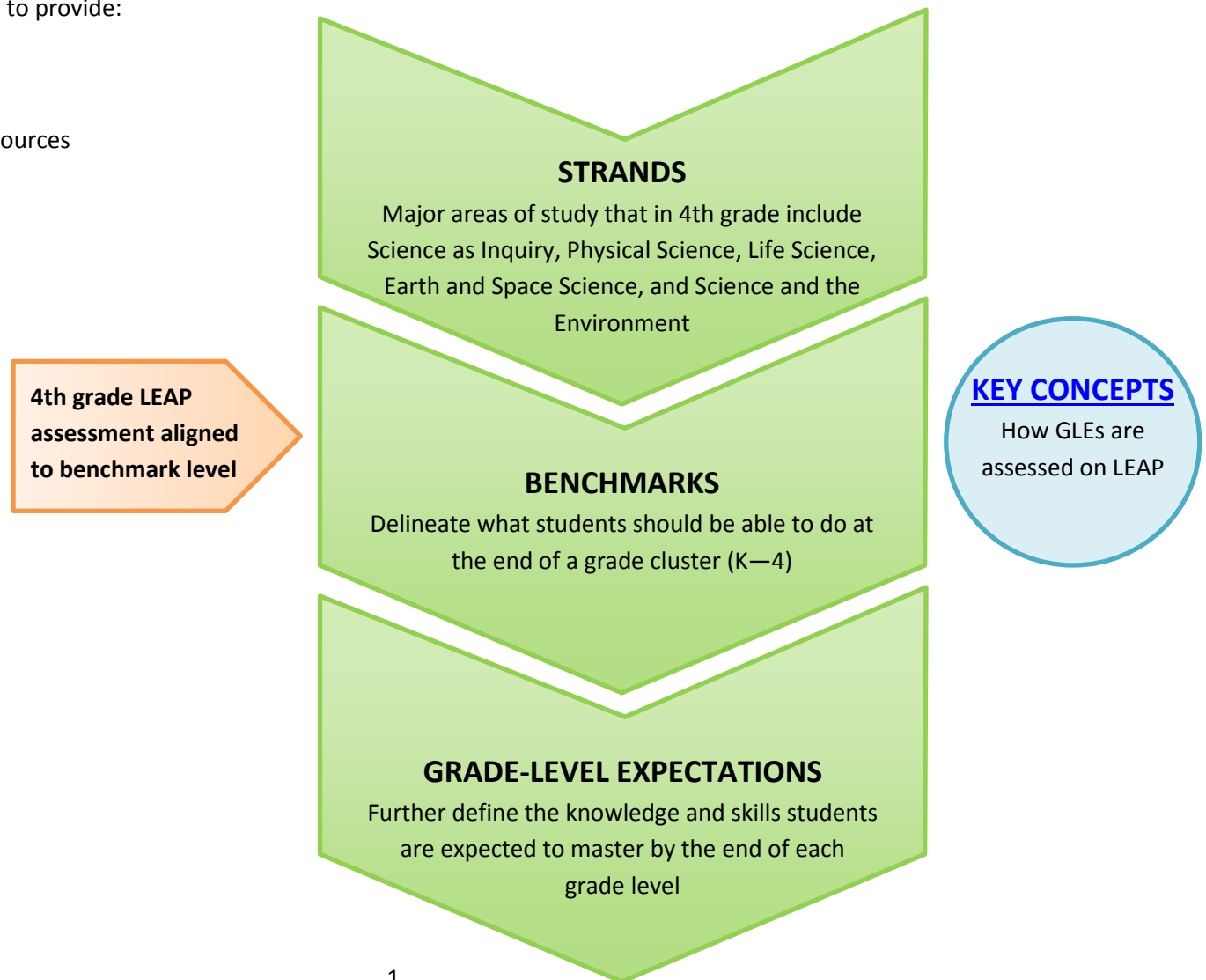


The grade 4 LEAP test continues to assess Louisiana’s science benchmarks. The design of the test remains the same as in previous administrations.

