Table of Contents

CONTENT STANDARDS

Below are the standards **taught** and **assessed** in this unit.

Readiness Standards
• 7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids; • 7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere. • 7.13C compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time; • 7.13D describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations. • 7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups; • 7.14B describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter.

UNDERSTANDINGS AND QUESTIONS

Important big ideas and processes for the unit.

Key Understandings
• A healthy ecosystem is one that is sustainable – that is, it has the ability to maintain its organization and productivity and is resilient. • The greater the biodiversity the healthier the ecosystem. • The natural regions of Texas look different from one another, both in terms of the living aspects (plant and animal communities) and the non-living attributes (topography, geology, soils). Texas is divided into eleven natural regions, called ecoregions. • Energy is transferred through trophic levels in the environment. This energy transfer is modeled in food chains and food webs. • A diagram called an energy pyramid shows the amount of energy that moves from one trophic level to the next in a food chain/web. The most energy available is at the producer level. As you move up the levels in the energy pyramid, less energy is available than at the level below. • The biogeochemical cycle involves the movement of elements and compounds among four major systems: (1) lithosphere, (2) biosphere, (3) atmosphere, and (4) hydrosphere. • The water cycle shows the continuous movement of matter (water) within the Earth's systems. • The carbon cycle shows the continuous movement of matter (carbon) within the Earth's systems. • The nitrogen cycle shows the continuous movement of matter (nitrogen) within the Earth's systems • Asexual reproduction and sexual reproduction have significant differences in terms of the diversity of offspring and changes in the population over time. Sexual reproduction tends to result in greater genetic diversity and adaptability within a population, which can increase the chances of survival and reproductive success over time. Asexual reproduction tends to produce offspring that are genetically identical to the parent, which can limit genetic diversity and make populations less adaptable to changing environments.

- Natural selection is the process through which populations of living organisms adapt and change. Individuals in a population are naturally variable, meaning that they are all different in some ways. This variation means that some individuals have traits better suited to the environment than others. Individuals with adaptive traits—traits that give them some advantage—are more likely to survive and reproduce.
- Artificial selection is the identification by humans of desirable traits in plants and animals, and the steps taken to enhance and perpetuate those traits in future generations. Artificial selection works the same way as natural selection, except that with natural selection it is nature, not human interference, that makes these decisions.
- Taxonomy is the science of finding, describing, and categorizing organisms with the goal to name the species. This scientific classification system is based on observable characteristics of organisms. The current categories, from broadest to most specific, are domain, kingdom, phylum, class, order, family, genus, and species.
- Organisms can be classified into one of 6 kingdoms by basic characteristics including whether they are prokaryotic or eukaryotic, unicellular or multicellular, and autotrophic or heterotrophic.
- A dichotomous key is an important scientific tool, used to identify different organisms, based the organism's observable traits. Dichotomous keys consist of a series of statements with two choices in each step that will lead users to the correct identification.
- A cladogram is a graphical representation of the hypothetical relationship between organisms based on their similarities.

Key Questions

- What does it mean for an ecosystem to be healthy?
- What are the ecoregions of Texas?
- How does energy flow through an ecosystem?
- How can you use models to describe the flow of matter and energy in an ecosystem?
- What is the 10% rule?
- How does an owl pellet provide evidence of the flow of energy through an ecosystem?
- How is matter recycled through Earth's systems?
- How do the different types of reproduction, asexual or sexual, affect the genetic diversity of offspring and the population overtime?
- How can the occurrence of traits in a population be changed through natural selection?
- How can the occurrence of traits in a population be changed through artificial selection?
- How are organisms grouped, sorted, and classified?
- How do scientists use cladograms, dichotomous keys, and taxonomic rankings to classify organisms?
- What characteristics are used to classify organisms into kingdoms?
- How is a dichotomous key used to identify organisms?
- What can cladograms tell us about common characteristics of organisms.

ROADMAP

Suggested daily guide for instruction in this unit.

