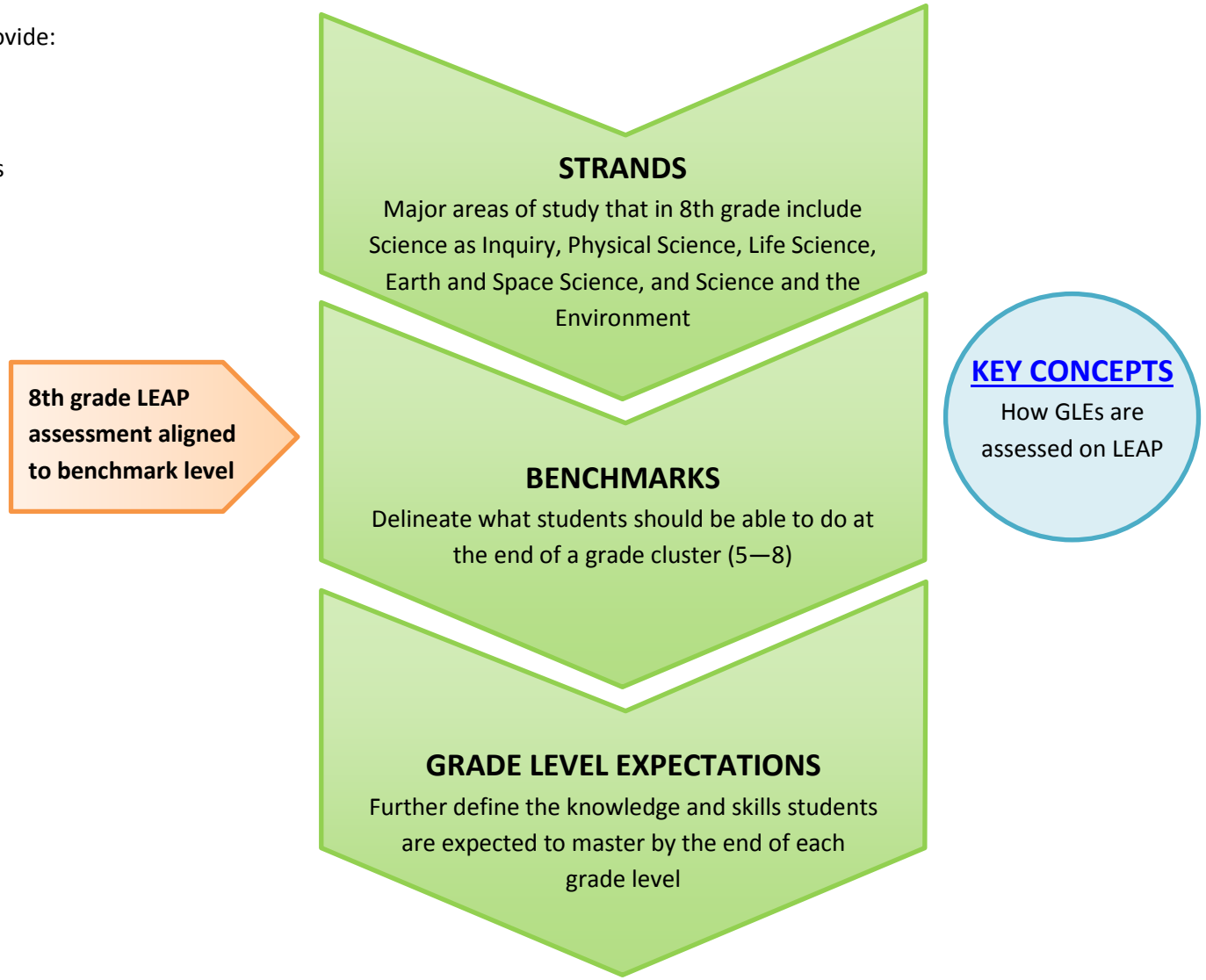
The grade 8 LEAP test continues to assess Louisiana's science benchmarks. The design of the test remains the same as in previous administrations.

The purpose of this assessment guidance is to provide:

- the structure of the test
- specifications for the test
- the benchmarks for grades 5-8
- 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 8 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 Sessions	Number of Items	Number of Points	Suggested Testing Time*
Session 1: Multiple Choice	40	40	60 minutes
Session 2: Short Answer	4	8 (2 pts each)	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.**

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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 and Changes of Properties in Matter			
B. Motion and Forces			
C. Transformations of Energy			
Life Science	8	2	21
A. Structure and Function in Living Systems			
B. Reproduction and Heredity			
C. Populations and Ecosystems			
D. Adaptations of Organisms			
Earth and Space Science	8	2	21
A. Structure of Earth			
B. Earth History			
C. Earth in the Solar System			
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 8 may be found in the Sample Items document.

At grade 8, the literacy skills required by the task may include some or all of the following:

- citing specific textual evidence
- determining the central ideas or conclusions of a text
- following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks
- determining the meaning of symbols, key terms, and other domain-specific words and phrases
- analyzing the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text
- integrating quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, table)
- distinguishing among facts, reasoned judgment based on research findings, and speculation in a text
- comparing and contrasting the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic

Description of Stimulus Material

The multiple-choice, constructed-response, and task sessions 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

Examples of the types of stimulus materials may be found in the Sample Items document.