The purpose of this assessment guidance is to provide:

- the structure of the test
- specifications for the test
- the benchmarks for grades K-4
- links to sample items and other resources



Strands and Benchmarks

Louisiana’s science content standards—broad statements of expectations for student learning— encompass five strands: Science as Inquiry, Physical Science, Life Science, Earth and Space Science, and Science and the Environment. The grade 4 LEAP test assesses all five strands.

To delineate what students should know and be able to do, each standard is divided into benchmarks for grade clusters (K-4 or 5-8). Benchmarks are organized into categories within each strand. These categories (e.g., Abilities Necessary to Do Scientific Inquiry, or Objects in the Sky) provide content definition by highlighting the underlying themes within the domain of each strand.

To further define the knowledge and skills students are expected to know at the end of each grade, not just at the end of a grade span, Louisiana educators developed grade-level expectations (GLEs).

The test items reflect the benchmarks and focus on both the *why* and the implications of phenomena in science, rather than the focus on the *what* and specific facts or details.

Test Structure

Test Sessions	Number of Items	Number of Points	Suggested Testing Time*
Session 1: Multiple Choice	40	40	60 minutes
Session 2: Short Answer	4	8	30 minutes
Session 3: Task	4 multiple choice 1 extended response	8 (multiple choice = 1 pt each, extended response = 4 pts)	30 minutes

*The science test is **untimed**.

Test Specifications

Percentage of Points by Strand for the Multiple-Choice and Short Answer Sessions (Sessions 1 and 2)*

Strand/Category	# of Points MC	# of Points CR	% of Points
Science as Inquiry	8	0	16
A. Questioning, Planning, Doing, and Recording			
B. Interpreting and Communicating			
Physical Science	8	2	21
A. Properties of Objects and Materials			
B. Position and Motion of Objects			
C. Forms of Energy			
Life Science	8	2	21
A. Characteristics of Organisms			
B. Life Cycles of Organisms			
C. Organisms and their Environment			
Earth and Space Science	8	2	21
A. Properties of Earth Materials			
B. Objects in the Sky			
Science and the Environment	8	2	21
Total	40	8	100

*The table refers to the multiple-choice and short answer sessions only.

Description of the Task

The task promotes science literacy through the use of discipline-specific practices to collect, apply, and communicate content knowledge. The task reflects the rigor of Louisiana’s content standards and applies English language arts standards for reading informational text (includes science and technical texts) and writing to a science context.

The items in the task are aligned to science benchmarks. The task may assess any of the five science strands: Science as Inquiry, Physical Science, Life Science, Earth and Space Science, and Science and the Environment.

The task consists of four multiple-choice items and one extended-response item. The items are based on one or two stimulus materials. The extended-response portion of the task requires students to provide a written response that will be scored using a 0-4 point rubric. The task asks students to incorporate science content knowledge with evidence from the stimulus materials. A sample task for grade 4 may be found in the [Sample Items](#) document.

At grade 4, the reading and writing skills required by the task may include some or all of the following:

- reading and comprehending grade-level complex text, including science and technical texts, independently and proficiently
- determining the main idea of a text and explaining how it is supported by key details
- describing the relationship between a series of scientific ideas, concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, cause and effect
- determining the meaning of domain-specific words and phrases in a text
- using information gained from illustrations (e.g., maps, charts, graphs) and the words in a text to demonstrate understanding of the text
- comparing and contrasting the most important points and key details presented in two texts on the same topic
- providing a concluding statement or section

Description of Stimulus Material

The grade 4 test may incorporate the following types of stimulus material:

- an excerpt from a text-based source
- data tables or graphs presenting data to be read or interpreted
- charts, illustrations, or graphic organizers
- descriptions and details of science investigations
- maps showing geographical features

Example of the types of stimulus materials may be found in the [Sample Items](#) document.

GRADE 4
SCIENCE STANDARDS AND BENCHMARKS

Science as Inquiry: Students will *do* science by engaging in partial and full inquiries that are within their developmental capabilities.

