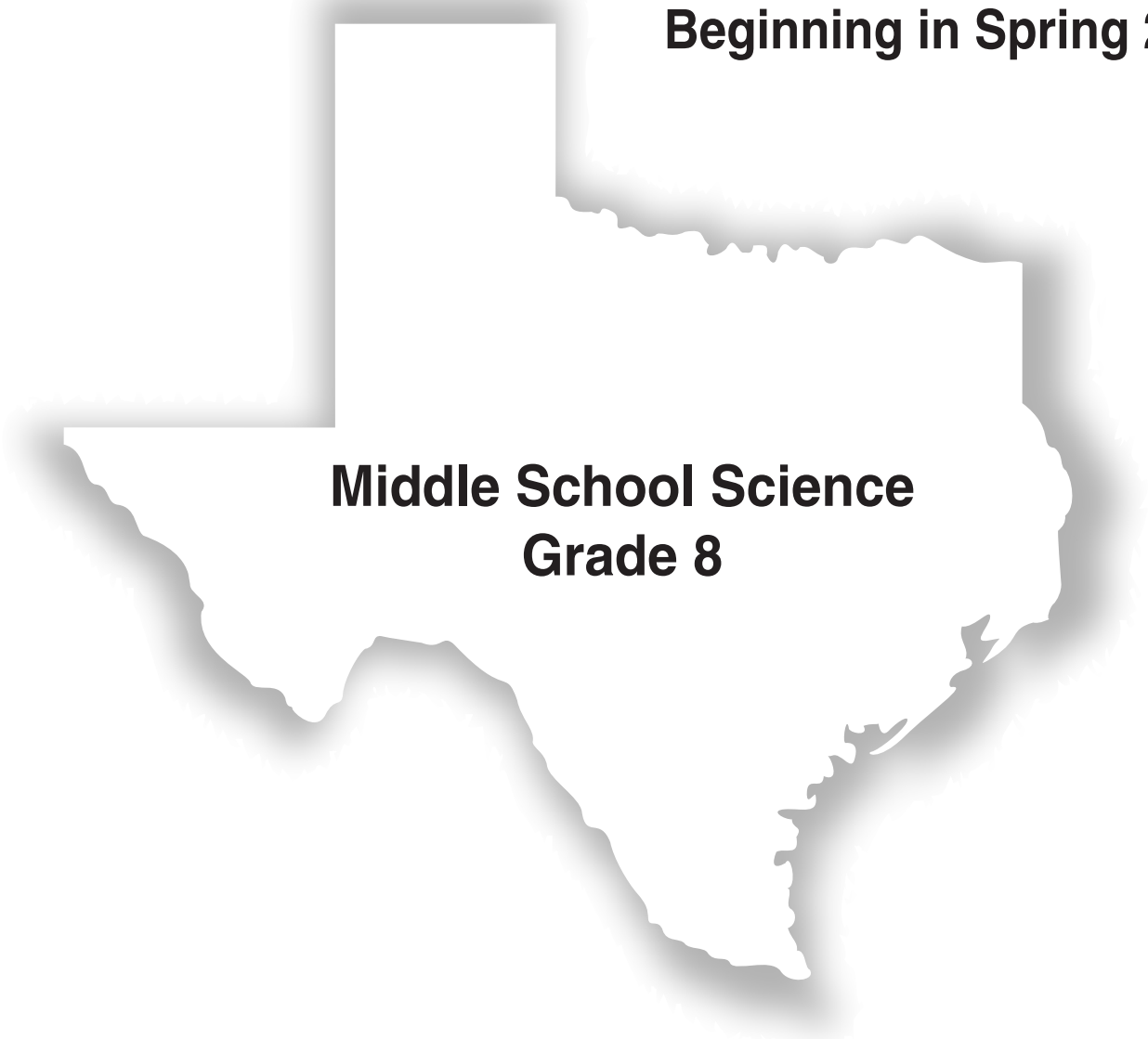
TAKS

Texas Assessment of Knowledge and Skills

Texas Essential Knowledge and Skills (TEKS)

Objectives and TEKS Student Expectations

New Statewide Assessment
Beginning in Spring 2006



Middle School Science
Grade 8

A Key to Understanding the TEKS Included on the TAKS Middle School Science—Grade 8

Example from Objective 3

A

(6.7, 7.7, 8.9) Science Concepts. The student knows that substances have physical and chemical properties. The student is expected to

B → (B) interpret information on the periodic table to understand that [physical] properties are used to group elements (8.9).