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GRADE 8
SCIENCE STANDARDS AND BENCHMARKS

Science as Inquiry: **The 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
SI-M-A1 identifying questions that can be used to design a scientific investigation **SI-M-A2** designing and conducting a scientific investigation **SI-M-A3** using mathematics and appropriate tools and techniques to gather, analyze, and interpret data **SI-M-A8** utilizing safety procedures during scientific investigations **SI-M-B1** recognizing that different kinds of questions guide different kinds of scientific investigations **SI-M-B2** communicating that current scientific knowledge guides scientific investigations **SI-M-B3** understanding that mathematics, technology, and scientific techniques used in an experiment can limit or enhance the accuracy of scientific knowledge	• construct knowledge and explanations • formulate testable 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
SI-M-A4 developing descriptions, explanations, and graphs using data **SI-M-A5** developing models and predictions using the relationships between data and explanations **SI-M-A6** comparing alternative explanations and predictions **SI-M-A7** communicating scientific procedures, information, and explanations **SI-M-B4** using data and logical arguments to propose, modify, or elaborate on principles and models	• 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 investigation through oral and written formats

SI-M-B5 understanding that scientific knowledge is enhanced through peer review, alternative explanations, and constructive criticism **SI-M-B6** communicating that scientific investigations can result in new ideas, new methods or procedures, and new technologies **SI-M-B7** understanding that scientific development/technology is driven by societal needs and funding	

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

PS-M-A1 investigating, measuring, and communicating the properties of different substances that are independent of the amount of the substance
PS-M-A2 understanding that all matter is made up of particles called atoms and that atoms of different elements are different
PS-M-A3 grouping substances according to similar properties and/or behaviors
PS-M-A4 understanding that atoms and molecules are perpetually in motion
PS-M-A7 understanding that during a chemical reaction in a closed system, the mass of the products is equal to that of the reactants
PS-M-B2 recognizing different forces and describing their effects (gravity, electrical, magnetic)
PS-M-B3 understanding that, when an object is not being subjected to a force, it will continue to move at a constant speed and in a straight line
PS-M-B5 understanding that unbalanced forces will cause changes in the speed or direction of an object's motion
PS-M-C2 understanding the different kinds of energy transformations and the fact that energy can be neither destroyed nor created
PS-M-C3 understanding that the Sun is a major source of energy and that energy arrives at Earth's surface as light with a range of wavelengths
PS-M-C7 understanding that energy is involved in chemical reactions
	• demonstrate knowledge and understanding of
	  o —*properties of matter*
	  o —*physical interactions of matter*
	  o —*chemical interactions of matter*
	  o —*the transfer of energy*
	• recognize and discuss patterns of behavior among materials

Explaining, Reflecting, and Connecting

BENCHMARKS	STUDENT REQUIREMENTS
PS-M-A8 discovering and recording how factors such as temperature influence chemical reactions **PS-M-A9** identifying elements in compounds found in common foods, clothing, household materials, and automobiles **PS-M-B4** describing how forces acting on an object will reinforce or cancel one another, depending upon their direction and magnitude **PS-M-C1** identifying and comparing the characteristics of different types of energy **PS-M-C4** observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering) **PS-M-C6** describing the types of energy that can be involved, converted, or released in electrical circuits	• think critically and logically about the relationships between evidence and Physical Science concepts • recognize the importance of and relationships between separate ideas, facts, observations, and phenomena • recognize similarities or differences, patterns of change or constancy, and 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**
PS-M-A5 investigating the relationships among temperature, molecular motion, phase changes, and physical properties of matter **PS-M-A6** investigating chemical reactions between different substances to discover that new substances formed may have new physical properties and do have new chemical properties **PS-M-B1** describing and graphing the motions of objects **PS-M-C5** investigating and describing the movement of heat and the effects of heat in objects and systems **PS-M-C8** comparing the uses of different energy resources and their effects upon the environment	• 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 • communicate their findings and ideas
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.	
Understanding Essential Content and Concepts	

