This document includes the following:

- LEAP 2025 Science Assessments Support Key Shifts in Science Instruction
- Achievement-Level Definitions
- Achievement-Level Descriptors

LEAP 2025 Science Assessments Support Key Shifts in Science Instruction

The operational test will assess a student's understanding of the LSS for Science in high school Biology reflecting the multiple dimensions of the standards.

Shift: Apply content knowledge and skills (Disciplinary Core Idea, DCI)

In the classroom, students develop skills and content knowledge reflected in the Performance Expectations (PE) and detailed in the Disciplinary Core Ideas (DCI), the key skills and knowledge students are expected to master by the end of the course.

On the test, students answer questions which require content knowledge and skills aligned to PE bundles (groupings of like PEs) and the corresponding DCIs.

Shift: Investigate, evaluate, and reason scientifically (Science and Engineering Practice, SEP)

In the classroom, students do more than learn about science: they "do" science. Simply having content knowledge and scientific skills are not enough; students must investigate and apply content knowledge to scientific phenomena. Phenomena are real world observations that can be explained through scientific knowledge and reasoning (e.g., water droplets form on the outside of a water glass, plants tend to grow toward their light source, different layers of rock can be seen on the side of the road). Science instruction must integrate the practices, or behaviors, of scientists and engineers as students investigate real-world phenomena and design solutions to problems.

On the test, students do more than answer recall questions about science; they apply the practices, or behaviors, of scientists and engineers as students investigate each real-world phenomenon and design solutions to problems.

Shift: Connect ideas across disciplines (Crosscutting Concept, CCC)

In the classroom, students develop a coherent and scientifically-based view of the world, they must make connections across the domains of science (life science, physical science, earth and space science, environmental science, and engineering, technology, and applications of science). These connections are identified as crosscutting concepts (CCC).

On the test, sets of questions assess student application of knowledge across the domains of science for a comprehensive picture of student readiness for their next grade or course in science.

Achievement-Level Definitions

Achievement-level definitions briefly describe the expectations for student performance at each of Louisiana's five achievement levels. The achievement levels are part of Louisiana's cohesive assessment system and indicate a student's ability to demonstrate proficiency on the Louisiana student standards defined for a specific course.

The following list identifies the achievement-level definitions for the LEAP 2025 assessment program.

- **Advanced:** Students performing at this level have **exceeded** college and career readiness expectations and are well prepared for the next level of studies in this content area.
- **Mastery:** Students performing at this level have **met** college and career readiness expectations and are prepared for the next level of studies in this content area.
- **Basic:** Students performing at this level have **nearly met** college and career readiness expectations and may need additional support to be fully prepared for the next level of studies in this content area.
- **Approaching Basic:** Students performing at this level have **partially met** college and career readiness expectations and will need much support to be prepared for the next level of studies in this content area.
- **Unsatisfactory:** Students performing at this level have **not yet met** the college and career readiness expectations and will need extensive support to be prepared for the next level of studies in this content area

Achievement-Level Descriptors

Achievement-level descriptors (ALDs) are content specific and describe the knowledge, skills, and processes that students typically demonstrate at each achievement level. The Achievement-Level Descriptors Table, shown below, is color-coded to highlight the key shifts in science instruction built into the LEAP 2025 science assessments. The codes are: **SEP = blue**; **DCI = orange**; **CCC = green**

Science and Engineering Practices (SEP) are the practices that scientists and engineers use when investigating real world phenomena and designing solutions to problems. There are eight science and engineering practices that apply to all grade levels and content areas.

1. Asking questions (science) and defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematical and computational thinking
6. Constructing explanations (science) and designing solutions (engineering)
7. Engaging in argument with evidence
8. Obtaining, evaluating, and communicating information

Crosscutting Concepts (CCC) are common themes that have application across all disciplines of science and allow students to connect learning within and across grade levels or content areas. The seven crosscutting concepts apply to all grade levels and content areas.

