

Click-On TEKS



A simple approach to understanding
the Texas Essential Knowledge and Skills

GRADE 5 SCIENCE

These explanations of the science standards are designed to help you understand what the standards mean so you can help students experience science content more deeply. The authors hope that this deconstruction of the Texas Essential Knowledge and Skills (TEKS) for Science makes teaching science more rigorous, more fun, and a little less confusing.

The goal of this document is to be responsive to the information about the current Science TEKS. Specificity and/or activities may be adjusted over time as the state streamlines the TEKS.

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Content Strand 1: Matter and Energy (Reporting Category 1)

5.5



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:

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Acknowledgements

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Structure of the TEKS

The Texas Essential Knowledge and Skills (TEKS) consists of four parts.

Part 1: The Introduction

The state standards, or TEKS, for each grade level begin with the Introduction that gives an overview of the focal areas for each grade and provides general information about science content and the processing skills. While the Introduction has not been reprinted in this text, information from the Introduction has been included in the explanations of the TEKS when appropriate.

Part 2: Strands

The standards are broken into groups or categories called Strands. The TEKS for elementary science are divided into five strands:

1. Scientific Investigation and Reasoning Skills: This strand contains the process standards for science and includes the requirements for safety, the scientific methods for inquiry, critical thinking and problem solving, and the use of tools. These skills are not intended to be taught in isolation, but rather to be integrated into the other strands so that they have meaning and relevance. The dual-coded questions on STAAR will be coded with a content standard and a process standard. These skills will be incorporated into at least 40% of the test questions and will be identified along with the content standards.
2. Matter and Energy (Reporting Category 1)
3. Force, Motion, and Energy (Reporting Category 2)
4. Earth and Space (Reporting Category 3)
5. Organisms and Environments (Reporting Category 4)

Example

5.1 Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:

(A) demonstrate safe practices and the use of safety equipment as described in the Texas Safety Standards during classroom and outdoor investigations.

Part 3: Knowledge and Skills Statements

Immediately following the strand is the **Knowledge and Skills** statement. It provides the context for the student expectations that follow it.

Numbering: The first number is the grade level. The second number is the Knowledge and Skills number. The Knowledge and Skills statement shown is from fifth grade.

Part 4: Student Expectations

Immediately following each Knowledge and Skills statement is a list of **Student Expectations**.

The letters, such as (A), refer to what students are expected to do with regard to a particular Knowledge and Skills statement. We often refer to this example as 5.1A. [Grade Level: Fifth, Knowledge and Skills statement (1), Student Expectation (A)]

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Process Skills: Scientific Investigation and Reasoning	
5.1	Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:
5.1A	demonstrate safe practices and the use of safety equipment as outlined in the Texas Education Agency-approved safety standards during classroom and outdoor investigations using safety equipment, including safety goggles or chemical splash goggles, as appropriate, and gloves, as appropriate.
5.1B	make informed choices in the conservation, disposal, and recycling of materials.
5.2	Scientific investigation and reasoning. The student uses scientific methods during laboratory and outdoor investigations. The student is expected to:
5.2A	describe, plan, and implement simple experimental investigations testing one variable.
5.2B	ask well-defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology.
5.2C	collect and record information by detailed observations and accurate measuring.
5.2D	analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence.
5.2E	demonstrate that repeated investigations may increase the reliability of results.
5.2F	communicate valid conclusions in both written and verbal forms.
5.2G	construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information.
5.3	Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:
5.3A	analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing.
5.3B	draw or develop a model that represents how something that cannot be seen such as the Sun, Earth, and Moon system and formation of sedimentary rock works or looks.
5.3C	connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

Process Skills: Scientific Investigation and Reasoning (continued)

5.4	Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:
5.4A	collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; and materials to support observations of habitats or organisms such as terrariums and aquariums.

Content Strand 1: Matter and Energy

5.5	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:
5.5A	classify matter based on measurable, testable, and observable physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal energy or electric energy. RC1, Readiness Standard
5.5B	demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand and sand and water. RC1, Supporting Standard
5.5C	identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water. RC1, Supporting Standard

Content Strand 2: Force, Motion, and Energy

5.6	Force, motion, and energy. The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems. The student is expected to:
5.6A	explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy. RC2, Readiness Standard
5.6B	demonstrate that the flow of electricity in closed circuits can produce light, heat, and sound. RC2, Readiness Standard
5.6C	demonstrate that light travels in a straight line until it strikes an object and is reflected; or travels through one medium to another and is refracted. RC2, Readiness Standard
5.6D	design a simple experimental investigation that tests the effect of force on an object. RC2, Supporting Standard