BENCHMARKS	STUDENT REQUIREMENTS
LS-M-A1 describing the observable components and functions of a cell, such as the cell membrane, nucleus, and movement of molecules into and out of cells **LS-M-A4** describing the basic processes of photosynthesis and respiration and their importance to life **LS-M-A7** describing communicable and noncommunicable diseases **LS-M-B1** describing the importance of body cell division (mitosis) and sex cell production (meiosis) **LS-M-B2** describing the role of chromosomes and genes in heredity **LS-M-B3** describing how heredity allows parents to pass certain traits to offspring **LS-M-D1** describing the importance of plant and animal adaptation, including local examples	• 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, evolutionary development)
Explaining, Reflecting, and Connecting	
BENCHMARKS	**STUDENT REQUIREMENTS**
LS-M-A2 comparing and contrasting the basic structures and functions of different plant and animal cells **LS-M-A5** investigating human body systems and their functions (including-circulatory, digestive, skeletal, respiratory) **LS-M-A6** describing how the human body changes with age and listing factors that affect the length and quality of life **LS-M-C2** modeling and interpreting food chains and food webs **LS-M-C3** investigating major ecosystems and recognizing physical properties and organisms within each **LS-M-C4** explaining the interaction and interdependence of nonliving and living components within ecosystems **LS-M-D2** explaining how some members of a species survive under changed environmental conditions	• 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 • 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
LS-M-A3 observing and analyzing the growth and development of selected organisms, including a seed plant, an insect with complete metamorphosis, and an amphibian **LS-M-C1** constructing and using classification systems based on the structure of organisms	• 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
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.	
Understanding Essential Content and Concepts	
BENCHMARKS	**STUDENT REQUIREMENTS**
ESS-M-A1 understanding that Earth is layered by density with an inner and outer core, a mantle, and a thin outer crust **ESS-M-A2** understanding that Earth's crust and solid upper mantle are dividing plates that move in response to convection currents (energy transfers) in the mantle **ESS-M-A5** identifying the characteristics and uses of minerals and rocks and recognizing that rocks are mixtures of minerals **ESS-M-A9** comparing and contrasting topographic features of the ocean floor to those formed above sea level **ESS-M-A11** understanding that the atmosphere interacts with the hydrosphere to affect weather and climate conditions **ESS-M-C1** identifying the characteristics of the Sun and other stars **ESS-M-C5** modeling the position of Earth in relationship to other objects in the solar system	• develop an understanding of: o —*the properties of Earth materials* o —*the structure of Earth's systems* o —*Earth's history* o —*Earth's place in the universe* • demonstrate knowledge about the structure, order, and origin of the universe • develop a basic understanding of our world

Explaining, Reflecting, and Connecting	
BENCHMARKS	**STUDENT REQUIREMENTS**
ESS-M-A3 investigating the characteristics of earthquakes and volcanoes and identifying zones where they may occur **ESS-M-A4** investigating how soils are formed from weathered rock and decomposed organic material **ESS-M-A6** explaining the processes involved in the rock cycle **ESS-M-A7** modeling how landforms result from the interaction of constructive and destructive forces **ESS-M-A10** explaining (illustrating) how water circulates—on and through the crust, in the oceans, and in the atmosphere—in the water cycle **ESS-M-B1** investigating how fossils show the development of life over time **ESS-M-B3** understanding that the Earth processes, such as erosion and weathering, that affect Earth today are similar to those which occurred in the past **ESS-M-C2** comparing and contrasting the celestial bodies in our solar system **ESS-M-C3** investigating the force of gravity and the ways gravity governs motion in the solar system and objects on Earth **ESS-M-C4** modeling the motions of the Earth-Moon-Sun system to explain day and night, a year, eclipses, moon phases, and tides **ESS-M-C7** modeling and explaining how seasons result from variations in the amount of the Sun's energy hitting the surface due to the tilt of Earth's rotation on its axis and the length of the day	• 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**
ESS-M-A8 identifying man-made and natural causes of coastal erosion and the steps taken to combat it **ESS-M-A12** predicting weather patterns through use of a weather map **ESS-M-B2** devising a model that demonstrates supporting evidence that Earth has existed for a vast period of time	• 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

ESS-M-C6 modeling and describing how radiant energy from the Sun affects phenomena on the Earth's surface, such as winds, ocean currents, and the water cycle **ESS-M-C8** understanding that space exploration is an active area of scientific and technological research and development	• propose, recognize, analyze, and critique explanations for observed phenomena • use technology and scientific information to investigate and solve problems • communicate findings and ideas
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.	
Understanding Essential Content and Concepts	
BENCHMARKS	**STUDENT REQUIREMENTS**
SE-M-A1 demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems **SE-M-A6** distinguishing between renewable and nonrenewable resources and understanding that nonrenewable natural resources are not replenished through the natural cycles and thus are strictly limited in quantity **SE-M-A7** demonstrating knowledge of the natural cycles, such as the carbon cycle, nitrogen cycle, water cycle, and oxygen cycle	• demonstrate knowledge about the interrelationships among the biological, chemical, geological, and physical aspects of the environment
Explaining, Reflecting, and Connecting	
BENCHMARKS	**STUDENT REQUIREMENTS**
SE-M-A2 demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations **SE-M-A5** tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem **SE-M-A9** demonstrating relationships of characteristics of soil types to agricultural practices and productivity	• 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-M-A3 defining the concept of pollutant and describing the effects of various pollutants on ecosystems **SE-M-A4** understanding that human actions can create risks and consequences in the environment **SE-M-A8** investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem **SE-M-A10** identifying types of soil erosion and preventive measures	• 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:

GLEs are numbered consecutively in each grade level and 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, Category A, Benchmark 5
PS-M-B4	PS Strand, Middle School, Category B, Benchmark 4
SE-H-A6	SE Strand, High School, Category A, Benchmark 6