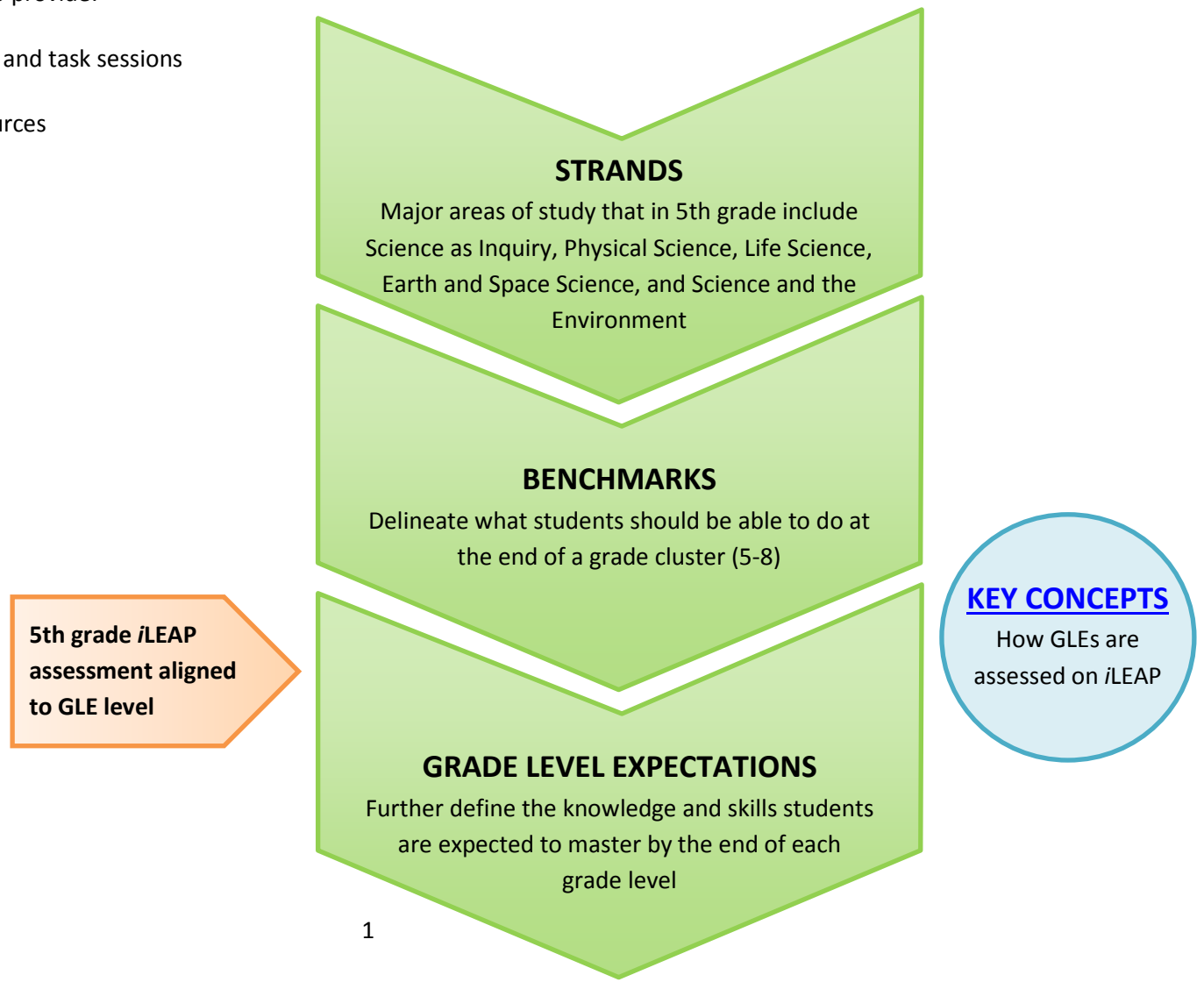
The grade 5 *i*LEAP test continues to assess Louisiana's science grade-level expectations (GLEs). The design of the test remains the same as in previous administrations.

The purpose of this assessment guidance is to provide:

- the structure of the test
- specifications for the multiple-choice and task sessions
- the GLEs eligible for assessment
- links to sample items and other resources



Strands, Benchmarks, and Grade-Level Expectations (GLEs)

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 5 test assesses all five strands primarily through general science concepts. Content explored at this grade level includes properties of matter, reactions, forces, motion and energy transformations, cells to living organisms, ecosystems, Earth and its atmosphere, cycles and climates, and space.

