

Grade 7 Life Science 2011

Unit 1: Living Things

Students investigate the common characteristics of living things. Important levels of organization for structure and function include cells, tissues, organs, organ systems, whole organisms, and ecosystems.

Essential Questions:

- What are the common characteristics of living organisms?
- What are the essential functions of a cell needed to sustain life?
- How are the structures of cells related to their functions in supporting life?
- How do organisms respond to an ever-changing external environment?
- How do the available resources and abiotic factors affect the carrying capacity of an ecosystem?
- How are organisms classified?

Resources: *Prentice Hall* Science Explorer Life Science Textbook

FOSS resources

Premier Science "Structure and Function" unit

Teacher generated resources

NJ Cumulative Progress Indicators (CPI):

5.1.8. B.1-Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.

5.1.8. B.2-Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.

5.1.8. B.3- Use qualitative and quantitative evidence to develop evidence-based arguments.

5.1.8. C.2: Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8. D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.8. D.2: Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model-building.

5.1.8. D.3: Demonstrate how to safely use tools, instruments, and supplies.

5.1.8. D.4: Handle and treat organisms humanely, responsibly, and ethically.

5.3.8. A.1. All organisms are composed of cell(s). In multicellular organisms, specialized cells perform specialized functions. Tissues, organs, and organ systems are composed of cells and function to serve the needs of cells for food, air, and waste removal.

5.3.8. A.2- During the early development of an organism, cells differentiate and multiply to form the many specialized cells, tissues, and organs that compose the final organism. Tissues grow through cell division.

5.3.8. B.1- Food is broken down to provide energy for the work that cells do, and is a source of the molecular building blocks from which needed materials are assembled.

5.3.8. B.2- All animals, including humans, are consumers that meet their energy needs by eating other organisms or their products.

5.3.8. C.1 Symbiotic interactions among organisms of different species can be classified as:

- Producer/consumer
- Predator/prey
- Parasite/host
- Scavenger/prey
- Decomposer/prey

Science Content (Declarative Conceptual Knowledge) Students Will Know and Understand:	NJCPI
All living organisms exhibit common characteristics; they grow, consume nutrients, exchange gases, respond to stimuli, reproduce, need water, and eliminate waste.	5.3.8.A.1
The cell is the basic unit of life.	5.3.8.A.1
Cells have the same needs and perform the same functions as more complex organisms.	5.3.8.A.1
Cells contain cell organelles.	5.3.8.A.1
Animal and plant cells have many organelles in common, but some organelles like cell walls and chloroplasts are only found in plant cells.	5.3.8.A.1
Many cells of the same type make a tissue.	5.3.8.A.2
More than one tissue working together to complete the same job is an organ.	5.3.8.A.1
More than one organ functioning together is an organ system.	5.3.8.A.1
The organ systems work interdependently to create an organism.	5.3.8.A.1
Different kinds of organisms have different internal and external structures that help them survive in their environment.	5.3.8.A.2
Organisms are grouped by common characteristics.	5.1.8.C.2
The classification system consists of several levels grouping organisms from general common characteristics to more specific characteristics in the following categories: kingdom, phylum, class, order, family, genus, and species.	5.1.8.C.2
An organism is any living thing.	5.3.8.A.1
An organism's habitat is where it lives, the place where it can meet all of its requirements.	5.3.8.B.1
A limiting factor is any biotic or abiotic component of the ecosystem that controls the population's size.	5.3.8.D.3
Similar ecosystems occur in areas of similar abiotic conditions on Earth.	5.3.8.D.3
All ecosystems have characteristics in common, such as trophic levels.	5.3.8.C.3
An adaptation is any trait of an organism that helps it survive and reproduce in its environment.	5.3.8.D.2

Thinking Processes (Procedural Knowledge)	NJCCCS
Students Will Be Able To:	
Categorize pictures of objects and organisms into living and nonliving groups.	5.1.8.C.2
Investigate unknown materials by placing them in various environments and observing them for evidence of life.	5.1.8.C.2
Use the microscope to study organisms.	5.1.8.D.4
Draw scale representations of images seen in the microscope to estimate size accurately.	5.1.8.D.3
Observe single-celled microorganisms with a microscope and investigate structure-function relationships.	5.1.8.D.3
Generate evidence to support the idea that humans are made of cells	5.1.8.D.1
Compare structure and function of cells from different organisms.	5.1.8.D.1
Relate the structure and function of cells, tissues, organs, systems and organisms.	5.3.8.A.1
Describe the structure and function of the human organ systems and how they are interdependent.	5.3.8.A.1
Classify organisms based on similar characteristics.	5.1.8.D.1
Investigate and measure the amount of energy from a food source.	5.3.8. B.1
Determine the mass of production needed to support primary, secondary, and third-level consumers.	5.3.8. B.2
Analyze and infer how energy moves through an ecosystem.	5.3.8. B.2
Calculate theoretical growth of a population with no limits.	5.3.8. B.2
Relate biotic and abiotic factors to the growth or decline of populations.	5.3.8.D.3
Apply understanding of ecological concepts to a new system.	5.3.8.D.3

