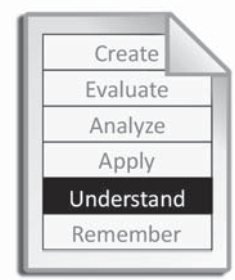
Academic Vocabulary

- Instinctive behaviors
- Learned behaviors
- Traits
- Inherited traits
- Offspring

Rigor Implications

Verb
- Demonstrate

Level of Bloom's Taxonomy
- Understanding



Instructional Implications
Learned behaviors are acquired by an organism's interactions with its environment and/ or parents. Some traits, such as body parts, are inherited from parents, but some traits are the result of events that happen after birth.

(4.10) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:

Grade 4 Science

(C) Explore, illustrate, and compare life cycles in living organisms such as butterflies, beetles, radishes or lima beans.

Supporting the Readiness Standards

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
This standard does not directly support a readiness standard.

How does it support the Readiness Standard(s)?
This standard does not directly support a readiness standard. However, it does provide background knowledge on cycles, which will help with the fifth grade supporting standard 5.10C on complete and incomplete metamorphosis.

May be adjusted according to local curriculum.

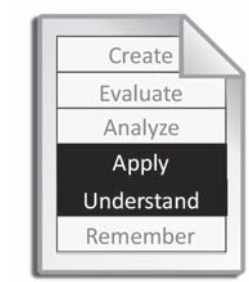
Academic Vocabulary

- Life cycle
- Seedling germination
- Nymph
- Larva
- Pupa

Rigor Implications

Verb
- Explore, Illustrate, Compare

Level of Bloom's Taxonomy
- Understanding
- Applying
- Analyzing



Instructional Implications
Students must have experiences with and be able to recognize life cycles of different organisms and compare stages.