To delineate what students should know and be able to do, each strand is divided into benchmarks for grade clusters (K-4 or 5-8). Benchmarks are organized into two to four thematic categories within each strand. These categories (e.g., Abilities Necessary to Do Scientific Inquiry, or Populations and Ecosystems) 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)

Test Structure

Test Sessions	Number of Items	Number of Points	Suggested Testing Time*
Multiple Choice	46	46	60 minutes
Task	4 multiple choice 1 extended response	8 (multiple choice = 1 pt each, extended response = 4 pts)	30 minutes

*The science test is **untimed.**

Specifications for the Multiple-Choice Session

Percentage of Points by Strand for the Multiple-Choice Session*

Strand/Category	**% of Points**
Science as Inquiry	22
A. The Abilities to Do Scientific Inquiry	
B. Understanding Scientific Inquiry	
Physical Science	20
A. Properties and Changes of Properties in Matter	
B. Motion and Forces	
C. Transformations of Energy	
Life Science	20
A. Structure and Function in Living Systems	
B. Reproduction and Heredity	
C. Populations and Ecosystems	
D. Adaptations of Organisms	
Earth and Space Science	22
A. Structure of Earth	
B. Earth History	
C. Earth in the Solar System	
Science and the Environment	16
Total	100

*The table refers to the multiple-choice session only.

Most of the GLEs are eligible for assessment on the multiple-choice session of the grade 5 *i*LEAP science test. Some, however, do not lend themselves to direct assessment in multiple-choice format. The following GLEs are not assessed:

- Science as Inquiry: 7,8,9,14,15,19,20,24,37
- Physical Science: 1,9
- Life Science: 23
- Earth and Space Science: 32,30,42,47

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 GLEs. 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 following GLE's are not assessed in the task session:

- Science as Inquiry: 8,20,24,37
- Physical Science: 1

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 stimulus materials. A sample task for grade 5 may be found in the Sample Items document.

At grade 5, the reading and writing skills required by the task may include some or all of the following:

- reading and comprehending grade-level complex texts including science and technical texts independently and proficiently
- determining the main idea of a text
- recounting the key details and explaining how they support the main idea
- 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 multiple choice and task sessions of the grade 5 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

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

Grade 5 SCIENCE STANDARDS, BENCHMARKS, AND GLES	
Science as Inquiry: Students will <u>do</u> science by engaging in partial and full inquiries that are within their developmental capabilities.	
A. The Abilities Necessary to Do Scientific Inquiry	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-M-A1: identifying questions that can be used to design a scientific investigation	1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation 2. Identify problems, factors, and questions that must be considered in a scientific investigation 3. Use a variety of sources to answer questions
SI-M-A2: designing and conducting a scientific investigation	4. Design, predict outcomes, and conduct experiments to answer guiding questions 5. Identify independent variables, dependent variables, and variables that should be controlled in designing an experiment
SI-M-A3: using mathematics and appropriate tools and techniques to gather, analyze, and interpret data	6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations 7. Record observations using methods that complement investigations (e.g., journals, tables, charts) 8. Use consistency and precision in data collection, analysis, and reporting 9. Use computers and/or calculators to analyze and interpret quantitative data
SI-M-A4: developing descriptions, explanations, and graphs using data	10. Identify the difference between description and explanation 11. Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) 12. Use data and information gathered to develop an explanation of experimental results 13. Identify patterns in data to explain natural events

SI-M-A5: developing models and predictions using the relationships between data and explanations	14. Develop models to illustrate or explain conclusions reached through investigation 15. Identify and explain the limitations of models used to represent the natural world 16. Use evidence to make inferences and predict trends
SI-M-A6: comparing alternative explanations and predictions	17. Recognize that there may be more than one way to interpret a given set of data, which can result in alternative scientific explanations and predictions 18. Identify faulty reasoning and statements that misinterpret or are not supported by the evidence
SI-M-A7: communicating scientific procedures, information, and explanations	19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) 20. Write clear step-by-step instructions that others can follow to carry out procedures or conduct investigations 21. Distinguish between *observations* and *inferences* 22. Use evidence and observations to explain and communicate the results of investigations
SI-M-A8: utilizing safety procedures during scientific investigations	23. Use relevant safety procedures and equipment to conduct scientific investigations 24. Provide appropriate care and utilize safe practices and ethical treatment when animals are involved in scientific field and laboratory research
B. Understanding Scientific Inquiry	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SI-M-B1: recognizing that different kinds of questions guide different kinds of scientific investigations	25. Compare and critique scientific investigations 26. Use and describe alternate methods for investigating different types of testable questions 27. Recognize that science uses processes that involve a logical and empirical, but flexible, approach to problem solving
SI-M-B2: communicating that current scientific knowledge guides scientific investigations	28. Recognize that investigations generally begin with a review of the work of others
SI-M-B3: understanding that mathematics, technology, and scientific	29. Explain how technology can expand the senses and contribute to the