Questioning, Planning, Doing, and Recording

BENCHMARKS	STUDENT REQUIREMENTS
<p>SI-E-A1: asking appropriate questions about organisms and events in the environment</p> <p>SI-E-A2: planning and/or designing and conducting a scientific investigation</p> <p>SI-E-A4: employing equipment and tools to gather data and extend the sensory observations</p> <p>SI-E-A7: utilizing safety procedures during experiments</p> <p>SI-E-B1: categorizing questions into what is known, what is not known, and what questions need to be explained</p> <p>SI-E-B2: using appropriate experiments depending on the questions to be explored</p> <p>SI-E-B3: choosing appropriate equipment and tools to conduct an experiment</p>	<ul style="list-style-type: none"> • construct knowledge and explanations • formulate questions • design plausible means of gathering data or evidence related to their questions • design and carry out scientific investigations • use appropriate tools, technology, and techniques • gather data to address the questions they formulated • recognize the variety of types of information that constitute evidence • recognize the inherent bias and limitations of each source of information keep clear, concise records of appropriate data and observations

Interpreting and Communicating

BENCHMARKS	STUDENT REQUIREMENTS
<p>SI-E-A3: communicating that observations are made with one's senses</p> <p>SI-E-A5: using data, including numbers and graphs, to explain observations and experiments</p> <p>SI-E-A6: communicating observations and experiments in oral and written formats</p> <p>SI-E-B4: developing explanations by using observations and experiments</p> <p>SI-E-B5: presenting the results of experiments</p> <p>SI-E-B6: reviewing and asking questions about the results of investigations</p>	<ul style="list-style-type: none"> • think critically and logically about relationships between different pieces of evidence • develop and modify predictions, models, and explanations • make meaning of observations, natural phenomena, and everyday occurrences • share the results of scientific investigations through oral and written formats

Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy

in the physical world.	
Understanding Essential Content and Concepts	
BENCHMARKS	STUDENT REQUIREMENTS
<p>PS-E-A1 observing, describing, and classifying objects by properties (size, weight, shape, color, texture, and temperature)</p> <p>PS-E-A2 measuring properties of objects using appropriate materials, tools, and technology</p> <p>PS-E-A3 observing and describing objects by the properties of the materials from which they are made (paper, wood, metal)</p> <p>PS-E-B1 observing and describing the position of an object relative to another object or the background</p> <p>PS-E-C1 experimenting and communicating how vibrations of objects produce sound and how changing the rate of vibration varies the pitch</p> <p>PS-E-C2 investigating and describing how light travels and what happens when light strikes an object (reflection, refraction, and absorption)</p> <p>PS-E-C3 investigating and describing different ways heat can be produced and moved from one object to another by conduction</p> <p>PS-E-C4 investigating and describing how electricity travels in a circuit</p>	<ul style="list-style-type: none"> • demonstrate knowledge and understanding of <ul style="list-style-type: none"> ○ —<i>properties of matter</i> ○ —<i>physical interactions of matter</i> ○ —<i>the transfer of energy</i> • recognize and discuss patterns of behavior among materials
Explaining, Reflecting, and Connecting	
BENCHMARKS	STUDENT REQUIREMENTS
<p>PS-E-A4 describing the properties of the different states of matter and identifying the conditions that cause matter to change states</p> <p>PS-E-B2 exploring and recognizing that the position and motion of objects can be changed by pushing or pulling (force) over time</p> <p>PS-E-B4 investigating and describing how the motion of an object is related to the strength of the force (pushing or pulling) and the mass of the object.</p> <p>PS-E-C5 investigating and communicating that magnetism and gravity can exert forces on objects without touching the objects</p> <p>PS-E-C7 exploring and describing the uses of energy at school, home, and play</p>	<ul style="list-style-type: none"> • think critically and logically about the relationships between evidence and Physical Science concepts • recognize similarities or differences • recognize patterns of change • recognize relations within systems or between form and function • unify concepts and processes to explain natural phenomena, observations, and ideas