D

C

KEY

A. Knowledge and Skills Statement

This broad statement describes what students should know and be able to do for Middle School Science—Grade 8. The number(s) preceding the statement identify the knowledge and skills statement; in the example above, "(6.7, 7.7, 8.9)" indicates that the knowledge and skills statement is the same for grades 6, 7, and 8. It is important to read the knowledge and skills statement along with the student expectations associated with it for a full understanding of the concept.

B. Student Expectation

This specific statement describes what students should be able to do to demonstrate proficiency in what is described in the knowledge and skills statement. Students will be tested on skills outlined in the student expectation statement.

C. (8.9)

The number in parentheses indicates the grade level at which the student expectation appears. In the example above, the "(8.9)" shows that this student expectation has been taken directly from the grade 8 science TEKS. While the wording of this student expectation is specific to grade 8, similar student expectations also appear in grades 6 and 7 under this same knowledge and skills statement. Texas educators have determined that the student expectation listed best represents what students must know and be able to do with regard to the science concepts inherent in the knowledge and skills statement. However, it is important for teachers at grades 6 and 7 to teach the student expectation that corresponds to the one listed so that students have the foundation they need for grade 8 instruction.

D. [bracketed text]

The student expectation has been presented in its entirety for two reasons: to clarify the link to the curriculum and to provide background information for test items. However, bracketed text will not be specifically tested on the TAKS.

NOTE: The full TEKS curriculum can be found at www.tea.state.tx.us/teks/.

TEKS STUDENT EXPECTATIONS—IMPORTANT VOCABULARY

For every subject area and grade level, two terms—*such as* and *including*—are used to help make the TEKS student expectations more concrete for teachers. However, these terms function in different ways. To help you understand the effect each of the terms has on specific student expectations, we are providing the following:

- a short definition of each term
- an example from a specific student expectation for this subject area
- a short explanation of how this term affects this student expectation

Such as

The term *such as* is used when the specific examples that follow it function only as representative illustrations that help define the expectation for teachers. These examples are just that—examples. Teachers may choose to use them when teaching the student expectation, but there is no requirement to do so. Other examples can be used in addition to those listed or as replacements for those listed.

(7.14, 8.14)(A) "The student is expected to predict land features resulting from gradual changes such as mountain building, beach erosion, land subsidence, [and continental drift] (8.14)."

For this student expectation, students must be able to predict what land features result from specific gradual changes to Earth formations. The examples listed in this student expectation should be changes that are familiar to most students and easy to describe in the classroom. However, there are many other examples that can be used, and the list of examples in this student expectation is not exhaustive or exclusive.

Including

The term *including* is used when the specific examples that follow it must be taught. However, other examples may also be used in conjunction with those listed.

(7.12)(B) "The student is expected to observe and describe how organisms including producers, consumers, and decomposers live together in an environment and use existing resources."

This expectation lists some types of organisms that must be familiar to students. It is important that students be exposed to information about other classes of organisms, such as parasites, but it is required that students know the characteristics of the organisms listed in the student expectation following the word "including."

Remember

- Any example preceded by the term *such as* in a particular student expectation may or may not provide the basis for an item assessing that expectation. Because these examples do not necessarily have to be used to teach the student expectation, it is equally likely that other examples may be used in assessment items. The rule here is that an example will be used only if it is central to the knowledge, concept, or skill the item assesses.

- It is more likely that some of the examples preceded by the term *including* in a particular student expectation will provide the basis for items assessing that expectation, since these examples must be taught. However, it is important to remember that the examples that follow the term *including* do not represent all of the examples possible, so other examples may also provide the basis for an assessment item. As above, the rule here is that an example should be used only if it is central to the knowledge, concept, or skill the item assesses.

Objective 1

The student will demonstrate an understanding of the nature of science.

(6.1, 7.1, 8.1) **Scientific processes.** The student conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to

(A) demonstrate safe practices during field and laboratory investigations.

(6.2, 7.2, 8.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology;

(B) collect data by observing and measuring;

(C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence (7.2, 8.2);

(D) communicate valid conclusions; and

(E) construct graphs, tables, maps, and charts using tools [including computers] to organize, examine, and evaluate data.

(6.3, 7.3, 8.3) **Scientific processes.** The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(B) draw inferences based on data [related to promotional materials] for products and services; and

(C) represent the natural world using models and identify their limitations.

(6.4, 7.4, 8.4) **Scientific processes.** The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to

(A) collect, record, and analyze information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, hot plates, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, calculators, field equipment, computers, computer probes, water test kits, and timing devices (8.4); and

(B) extrapolate from collected information to make predictions (8.4).