1. Patterns (PAT)
2. Cause and effect (C/E)
3. Scale, proportion, and quantity (SPQ)
4. Systems and models (SYS)
5. Energy and matter (E/M)
6. Structure and function (S/F)
7. Stability and change (S/C)

Biology Achievement-Level Descriptors

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Investigate				
HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms. CCC: S/C SEP: 3	Refine an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms (cells).	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms.	Compare variables in simple investigations to provide evidence that feedback mechanisms maintain homeostasis in living organisms.	Identify variables in a simple investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms (plants).
HS-LS3-1 Formulate, refine, and evaluate questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. CCC: C/E SEP:1	Evaluate questions to clarify how the DNA and chromosome coding from parents combine to create the characteristic traits expressed in their offspring.	Refine questions to clarify how the DNA and chromosome coding from parents combine to create the characteristic traits expressed in their offspring.	Ask questions that can be used to clarify trends observed in the characteristic traits passed from parents to offspring.	Identify questions that can be used to clarify trends observed in the characteristic traits passed from parents to offspring.
Evaluate				
HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity and populations of ecosystems at different scales. CCC: SPQ SEP: 5	Use mathematical and/or computational representations to evaluate explanations of factors that affect carrying capacity, biodiversity, and populations of ecosystems at different scales.	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity, biodiversity, and populations of ecosystems at different scales.	Use graphical representations of mathematical relationships to describe factors that affect carrying capacity and populations of ecosystems at different scales.	Use graphical representations to identify factors that affect populations of ecosystems at different scales.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. CCC: E/M SEP: 5	Use mathematical representations to evaluate claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Use graphical representations of mathematical relationships to make claims about the cycling of matter and flow of energy among organisms in an ecosystem.	Use simple models (e.g., food pyramid, diagrams of carbon cycle) to identify claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-6 Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. CCC: S/C SEP: 7	Evaluate reasoning supporting claims that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	Evaluate the claims and supporting evidence that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem	Compare evidence (amount, type) supporting claims that changing conditions may result in a new ecosystem.	Identify evidence supporting claims that changing conditions may result in a new ecosystem.
HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. CCC: C/E SEP:7	Refute a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	Compare evidence supporting claims that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	Identify evidence to support a claim that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. CCC: SPQ SEP: 4	Apply concepts of statistics and probability to support quantitative explanations related to the variation and distribution of expressed traits in a population.	Apply concepts of statistics and probability to explain and support explanations about the variation and distribution of expressed traits in a population.	Apply concepts of statistics and probability to explain patterns related to the distribution of expressed traits in a population.	Apply concepts of statistics and probability to identify patterns related to the variation of expressed traits in a population.
HS-LS4-1 Analyze and interpret scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. CCC: PAT SEP: 4	Evaluate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	Analyze and interpret scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	Interpret patterns in scientific information to illustrate that common ancestry and biological evolution are supported by at least one line of empirical evidence.	Identify patterns in scientific information to illustrate that common ancestry and biological evolution are supported by at least one line of empirical evidence.
HS-LS4-3 Apply concepts of statistics and probability to support explanations that populations of organisms adapt when an advantageous heritable trait increases in proportion to organisms lacking this trait. CCC: PAT SEP: 4	Apply concepts of statistics and probability (using data from complex graphs, tables, or text) to support explanations and provide quantitative evidence for causality that populations of organisms adapt when an advantageous allele increases in frequency in comparison to organisms lacking this allele.	Apply concepts of statistics and probability (using data from complex graphs, tables, or text) to support explanations that populations of organisms adapt when an advantageous heritable trait increases in proportion (inversely or directly) to organisms lacking this trait.	Apply concepts of statistics and probability to interpret patterns (in dual bar graphs, dual line graphs, and data tables) related to populations of organisms adapting when an advantageous heritable trait increases in proportion to organisms lacking this trait.	Apply concepts of statistics and probability to identify patterns (in a simple line graph, bar graph, or data table) about populations of organisms adapting when an advantageous heritable trait increases in proportion to organisms lacking this trait.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS4-5 Evaluate evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. CCC: C/E SEP: 7	Evaluate reasoning supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Evaluate evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Compare evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Identify evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