Grade 7 Life Science

Unit 2: Diversity of Life

Students will learn that reproduction is a characteristic of all living systems. Some simple organisms reproduce asexually resulting in offspring identical to them. Sexually produced offspring are never identical to either of their parents. Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. A single gene can influence many traits. Students will discover that the characteristics of an organism can be described in terms of a combination of traits. Reproduction, including limiting factors, heredity, and natural selection are explored as ways to understand both similarity and the variation within and between species.

Essential Questions:

- What is the difference between sexual and asexual reproduction?
- How is hereditary information passed from one generation to another in order to insure the continuation of a species?
- What environmental factors may lead to a change in a cell's genetic information?
- What is the probability that particular traits will be passed from one generation to the next?
- How does diversity of species develop over time?
- How do species become extinct?

Resources:

FOSS Diversity of Life Module

Premier Genetics Module

FOSS Populations and Ecosystems
Module

Prentice Hall Science Explorer Life
Science Textbook

NJ Cumulative Progress Indicators (CPI):

5.1.8. B.1-Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.

5.1.8. B.2-Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.

5.1.8. B.3- Use qualitative and quantitative evidence to develop evidence-based arguments.

5.1.8. C.2: Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8. D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.8. D.2: Engage in productive scientific discussion practices during conversations with peers, both face-to-face and virtually, in the context of scientific investigations and model-building.

5.1.8. D.3: Demonstrate how to safely use tools, instruments, and supplies.

5.1.8. D.4: Handle and treat organisms humanely, responsibly, and ethically.

5.3.8. D.1 Some organisms reproduce asexually. In these organisms, all genetic information comes from a single parent. Some organisms reproduce sexually, through which half of the genetic information comes from each parent.

5.3.8. D.2 The unique combination of genetic material from each parent in sexually reproducing organisms results in the potential for variation.

5.3.8. D.3 Characteristics of organisms are influenced by heredity and/or their environment.

5.3.8. E.1 Individual organisms with certain traits are more likely than others to survive and have offspring in particular environments. The advantages or disadvantages of specific characteristics can change when the environment in which they exist changes. Extinction of a species occurs when the environment changes and the characteristics of a species are insufficient to allow survival.

5.3.8. E.2 Anatomical evidence supports evolution and provides additional detail about the sequence of branching of various lines of descent.

Science Content (Declarative Conceptual Knowledge)	NJCPI
Students Will Know and Understand:	
The animal kingdom consists of a wide variety of organisms.	5.3.8.A.2
Characteristics of organisms are influenced by heredity and/or their environment.	5.3.8.D.3
Genes are the basic units of heredity carried by chromosomes in the nucleus of every cell. Genes code for features of organisms.	5.3.8.D.2
An organism's particular combination of paired alleles is its genotype; the traits produced by those alleles result in the phenotype.	5.3.8.D.2
Some organisms reproduce asexually. In these organisms, all genetic information comes from a single parent.	5.3.8.D.1
Some organisms reproduce sexually, through which half of the genetic information comes from each parent.	5.3.8.D.1
The unique combination of genetic material from each parent in sexually reproducing organisms results in the potential for variation.	5.3.8.D.2
Variation is the range of expression of a feature in a population.	5.3.8.D.2
Variation in a population helps the population survive when the environment changes.	5.3.8.D.2
Environmental factors out selective pressure on populations.	5.3.8.D.3
Natural selection is the process by which the individuals best adapted to their environment tend to survive and pass their traits to subsequent generations.	5.3.8.D.3
Anatomical evidence supports evolution and provides additional detail about the sequence of branching of various lines of descent.	5.3.8. E.2