techniques used in an experiment can limit or enhance the accuracy of scientific knowledge	increase and/or modification of scientific knowledge 30. Describe why all questions cannot be answered with present technologies 31. Recognize that there is an acceptable range of variation in collected data 32. Explain the use of statistical methods to confirm the significance of data (e.g., mean, median, mode, range)
SI-M-B4: using data and logical arguments to propose, modify, or elaborate on principles and models	33. Evaluate models, identify problems in design, and make recommendations for improvement
SI-M-B5: understanding that scientific knowledge is enhanced through peer review, alternative explanations, and constructive criticism	34. Recognize the importance of communication among scientists about investigations in progress and the work of others 35. Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding 36. Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted 37. Critique and analyze their own inquiries and the inquiries of others
SI-M-B6: communicating that scientific investigations can result in new ideas, new methods or procedures, and new technologies	38. Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas
SI-M-B7: understanding that scientific development/ technology is driven by societal needs and funding	39. Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) 40. Evaluate the impact of research on scientific thought, society, and the environment

Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.

A. Properties and Changes of Properties in Matter

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
PS-M-A1: investigating, measuring, and communicating the properties of different substances which are independent of the amount of the substance	1. Measure a variety of objects in metric system units 2. Compare the physical properties of large and small quantities of the same type of matter

PS-M-A2: understanding that all matter is made up of particles called atoms and that atoms of different elements are different	3. Describe the structure of atoms and the electrical charge of protons, neutrons, and electrons
PS-M-A3: grouping substances according to similar properties and/or behaviors	4. Identify the physical and chemical properties of various substances and group substances according to their observable and measurable properties (e.g., conduction, magnetism, light transmission)
PS-M-A5: investigating the relationships among temperature, molecular motion, phase changes, and physical properties of matter	5. Describe the properties and behavior of water in its solid, liquid, and gaseous phases (states)
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	6. Describe new substances formed from common chemical reactions (e.g., burning paper produces ash)
B. Motion and Forces	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-M-B1: describing and graphing the motions of objects	7. Compare, calculate, and graph the average speeds of objects in motion using both metric system and U.S. system units
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	8. Explain that gravity accelerates all falling objects at the same rate in the absence of air resistance
PS-M-B5: understanding that unbalanced forces will cause changes in the speed or direction of an object's motion	9. Demonstrate a change in speed or direction of an object's motion with the use of unbalanced forces
C. Transformations of Energy	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
PS-M-C1: identifying and comparing the characteristics of different types of energy	10. Compare potential and kinetic energy and give examples of each 11. Classify energy resources as renewable, nonrenewable, or inexhaustible
PS-M-C3: understanding that the Sun is a major source of energy and that energy arrives at the Earth's surface as light with a range of wavelengths	12. Identify the Sun as Earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion
PS-M-C4: observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering)	13. Investigate how changes in the position of a light source and an object alter the size and shape of the shadow
PS-M-C6: describing the types of energy that can be involved, converted, or	14. Identify other types of energy produced through the use of electricity (e.g.,

released in electrical circuits	heat, light, mechanical)

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

A. Structure and Function in Living Systems

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
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	15. Identify the cell as the basic unit of living things 16. Observe, identify, and describe the basic components of cells and their functions (e.g., cell wall, cell membrane, cytoplasm, nucleus)
LS-M-A2: comparing and contrasting the basic structures and functions of different plant and animal cells	17. Compare plant and animal cells and label cell components
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	18. Describe the metamorphosis of an amphibian (e.g., frog)
LS-M-A4: describing the basic processes of photosynthesis and respiration and their importance to life	19. Describe the processes of photosynthesis and respiration in green plants
LS-M-A5: investigating human body systems and their functions (including circulatory, digestive, skeletal, respiratory	20. Describe the levels of structural organization in living things (e.g., cells, tissues, organs, organ systems)
LS-M-A7: describing communicable and noncommunicable diseases	21. Identify diseases caused by germs and how they can be transmitted from person to person

B. Reproduction and Heredity

There are no Grade-Level Expectations for benchmarks in grade 5 for this category.