Applying and Using Knowledge and Technology	
BENCHMARKS	STUDENT REQUIREMENTS
<p>PS-E-A5 creating mixtures and separating them based on differences in properties (salt, sand)</p> <p>PS-E-B3 describing an object’s motion by tracing and measuring its position over time</p> <p>PS-E-C6 exploring and describing simple energy transformations</p>	<ul style="list-style-type: none"> • generalize findings about Physical Science concepts • solve contextualized problems • apply data to new situations • critically evaluate new ideas • propose, analyze, and critique explanations for observed phenomena • use technology and scientific information to investigate and solve problems • use technology and scientific information to communicate their findings and ideas
<p>Life Science: Students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.</p>	
Understanding Essential Content and Concepts	
BENCHMARKS	STUDENT REQUIREMENTS
<p>LS-E-A1 identifying the needs of plants and animals, based on age-appropriate recorded observations</p> <p>LS-E-A2 distinguishing between living and nonliving things</p> <p>LS-E-A3 locating and comparing major plant and animal structures and their functions</p> <p>LS-E-A5 locating major human body organs and describing their functions</p> <p>LS-E-A6 recognizing the food groups necessary to maintain a healthy body</p>	<ul style="list-style-type: none"> • develop an understanding of the characteristics and relationships of organisms and their environments • develop an understanding of the principles and concepts that explain characteristics of plants and animals (for example, systems interactions, form and function)
Explaining, Reflecting, and Connecting	
BENCHMARKS	STUDENT REQUIREMENTS
<p>LS-E-A4 recognizing that there is great diversity among organisms</p> <p>LS-E-B1 observing and describing the life cycles of some plants and animals</p> <p>LS-E-B2 observing, comparing, and grouping plants and animals according to likenesses and/or differences</p>	<ul style="list-style-type: none"> • think critically and logically about the relationships between evidence and Life Science concepts • recognize the importance of and relationships between separate ideas, facts, and phenomena

<p>LS-E-B3 observing and recording how the offspring of plants and animals are similar to their parents</p> <p>LS-E-C2 describing how the features of some plants and animals enable them to live in specific habitats</p> <p>LS-E-C3 observing animals and plants and describing interaction or interdependence</p>	<ul style="list-style-type: none"> • recognize similarities or differences • recognize patterns of change or constancy • recognize relations within systems or between form and function unify concepts and processes to explain natural phenomena, observations, and ideas
Applying and Using Knowledge and Technology	
BENCHMARKS	STUDENT REQUIREMENTS
<p>LS-E-B4 observing, recording, and graphing student growth over time using a variety of quantitative measures (height, weight, linear measure of feet and hands, etc.)</p> <p>LS-E-C1 examining the habitats of plants and animals and determining how basic needs are met within each habitat</p>	<ul style="list-style-type: none"> • use scientific knowledge and understanding to generalize findings and Life Science concepts • solve contextualized problems • apply data to new situations • critically evaluate new ideas • propose, recognize, analyze, and critique explanations for observed phenomena • use technology and scientific information to investigate and solve problems • communicate findings and ideas
<p>Earth and Space Science: Students will develop an understanding of the properties of earth materials, the structure of Earth’s system, Earth’s history, and Earth’s place in the universe.</p>	
Understanding Essential Content and Concepts	
BENCHMARKS	STUDENT REQUIREMENTS
<p>ESS-E-A1 understanding that earth materials are rocks, minerals, and soils</p> <p>ESS-E-A5 observing and communicating that rocks are composed of various substances</p> <p>ESS-E-A6 observing and describing variations in soil</p> <p>observing and describing the characteristics of objects in the sky</p> <p>ESS-E-B5 understanding that the Sun, a star, is a source of heat and light energy and identifying its effects upon Earth</p>	<ul style="list-style-type: none"> • develop an understanding of the properties of earth materials • develop an understanding of the structure of Earth’s systems, Earth’s history, and Earth’s place in the universe • develop an understanding of the structure, order, and origin of the universe