Objective 2

The student will demonstrate an understanding of living systems and the environment.

(6.5) **Science concepts.** The student knows that systems may combine with other systems to form a larger system. The student is expected to

(B) describe how the properties of a system are different from the properties of its parts.

(6.10, 7.9) **Science concepts.** The student knows the relationship between structure and function in living systems. The student is expected to

(B) determine that all organisms are composed of cells that carry on functions to sustain life (6.10); and

(C) identify how structure complements function at different levels of organization including organs, organ systems, organisms, and populations (6.10).

(6.8, 7.8, 8.10) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to

(B) identify that radiant energy from the Sun is transferred into chemical energy through the process of photosynthesis (7.8).

(7.12) **Science concepts.** The student knows that there is a relationship between organisms and the environment. The student is expected to

(B) observe and describe how organisms including producers, consumers, and decomposers live together in an environment and use existing resources;

(C) describe how different environments support different varieties of organisms; and

(D) observe and describe the role of ecological succession in ecosystems.

(8.6) **Science concepts.** The student knows that interdependence occurs among living systems. The student is expected to

(A) describe interactions among systems in the human organism;

(B) identify feedback mechanisms that maintain equilibrium of systems such as body temperature, turgor pressure, and chemical reactions; and

(C) describe interactions within ecosystems.

(6.11, 7.10, 8.11) **Science concepts.** The student knows that traits of species can change through generations and that the instructions for traits are contained in the genetic material of the organisms. The student is expected to

(A) identify that change in environmental conditions can affect the survival of individuals and of species (8.11);

(B) distinguish between inherited traits and other characteristics that result from interactions with the environment (8.11); and

(C) make predictions about possible outcomes of various genetic combinations of inherited characteristics (8.11).

Objective 3

The student will demonstrate an understanding of the structures and properties of matter.

(6.7, 7.7, 8.9) **Science concepts.** The student knows that substances have physical and chemical properties. The student is expected to

(B) classify substances by their physical and chemical properties (6.7);

(C) recognize that compounds are composed of elements (7.7);

(A) demonstrate that substances may react chemically to form new substances (8.9);

(B) interpret information on the periodic table to understand that [physical] properties are used to group elements (8.9); and

(C) recognize the importance of formulas and equations to express what happens in a chemical reaction (8.9).

(8.8) **Science concepts.** The student knows that matter is composed of atoms. The student is expected to

(A) describe the structure and parts of an atom; and

(B) identify the properties of an atom including mass and electrical charge.

(6.8, 7.8, 8.10) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to

(A) illustrate interactions between matter and energy including specific heat (8.10).

Objective 4

The student will demonstrate an understanding of motion, forces, and energy.

(6.9) **Science concepts.** The student knows that obtaining, transforming, and distributing energy affects the environment. The student is expected to

(A) identify energy transformations occurring during the production of energy for human use such as electrical energy to heat energy or heat energy to electrical energy.

(6.8, 7.8, 8.10) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to

(A) illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water (7.8).

(6.6, 7.6, 8.7) **Science concepts.** The student knows that there is a relationship between force and motion. The student is expected to

(B) demonstrate that changes in motion can be measured and graphically represented (6.6);

(A) demonstrate basic relationships between force and motion using simple machines including pulleys and levers (7.6);

(C) relate forces to basic processes in living organisms including the flow of blood and the emergence of seedlings (7.6);

(A) demonstrate how unbalanced forces cause changes in the speed or direction of an object's motion (8.7); and

(B) recognize that waves are generated and can travel through different media (8.7).

Objective 5

The student will demonstrate an understanding of earth and space systems.

(6.14) **Science concepts.** The student knows the structures and functions of Earth systems. The student is expected to

(B) identify relationships between groundwater and surface water in a watershed.

(6.13, 7.13) **Science concepts.** The student knows components of our solar system. The student is expected to

(A) identify and illustrate how the tilt of the Earth on its axis as it rotates and revolves around the Sun causes changes in seasons and the length of a day (7.13); and

(B) relate the Earth's movement and the moon's orbit to the observed cyclical phases of the moon (7.13).

(6.8, 7.8, 8.10) **Science concepts.** The student knows that complex interactions occur between matter and energy. The student is expected to

(B) explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass such as in a compost bin (6.8); and

(B) describe interactions among solar, weather, and ocean systems (8.10).