Thinking Processes (Procedural Knowledge)	NJCPI
Students Will Be Able To:	
Use Punnett squares to explain how organisms inherit dominant and recessive alleles.	5.1.8. B.1
Use Punnett squares to predict the proportion of offspring that will have certain traits.	5.1.8. B.1
Use a simulation to determine the transfer of genetic information during breeding and the traits that result.	5.1.8. C.2
Explain how adaptations help organisms survive in a specific environment.	5.3.8.D.3
Use a multimedia simulation to investigate the adaptive value of protective coloration.	5.1.8. C.2 5.3.8.D.3
Investigate how selective pressure can affect the genetic makeup of a population.	5.5.8.D.3
Collect and analyze data that shows how a population can change over time in response to environment factors.	5.1.8. B.3 5.3.8.D.3
Explain how the traits expressed by the members of a population can change naturally over time.	5.1.8. D.1 5.1.8. D.2
Analyze anatomical evidence from various living things	5.1.8. B.3 5.3.8. E.2
Use anatomical evidence to support evolution	5.1.8. B.3 5.3.8. E.2
Investigate analogous and homologous structures in living things and use anatomical evidence to provide additional detail about the sequence of branching of various lines of descent.	5.1.8. D.1 5.1.8. D.2 5.3.8. E.2

Grade 7 Life Science

Unit 3: Kingdoms of Life

Students will study the relationships between cells, tissues, organs and organ systems. They will learn that living systems at all levels of organization demonstrate the complementary nature of structure and function in living things. Students will compare the organs and systems in the Kingdoms of living things and will be aware that anatomical evidence supports evolution and provides additional detail about the sequence of branching of various lines of descent in the evolution of living things. Students will identify anatomical evidence for relationships among living things by dissecting various specimens from the animal kingdom.

Essential Questions:

- How do organisms demonstrate the interdependent structure and function of cells, tissues, organs, and organ systems?
- How are the structures of tissues, organs, and systems related to their functions in supporting life?
- What are the benefits and limitations of existing as a single-celled organism and as a multicellular organism?
- What are the levels of organization that exist in the Kingdoms of living things (Monera, Protists, Fungi, Plants and Animals) ?
- How can you trace the evolution of the animal phyla by investigating their internal organization?
- How are the organ systems in the frog similar to organ systems in humans?

Resources:

Prentice Hall Science Explorer Life Science Textbook

Teacher generated resources

NJ Cumulative Progress Indicators (CPI):

5.1.8.A.2 Use mathematical, physical, and computational tools to build conceptual-based models and to pose theories.

5.1.8.A.3 Use scientific principles and models to frame and synthesize scientific arguments and pose theories.

5.1.8.B.1 Design investigations and use scientific instrumentation to collect, analyze, and evaluate evidence as part of building and revising models and explanations.

5.1.8.B.2 Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.

5.1.8.B.3 Use qualitative and quantitative evidence to develop evidence-based arguments.

5.1.8.C.1 Monitor one's own thinking as understandings of scientific concepts are refined.

5.1.8.C.2 Revise predictions or explanations on the basis of discovering new evidence, learning new information, or using models.

5.1.8.C.3 Generate new and productive questions to evaluate and refine core explanations.

5.3.8.A.1 Compare the benefits and limitations of existing as a single-celled organism and as a multicellular organism.

5.3.8.A.2 Relate the structures of cells, tissues, organs, and systems to their functions in supporting life.

5.3.6.B.1 Describe the sources of the reactants of photosynthesis and trace the pathway to the products.

5.3.8.E.1 Organize and present evidence to show how the extinction of a species is related to an inability to adapt to changing environmental conditions using quantitative and qualitative data.

5.3.8.E.2 Compare the anatomical structures of a living species with fossil records to derive a line of descent.

Science Content (Declarative Conceptual Knowledge)	NJCPI
Students Will Know and Understand:	
Microbe is the general name for microscopic bacteria and fungi, especially those that cause disease and promote fermentation.	5.3.8.A.2
Bacteria, fungi, and algae have the characteristics of living organisms.	5.3.8.A.2
The similarities and differences between bacteria and fungi, plants, animals, and protists.	5.1.8.D.3
How to use the microscope to study organisms.	5.1.8.B.1
The relationship between structure and function of cells, tissues, organs and systems	5.3.8.B.1
The structure and function of cells from different organisms.	5.3.8.B.1
That Monerans are prokaryotes and all other Kingdoms are eukaryotes	5.3.8.B.1
That Fungi and some plants use spores to reproduce	5.3.8.A.2
That Protists are the precursors to plants and animals	5.3.8.E.2
That protozoa are visible in pond water	5.3.8.A.1
That plants may be vascular or non-vascular	5.3.8.A.2
That plants have organ systems that are interdependent	5.3.8.A.2
That there are two main groups of plants based on the structure of their seeds-Monocots and Dicots	5.3.8.A.2
Seeds contain the dormant, living embryo of a plant.	5.3.8.A.2
Germination is the onset of growth and differentiation in plant seeds.	5.3.8.A.2
The cotyledon is the primary source of energy for seed germination.	5.5.3.B 1
Xylem is the system of tube-like connected cells that transports water from the roots to all structures of the plant.	5.3.8.A.2
Stomata are openings on leaves that are controlled by guard cells.	5.3.8.A.2