Content Strand 3: Earth and Space

5.7	Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to:
5.7A	explore the processes that led to the formation of sedimentary rocks and fossil fuels. RC3, Readiness Standard
5.7B	recognize landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, and ice. RC3, Readiness Standard
5.8	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:
5.8A	differentiate between weather and climate. RC3, Supporting Standard
5.8B	explain how the Sun and the ocean interact in the water cycle. RC3, Supporting Standard
5.8C	demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle and the apparent movement of the Sun across the sky. RC3, Readiness Standard
5.8D	identify and compare the physical characteristics of the Sun, Earth, and Moon. RC3, Supporting Standard

Content Strand 4: Organisms and Environments

5.9	Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:
5.9A	observe the way organisms live and survive in their ecosystem by interacting with the living and non-living components. RC4, Readiness Standard
5.9B	describe how the flow of energy through food webs, beginning with the Sun, and predict how changes in the ecosystem affect the food web. RC4, Readiness Standard
5.9C	predict the effects of changes in ecosystems caused by living organisms, including humans, such as the overpopulation of grazers or the building of highways. RC4, Supporting Standard
5.9D	identify fossils as evidence of past living organisms and the nature of the environments at the time using models. RC4, Supporting Standard
5.10	Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:
5.10A	compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals. RC4, Readiness Standard
5.10B	differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle. RC4, Readiness Standard

Content Strand 1: Matter and Energy

5.5 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:

5.5A classify matter based on measurable, testable, and observable physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

(RC1, Readiness Standard)

This student expectation addresses *physical* properties:

- Mass
- Magnetism
- Physical state (solid, liquid, and gas)
- Relative density (sinking and floating)
- Solubility in water*
- Ability to conduct or insulate thermal or electric energy*

**introduced in Grade 5*

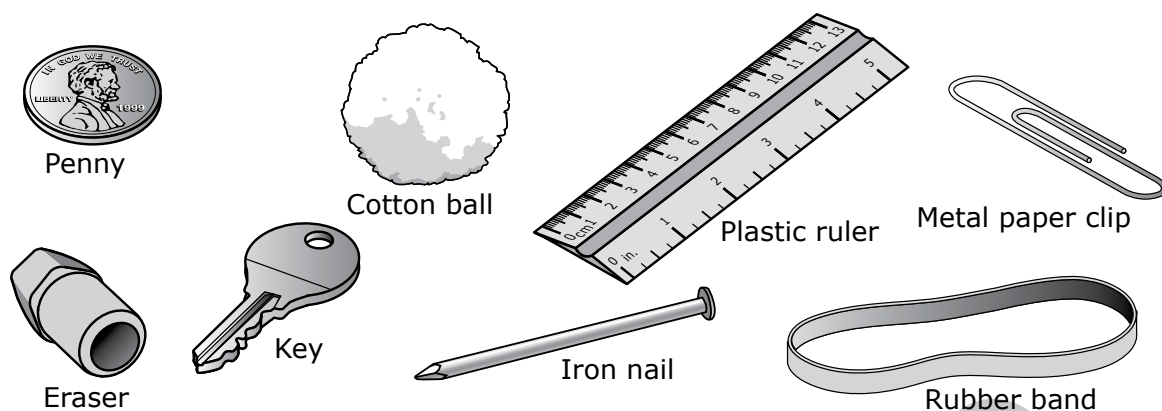
Prior knowledge for this expectation is provided in Grade 3 when students measure, test, and record physical properties of matter and in Grade 4 when students measure, compare, and contrast size, mass, volume, physical states, temperature, magnetism, and the ability to sink or float. The properties of **solubility in water** and the **ability to conduct or insulate thermal or electric energy** are introduced in Grade 5. Chemical properties are introduced in middle school.

The following STAAR demonstrates that students must analyze and apply their knowledge of different properties to a variety of common objects.



2015 STAAR Sample Question

A student classifies the objects shown based on their physical properties.



Which property **cannot** be used to classify these objects into more than one group?

- A Magnetism
- B Mass
- C Electrical conductivity
- ☒ D Solubility in water



Example/Activity

Explore this Student Expectation with your students by having them observe and classify a variety of objects, including the ones pictured in the STAAR item above. Allow them to investigate using tools such as:

- balance scales to determine mass
- magnets to test for magnetism
- water tanks to test for density and solubility in water
- thermometers to test for conduction and insulation

Have students record their findings by creating charts, Venn diagrams, and infographics to record the physical properties they discover.

In addition, have students list the physical state of each object along with their evidence for determining its state. For example:

- Solids have mass, have volume (take up space), and a definite shape.
- Liquids have mass, volume (take up space), and take the shape of their container.
- Gases have mass, volume (take up space), and expand to fill their containers.

STAAR Information

Note that this Grade 3 student expectation is a Supporting Standard that may be assessed on STAAR and aligns with **5.5A**.