(8.12) **Science concepts.** The student knows that cycles exist in Earth systems. The student is expected to

(A) analyze and predict the sequence of events in the lunar and rock cycles; and

(C) predict the results of modifying the Earth's nitrogen, water, and carbon cycles.

(8.13) **Science concepts.** The student knows characteristics of the universe. The student is expected to

(A) describe characteristics of the universe such as stars and galaxies.

(7.14, 8.14) **Science concepts.** The student knows that natural events and human activity can alter Earth systems. The student is expected to

(A) describe and predict the impact of different catastrophic events on the Earth (7.14);

(B) analyze effects of regional erosional deposition and weathering (7.14);

(C) make inferences and draw conclusions about effects of human activity on Earth's renewable, non-renewable, and inexhaustible resources (7.14);

(A) predict land features resulting from gradual changes such as mountain building, beach erosion, land subsidence, [and continental drift] (8.14); *

*TAKS will assess students' understanding of plate tectonics. The theory of plate tectonics is the most current and accepted theory of plate movement.

(B) analyze how natural or human events may have contributed to the extinction of some species (8.14); and

(C) describe how human activities have modified soil, water, and air quality (8.14).

TEXAS ASSESSMENT OF KNOWLEDGE AND SKILLS (TAKS)

PROPOSED BLUEPRINT FOR MIDDLE SCHOOL SCIENCE GIVEN AT GRADE 8

Objectives	Number of Items
Objective 1—Nature of Science	14
Objective 2—Living Systems and the Environment	12
Objective 3—Structures and Properties of Matter	6
Objective 4—Motion, Forces, and Energy	6
Objective 5—Earth and Space Systems	12
Total number of items	**50**

Objective 1—Nature of Science

Objective 1 focuses on an understanding of scientific processes, which includes design of investigations, accurate data collection, the use of models to represent the natural world, and data analysis. Because an understanding of the nature of science is critical to scientific literacy, this objective is given slightly more emphasis (14 items) than any of the other four objectives.

Objective 2—Living Systems and the Environment

The middle school TEKS at grades 6–8 both continue and extend the life science concepts that were tested in elementary science on Objective 2. The emphasis on life science concepts on the middle school science test (12 items) will ensure that students have the foundation in living systems and the environment to be successful in high school biology as well as on the TAKS science assessments at grades 10 and exit level.

Objectives 3 and 4—Chemistry and Physics Concepts

To use the middle school assessment as a diagnostic tool for high school science placement, Objective 3 from the elementary science test has been divided into two objectives for middle school. To emphasize that these physical sciences are of equal importance, Objectives 3 and 4 will each be assessed with six items, for a total of 12 items assessing students' understanding of the physical sciences.

Objective 5—Earth and Space Systems

Objective 5 focuses on earth and space sciences and is both a continuation and extension of Objective 4 on the TAKS elementary science test. The National Science Standards indicate that students should have a working knowledge of earth/space systems, since these systems are considered an important science strand. The TEKS for grades 6–8 devote approximately one third of the curriculum to earth/space science; therefore, the TAKS middle school science assessment tests this objective with 12 items.

Summary

The content areas of science studied at grades 6, 7, and 8 are equally divided among life, physical, and earth/space sciences. It is for this reason that each of these content areas is assessed with 12 items. The emphasis on Objective 1 is similar to its treatment on the TAKS science tests at grades 5, 10, and exit level.

A 50-item science test will provide an accurate snapshot of students' understanding of important science concepts taught at middle school.

FORMULA CHART
for Middle School—Grade 8 Science Assessment

Work = force × distance	$W = Fd$
Speed = $\frac{\text{distance}}{\text{time}}$	$s = \frac{d}{t}$
Force = mass × acceleration	$F = ma$
Weight = mass × acceleration due to gravity	$Weight = mg$
Density = $\frac{\text{mass}}{\text{volume}}$	$D = \frac{m}{v}$

Constants/Conversions
g = acceleration due to gravity = $9.8\ \frac{\text{m}}{\text{s}^2}$
speed of light = $3 \times 10^8\ \frac{\text{m}}{\text{s}}$
speed of sound = $343\ \frac{\text{m}}{\text{s}}$ at sea level and 20°C
$1\ \text{cm}^3 = 1\ \text{mL}$