C. Populations and Ecosystems

BENCHMARKS	GRADE-LEVEL EXPECTATIONS
LS-M-C1: constructing and using classification systems based on the structure	22. Develop and use a simple dichotomous key to classify common plants and

of organisms	animals
LS-M-C2: modeling and interpreting food chains and food webs	23. Construct food chains that could be found in ponds, marshes, oceans, forests, or meadows 24. Describe the roles of producers, consumers, and decomposers in a food chain 25. Compare food chains and food webs
LS-M-C3: investigating major ecosystems and recognizing physical properties and organisms within each	26. Identify and describe ecosystems of local importance 27. Compare common traits of organisms within major ecosystems
LS-M-C4: explaining the interaction and interdependence of nonliving and living components within ecosystems	28. Explain and give examples of predator/prey relationships
D. Adaptations of Organisms	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
LS-M-D1: describing the importance of plant and animal adaptation, including local examples	29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments
Earth and Space Science: Students will develop an understanding of the properties of earth materials, the structure of Earth's system, the Earth's history, and the Earth's place in the universe.	
A. Structure of the Earth	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
ESS-M-A4: investigating how soils are formed from weathered rock and decomposed organic material	30. Identify organic and inorganic matter in soil samples with the aid of a hand lens or microscope
ESS-M-A5: identifying the characteristics and uses of minerals and rocks and recognizing that rocks are mixtures of minerals	31. Identify common rocks and minerals and explain their uses and economic significance
ESS-M-A7: modeling how landforms result from the interaction of constructive and destructive forces	32. Demonstrate the results of constructive and destructive forces using models or illustrations 33. Identify the processes that prevent or cause erosion

ESS-M-A10: explaining (illustrating) how water circulates—on and through the crust, in the oceans, and in the atmosphere—in the water cycle	See GLE #46
ESS-M-A11: understanding that the atmosphere interacts with the hydrosphere to affect weather and climate conditions	34. Identify the components of the hydrosphere 35. Identify the atmosphere as a mixture of gases, water vapor, and particulate matter 36. Identify, describe, and compare climate zones (e.g., polar, temperate, tropical)
ESS-M-A12: predicting weather patterns through use of a weather map	37. Identify typical weather map symbols and the type of weather they represent
B. Earth History	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
ESS-M-B3: understanding that earth processes such as erosion and weathering affect the Earth today and are similar to those which occurred in the past	38. Estimate the range of time over which natural events occur (e.g., lightning in seconds, mountain formation over millions of years)
C. Earth in the Solar System	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
ESS-M-C1: identifying the characteristics of the Sun and other stars	39. Identify the physical characteristics of the Sun 40. Describe the significance of Polaris as the North Star 41. Explain why the Moon, Sun, and stars appear to move from east to west across the sky
ESS-M-C2: comparing and contrasting the celestial bodies in our solar system	42. Differentiate among moons, asteroids, comets, meteoroids, meteors, and meteorites 43. Describe the characteristics of the inner and outer planets
ESS-M-C4: modeling the motions of the Earth-Moon-Sun system to explain day and night, a year, eclipses, moon phases, and tides	44. Explain rotation and revolution by using models or illustrations
ESS-M-C5: modeling the position of the Earth in relationship to other objects in the solar system	45. Identify Earth's position in the solar system
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	46. Identify and explain the interaction of the processes of the water cycle

water cycle	
ESS-M-C8: understanding that space exploration is an active area of scientific and technological research and development	47. Identify and explain advances in technology that have enabled the exploration of space
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.	
BENCHMARKS	**GRADE-LEVEL EXPECTATIONS**
SE-M-A2: demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations	48. Determine the ability of an ecosystem to support a population (carrying capacity) by identifying the resources needed by that population
SE-M-A3: defining the concept of pollutant and describing the effects of various pollutants on ecosystems	49. Identify and give examples of pollutants found in water, air, and soil
SE-M-A4: understanding that human actions can create risks and consequences in the environment	50. Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing nonnative species)
SE-M-A7: demonstrating knowledge of the natural cycles, such as the carbon cycle, nitrogen cycle, water cycle, and oxygen cycle	51. Describe naturally occurring cycles and identify where they are found (e.g., carbon, nitrogen, water, oxygen)

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