Reason Scientifically				
HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. CCC: S/F SEP: 6	Revise an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	Compare explanations based on evidence for how the structure of DNA determines the structure of proteins, which, in turn, affects the function of proteins.	Identify an explanation based on evidence for how the structure of DNA determines the structure or function of proteins.
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. CCC: SYS SEP: 2	Revise a model to make or refute claims about the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Develop and use a model to explain the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Use models or components of models to describe the hierarchical levels of organization that make up systems within an organism.	Identify components within a model to show the organization of systems within an organism.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS1-4 Use a model to illustrate the role of the cell cycle and differentiation in producing and maintaining complex organisms. CCC: SYS SEP: 2	Revise a model to make or refute claims about the role of the cell cycle and differentiation to produce systems that maintain complex organisms.	Use a model to explain the role of the cell cycle and differentiation to produce systems that maintain complex organisms.	Use a model to describe the changes that occur as cells differentiate to produce tissues and organs that will ultimately maintain complex organisms.	Use a model to identify the point at which differentiation occurs to produce tissues and organs that will ultimately maintain complex organisms.
HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. CCC: E/M SEP: 2	Revise a model to make or refute claims about how photosynthesis transforms light energy into stored chemical energy.	Use a model to explain how photosynthesis transforms light energy into stored chemical energy.	Use models or components of models to describe how photosynthesis is a chemical process that transforms matter and energy.	Identify components within a model to show the flow of matter and energy due to photosynthesis.
HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. CCC: E/M SEP: 6	Revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	Construct an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	Compare explanations based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine to form larger carbon-based molecules.	Identify an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine to form larger carbon-based molecules.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy. CCC: E/M SEP: 2	Revise a model to make or refute claims about how cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	Use a model to explain that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	Use models or components of models to describe how cellular respiration transforms matter and energy.	Identify components within a model to show the flow of matter and energy due to cellular respiration.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. CCC: S/C SEP: 6	Evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	Design a solution for reducing the impacts of human activities on the environment and biodiversity.	Compare solutions for reducing the impacts of human activities on the environment and biodiversity.	Identify solutions for reducing the impacts of human activities on the environment and biodiversity.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS4-2 Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. CCC: C/E SEP: 6	Revise an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Compare explanations based on evidence that biological diversity is influenced by the potential for a species to increase in number, competition for limited resources, and the proliferation of those organisms that are better able to survive and reproduce in the environment.	Identify an explanation based on evidence that biological diversity is influenced by competition for limited resources and the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-4 Construct an explanation based on evidence for how natural selection and other mechanisms lead to genetic changes in populations. CCC: C/E SEP: 6	Revise an explanation based on evidence for how natural selection and other mechanisms lead to genetic changes in populations.	Construct an explanation based on evidence for how natural selection and other mechanisms lead to genetic changes in populations.	Compare explanations based on evidence for how natural selection leads to genetic changes in populations.	Identify an explanation based on evidence for how natural selection leads to changes in populations.

HS-LS1-8 may be assessed and would be reported as part of the overall score. This particular PE does not fit neatly into any one of the three categories; rather, it partly touches all three categories.

Performance Expectation	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
HS-LS1-8 Obtain, evaluate, and communicate information about (1) viral and bacterial reproduction and adaptation, (2) the body's primary defenses against infection, and (3) how these features impact the design of effective treatment. CCC: SPQ SEP: 8	Evaluate and communicate complex evidence, concepts, and/or processes about (1) viral and bacterial reproduction and adaptation, (2) the body's primary defenses against infection, and (3) how these features impact the design of effective treatment.	Evaluate and communicate information about (1) viral and bacterial reproduction and adaptation, (2) the body's primary defenses against infection, and (3) how these features impact the design of effective treatment.	Compare information about (1) viral and bacterial reproduction and adaptation and (2) the body's primary defenses against infection.	Identify relevant information from a source about viral and bacterial reproduction and adaptation.