Periodic Table of the Elements

Atomic number	14
Symbol	**Si**
Atomic mass	28.086
Name	Silicon

	Group 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 **H** 1.008 Hydrogen																	2 **He** 4.0026 Helium
2	3 **Li** 6.941 Lithium	4 **Be** 9.012 Beryllium											5 **B** 10.81 Boron	6 **C** 12.011 Carbon	7 **N** 14.007 Nitrogen	8 **O** 15.999 Oxygen	9 **F** 18.998 Fluorine	10 **Ne** 20.179 Neon
3	11 **Na** 22.990 Sodium	12 **Mg** 24.305 Magnesium											13 **Al** 26.982 Aluminum	14 **Si** 28.086 Silicon	15 **P** 30.974 Phosphorus	16 **S** 32.066 Sulfur	17 **Cl** 35.453 Chlorine	18 **Ar** 39.948 Argon
4	19 **K** 39.098 Potassium	20 **Ca** 40.08 Calcium	21 **Sc** 44.956 Scandium	22 **Ti** 47.88 Titanium	23 **V** 50.942 Vanadium	24 **Cr** 51.996 Chromium	25 **Mn** 54.938 Manganese	26 **Fe** 55.847 Iron	27 **Co** 58.933 Cobalt	28 **Ni** 58.69 Nickel	29 **Cu** 63.546 Copper	30 **Zn** 65.39 Zinc	31 **Ga** 69.72 Gallium	32 **Ge** 72.61 Germanium	33 **As** 74.922 Arsenic	34 **Se** 78.96 Selenium	35 **Br** 79.904 Bromine	36 **Kr** 83.80 Krypton
5	37 **Rb** 85.468 Rubidium	38 **Sr** 87.62 Strontium	39 **Y** 88.906 Yttrium	40 **Zr** 91.224 Zirconium	41 **Nb** 92.906 Niobium	42 **Mo** 95.94 Molybdenum	43 **Tc** (98) Technetium	44 **Ru** 101.07 Ruthenium	45 **Rh** 102.906 Rhodium	46 **Pd** 106.42 Palladium	47 **Ag** 107.868 Silver	48 **Cd** 112.41 Cadmium	49 **In** 114.82 Indium	50 **Sn** 118.71 Tin	51 **Sb** 121.763 Antimony	52 **Te** 127.60 Tellurium	53 **I** 126.904 Iodine	54 **Xe** 131.29 Xenon
6	55 **Cs** 132.905 Cesium	56 **Ba** 137.33 Barium	57 **La** 138.906 Lanthanum	72 **Hf** 178.49 Hafnium	73 **Ta** 180.948 Tantalum	74 **W** 183.84 Tungsten	75 **Re** 186.207 Rhenium	76 **Os** 190.23 Osmium	77 **Ir** 192.22 Iridium	78 **Pt** 195.08 Platinum	79 **Au** 196.967 Gold	80 **Hg** 200.59 Mercury	81 **Tl** 204.383 Thallium	82 **Pb** 207.2 Lead	83 **Bi** 208.980 Bismuth	84 **Po** (209) Polonium	85 **At** (210) Astatine	86 **Rn** (222) Radon
7	87 **Fr** (223) Francium	88 **Ra** 226.025 Radium	89 **Ac** 227.028 Actinium	104 **Rf** (261) Rutherfordium	105 **Db** (262) Dubnium	106 **Sg** (263) Seaborgium	107 **Bh** (262) Bohrium	108 **Hs** (265) Hassium	109 **Mt** (266) Meitnerium	110 (269)								

Mass numbers in parentheses are those of the most stable or most common isotope.

Lanthanide Series	58 **Ce** 140.12 Cerium	59 **Pr** 140.908 Praseodymium	60 **Nd** 144.24 Neodymium	61 **Pm** (145) Promethium	62 **Sm** 150.36 Samarium	63 **Eu** 151.97 Europium	64 **Gd** 157.25 Gadolinium	65 **Tb** 158.925 Terbium	66 **Dy** 162.50 Dysprosium	67 **Ho** 164.930 Holmium	68 **Er** 167.26 Erbium	69 **Tm** 168.934 Thulium	70 **Yb** 173.04 Ytterbium	71 **Lu** 174.967 Lutetium
Actinide Series	90 **Th** 232.038 Thorium	91 **Pa** 231.036 Protactinium	92 **U** 238.029 Uranium	93 **Np** 237.048 Neptunium	94 **Pu** (244) Plutonium	95 **Am** (243) Americium	96 **Cm** (247) Curium	97 **Bk** (247) Berkelium	98 **Cf** (251) Californium	99 **Es** (252) Einsteinium	100 **Fm** (257) Fermium	101 **Md** (258) Mendelevium	102 **No** (259) Nobelium	103 **Lr** (262) Lawrencium