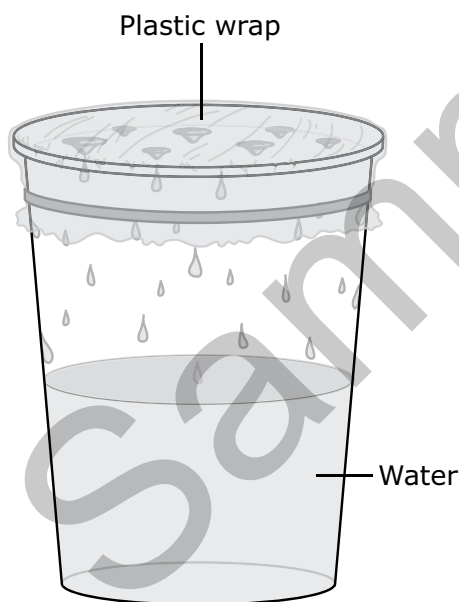
3.5C predict, observe, and record changes in the state of matter caused by heating or cooling such as ice becoming liquid, water condensation forming on the outside of a glass of ice water, or liquid water being heated to the point of becoming water vapor. (RC1, Supporting Standard)

The following shows that students understand changes in physical properties.



2014 STAAR Sample Question

A student makes a model of the water cycle by using a cup, some water, and plastic wrap. After the student places the model near a sunny window, moisture forms on the inside of the plastic wrap.



What change is the student most likely observing in this model?

- A** Freezing
- B** Condensation
- C** The warming of air
- D** The formation of clouds

5.5 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:

5.5B demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand and sand and water. (RC1, Supporting Standard)

A **mixture** is a substance made by combining two or more different materials in such a way that no chemical reaction occurs. A **mixture** can usually be separated back into its original components. Some examples of **mixtures** are a tossed salad, salt water (a mixture that is also a solution), and a bag of mixed nuts.

Background for this student expectation is provided in Grade 4 as students compare and contrast a variety of mixtures and solutions such as rocks in sand, sand in water, or sugar in water.

In Grade 5 students should be familiar with mixtures such as these that have appeared in STAAR items:

- Iron filings and sand
- Pepper and salt
- Assorted beads
- Tea and sugar
- Recipes that include ingredients such as salt, cooking oil, sugar cubes, butter, and carrots
- Powdered substances in water

The following demonstrates that students must apply their knowledge of the properties of matter (found in 5.5A) to determine the most effective way to separate a mixture.



2014 STAAR Sample Question

A student made a mixture using equal amounts of salt and pepper. The salt grains were the same size as the pepper grains. What should the student do to most easily separate the pepper from the salt?

- A** Use a pair of tweezers to remove each grain of pepper
- B** Run a small magnet through the mixture to attract the pepper
- C** Put the mixture in water and filter the pepper out of the water
- D** Use a strainer with a fine wire screen to remove the pepper



Example/Activity

Explore this Student Expectation with your students by having them investigate:

- How a magnet can separate some substances from a mixture.
- How water can be used to separate mixtures with substances of different densities.
- How filters and screens are useful tools to separate mixtures of different sized-substances.
- How evaporation can be used to separate some solutions.

5.5 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:

5.5C identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water.

(RC1, Supporting Standard)

In Grade 4 students develop a conceptual understanding of solutions. In Grade 5 students understand that *solubility* is the ability to dissolve in water, and *dissolving* is the process by which substances breakdown into small pieces and spread evenly throughout a mixture.

In Grade 5 students should be familiar with solutions such as these that have appeared in STAAR items:

- Powdered drink mix in water
- Salt and water
- Recipes that include ingredients such as salt, sugar cubes, and butter

The following shows how students must use understandings of the properties of matter (found in 5.5A) to fully analyze the question.

Sample



2014 STAAR Sample Question

A cook uses the ingredients listed below to prepare a meal.

Ingredients

- Sugar cubes
- Salt
- Cooking oil
- Carrots
- Butter

Which table correctly shows the physical properties of these ingredients when placed in hot water?

A

Ingredient	Physical Property
Sugar cubes	Solid that becomes a liquid and floats
Salt	Solid that becomes a liquid and sinks
Cooking oil	Liquid that floats
Carrots	Solid that does not dissolve
Butter	Solid that dissolves

C

Ingredient	Physical Property
Sugar cubes	Solid that does not dissolve
Salt	Solid that dissolves
Cooking oil	Liquid that sinks
Carrots	Solid that does not dissolve
Butter	Solid that becomes a liquid and floats

B

Ingredient	Physical Property
Sugar cubes	Solid that dissolves
Salt	Solid that dissolves
Cooking oil	Liquid that sinks
Carrots	Solid that dissolves
Butter	Solid that becomes a liquid and floats

D

Ingredient	Physical Property
Sugar cubes	Solid that dissolves
Salt	Solid that dissolves
Cooking oil	Liquid that floats
Carrots	Solid that does not dissolve
Butter	Solid that becomes a liquid and floats



Example/Activity

Explore this Student Expectation with your students by having them investigate how substances such as salt, pepper, oil, and sand interact when placed in water. Have them use terms such as *dissolve*, *solution*, and *mixture* in their oral and written responses.