Explaining, Reflecting, and Connecting	
BENCHMARKS	STUDENT REQUIREMENTS
<p>ESS-E-A2 understanding that approximately three-fourths of Earth’s surface is covered with water and how this condition affects weather patterns and climates</p> <p>ESS-E-A3 investigating, observing, and describing how water changes from one form to another and interacts with the atmosphere</p> <p>ESS-E-B demonstrating how the relationship of Earth, the Moon, and the Sun causes eclipses and moon phases</p> <p>ESS-E-B3 observing and recording the changing appearances and positions of the Moon in the sky at night and determining the monthly pattern of lunar change</p>	<ul style="list-style-type: none"> • think critically and logically about the relationships between evidence and Earth and Space Science concepts • recognize the importance of and relationships between separate ideas, facts, and phenomena • recognize similarities or differences • recognize patterns of change or constancy • recognize relations within systems or between form and function • unify concepts and processes to explain natural phenomena, observations, and ideas
Applying and Using Knowledge and Technology	
BENCHMARKS	STUDENT REQUIREMENTS
<p>ESS-E-A4 investigating, observing, measuring, and describing changes in daily weather patterns and phenomena</p> <p>ESS-E-A7 investigating fossils and describing how they provide evidence about plants and animals that lived long ago and the environment in which they lived</p> <p>ESS-E-B4 modeling changes that occur because of the rotation of Earth (alternation of night and day) and the revolution of Earth around the Sun</p> <p>ESS-E-B6 understanding that knowledge of Earth as well as of the universe is gained through space exploration</p>	<ul style="list-style-type: none"> • use scientific knowledge and understanding to generalize findings and Earth and Space Science concepts • solve contextualized problems • apply data to new situations • critically evaluate new ideas • propose, recognize, analyze, and critique explanations for observed phenomena • use technology and scientific information to investigate and solve problems • communicate findings and ideas
<p>Science and the Environment: Students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.</p>	
Understanding Essential Content and Concepts	

BENCHMARKS	STUDENT REQUIREMENTS
SE-E-A1 understanding that an ecosystem is made of living and nonliving components	<ul style="list-style-type: none"> know and understand the interrelationships among the biological, chemical, geological, and physical aspects of the environment
Explaining, Reflecting, and Connecting	
BENCHMARKS	STUDENT REQUIREMENTS
SE-E-A2 understanding the components of a food chain SE-E-A4 understanding that the original sources of all material goods are natural resources and that the conserving and recycling of natural resources is a form of stewardship SE-E-A5 understanding that most plant and animal species are threatened or endangered today due to habitat loss or change	<ul style="list-style-type: none"> think critically and logically about the relationships between evidence and Environmental Science concepts recognize the importance of and relationships between separate ideas, facts, and phenomena recognize similarities or differences recognize patterns of change or constancy recognize relations within systems or between form and function unify concepts and processes to explain natural phenomena, observations, and ideas
Applying and Using Knowledge and Technology	
BENCHMARKS	STUDENT REQUIREMENTS
SE-E-A3 identifying ways in which humans have altered their environment, both in positive and negative ways, either for themselves or for other living things	<ul style="list-style-type: none"> use scientific knowledge and understanding to generalize findings and Environmental Science concepts solve contextualized problems apply data to new situations critically evaluate new ideas propose, recognize, analyze, and critique explanations for observed phenomena use technology and scientific information to investigate and solve problems communicate findings and ideas

Explanation of Codes:

Benchmarks are grouped by strand and thematic category. Benchmarks are coded by strand, grade cluster, and benchmark number. The first term in the code refers to the strand. The second term refers to the grade cluster, and the third term refers to the category and benchmark number.

Examples of Science Codes:

CODE	TRANSLATION
SI-E-A5	SI Strand, Elementary level, category A, benchmark 5
PS-M-B4	PS Strand, Middle School level, category B, benchmark 4
SE-H-A6	SE Strand, High School level, category A, benchmark 6