Sepals, petals, stamens, and pistils are the major structures of typical flowers.	5.3.8.A.2
Pollen from the anthers on stamens and eggs in the ovules of the pistil are the male and female cells that combine during sexual reproduction.	5.3.8.A.2
The animal kingdom consists of a wide variety of organisms.	5.5.8.B 1
In multicellular organisms, including plants and animals, specialized cells perform specialized functions. Tissues, organs, and organ systems are composed of cells and function to serve the needs of cells for food, air, and waste removal.	5.3.8.A.1
Compare the anatomical structures of a living species with fossil records to derive a line of descent.	5.3.8.E.2:

Thinking Processes (Procedural Knowledge)	NJCPI
Students Will Be Able To:	
Use the microscope to study organisms.	5.5.8.D.3
Draw scale representations of images seen in the microscope to estimate size accurately.	5.1.8.B.1
Observe single-celled microorganisms with a microscope and investigate structure-function relationships.	5.1.8.B.2
Generate evidence to support the idea that paramecia are organisms.	5.1.8.B.2
Compare microorganisms.	5.1.8.C.1
Compare structure and function of cells from different organisms.	5.1.8.D.1
Relate the structure and function of cells, tissues, organs, systems and organisms.	5.1.8.D.3
Describe the structure and function of the human organ systems and how they are interdependent.	5.1.8.D.3
Classify organisms based on similar characteristics.	5.1.8.D.1
Examine and compare the internal and external structures of organisms through either real or digital dissection.	5.1.8.B.3
Dissect seeds to discover their structures.	5.1.8.A.1
Investigate the effect of light on germinated seeds.	5.1.8.A.1
Compare the development of two groups of complex plants-monocots and dicots.	5.1.8.D.2
Collect and analyze data to develop evidence for an explanation for how water enters a plant's roots and flows through the plant during transpiration.	5.1.8.A.1
Relate transpiration to the water cycle.	5.1.8.D.4

Investigate the structure-function relationships of plant flowers.	5.1.8.B.3
Make a model of observations to develop a general model of how seeds disperse.	5.1.8.B.2
Explain how seed-dispersal mechanisms contribute to a plant's survival.	5.1.8.C.1
Design and conduct an experiment on a plant and/or animal using proper safety and ethical procedures.	5.1.8.B.2
Use lab procedures to inoculate agar plates with bacteria and fungi from natural sources.	5.1.8.B.2
Compare bacteria and fungi to plants, animals, and protists.	5.1.8.B.3
Relate the structure and function of cells, tissues, organs, systems and organisms.	5.1.8.B.2
Describe the structure and function of the human organ systems and how they are interdependent.	5.1.8.B.2
Classify organisms based on similar characteristics.	5.1.8.B.1
Dissect seeds to discover their structures.	5.1.8.B.1
Investigate the effect of light on germinated seeds.	5.1.8.B.1
Compare the development of two groups of complex plants-monocots and dicots.	5.1.8.C.1
Collect and analyze data to develop evidence for an explanation for how water enters a plant's roots and flows through the plant during transpiration.	5.1.8.B.3
Relate transpiration to the water cycle.	5.1.8.B.3
Investigate the structure-function relationships of plant flowers.	5.1.8.B.3
Examine and compare the internal and external structures of organisms through either real or digital dissection.	5.1.8.B.3

Connections to “Common Core” Reading and Writing:

Reading:

Key Ideas and Details

- RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

- RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics*.
- RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
- RST.6-8.6. Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

- RST.6-8.7. Integrate 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, or table).
- RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
- RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity

- RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

Writing:

Text Types and Purposes

- WHST.6-8.1. Write arguments focused on *discipline-specific content*.
 - Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
 - Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
 - Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
 - Establish and maintain a formal style.
 - Provide a concluding statement or section that follows from and supports the argument presented.
- WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
 - Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
 - Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
 - Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
 - Use precise language and domain-specific vocabulary to inform about or explain the topic.
 - Establish and maintain a formal style and objective tone.
 - Provide a concluding statement or section that follows from and supports the information or explanation presented.
- WHST.6-8.3. (See note; not applicable as a separate requirement)

Production and Distribution of Writing

- WHST.6-8.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- WHST.6-8.5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
- WHST.6-8.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

Research to Build and Present Knowledge

- WHST.6-8.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
- WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.

Range of Writing

- WHST.6-8.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.