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 01: Ecosystem Stability and Ecoregions of Texas	**SWBAT** identify and describe the characteristics of a healthy ecosystem and identify the 11 ecoregions of Texas. **TEKS** 7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.	• Students will review levels of organization in ecosystems. • Students will play Ecosystem Jenga to model the stability of an ecosystem. • Students will explore the ecoregions of Texas and research one region. Students will conduct a gallery walk to learn about the other regions they did not research. • Students will analyze data about Texas ecoregions and determine which is more stable based on the given data. <u>Vocabulary</u> Biomass Ecoregion Ecosystem Organization Ecosystem Productivity Ecosystem Resilience	Lesson 01: Ecosystem Stability and Ecoregions of Texas
Lesson 02: Flow of Energy Part 1	**SWBAT** create a food web and energy pyramid to show the flow of energy through an ecosystem **TEKS** 7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids	• In the thinking task, students describe the plants in the South Texas Brush Country ecoregions and review that plants are autotrophs and producers. • In the activity called A Lower Rio Grande Valley Diet, students will analyze the feeding patterns of various organisms found in the lower Rio Grande Valley. Students will then use this information to make a food web. • Students will make food chains from the food web and label the producer and the different levels of consumers in each food web. (This is a review from 6th grade.) • In the Energy Efficiency activity, the class will model 8 different food chains (each chain will have a different number of trophic levels.) This modeling activity will provide evidence that available energy decreases in successive trophic levels. • Students will analyze a food web and food chain and describe the flow of energy through the trophic levels. <u>Vocabulary</u> Autotroph Consumer Heterotroph	Lesson 02: Flow of Energy Part 1

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
		Producer	
Lesson 03: Flow of Energy Part 2	**SWBAT** use models, such as an energy pyramid, to describe why the available energy decreases in successive trophic levels in a food chain **TEKS** 7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids	• Students will analyze the roles (producer, consumer, heterotroph, herbivore, etc.) organisms play in an ecosystem. • Students will participate in a reading to learn about energy pyramids. • Students will create energy pyramids from food chains. • Students will relate the modeling activity they did yesterday to the 10% rule and energy pyramids. • Students will describe why there is a decrease in the amount of energy available in successive trophic levels in a food chain/energy pyramid. <u>Vocabulary</u> 10% Rule Energy Pyramid Trophic Level	Lesson 03: Flow of Energy Part 2
Lesson 04: Flow of Energy Part 3	**SWBAT** describe and diagram the flow of energy through a food web based on evidence collected during the owl pellet dissection **TEKS** 7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids	• Students will read identify the role of various organisms in a barn owl's food chain. • Students will describe the impacts on the ecosystem when a population of one of the producers in the food chain is destroyed. • Students will read an article about the barn owl to determine the food sources of the barn owl and determine how owl pellets are made. • Students will dissect an owl pellet to gather evidence in order to model the flow of energy through the barn owl's ecosystem. • Students will explain why the more direct the feeding pattern (less transfers) there are in a food chain the more energy the top-level consumer receives.	Lesson 04: Flow of Energy Part 3

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 05: Recycling of Matter- Water Cycle	**SWBAT** describe the processes that occur within the water cycle that recycle matter **TEKS** 7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.	• Students will brainstorm how matter moves through Earth's systems. • Students will play a game in which they explore how water (hydrogen and oxygen) are recycled through Earth's 4 major systems. • Students will then read 5 task cards that describe the process involved in the water cycle and label a diagram of the water cycle based on the descriptions of the processes. • Complete a paragraph to describe the processes that occur within the water cycle that recycles matter. <u>Vocabulary</u> Biogeochemical cycles Condensation Deposition Evaporation Infiltration Percolation Plant Uptake Precipitation Run Off Sublimation Transpiration	Lesson 05: Recycling of Matter- Water Cycle

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 06: Recycling of Matter: Carbon Cycle	**SWBAT** describe the ecological importance of the carbon cycle **TEKS** 7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.	• Students will review gas exchange in the leaves of plants during photosynthesis from 6th grade. • Students will play a game in which they explore how matter (carbon) are recycled through the 4 carbon revisors. • Students will then view a PowerPoint and read 6 task cards that describe the process involved in the carbon cycle and label a diagram of the carbon cycle based on the descriptions of the processes. • Complete a paragraph to describe the processes that occur within the carbon cycle that recycles matter. <u>Vocabulary</u> Carbon fixation Combustion Decomposition Photosynthesis Respiration	Lesson 06: Recycling of Matter: Carbon Cycle
Lesson 07: Recycling of Matter: Nitrogen Cycle	**SWBAT** describe the ecological importance of the nitrogen cycle **TEKS** 7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.	• Students will review the composition of the air in Earth's atmosphere and conclude that most of the air is made of nitrogen. • Students will play a game in which they explore how matter (nitrogen) are cycled through Earth's systems. • Students will then view a PowerPoint and read 6 task cards that describe the process involved in the nitrogen cycle and label a diagram of the nitrogen cycle based on the descriptions of the processes. • Complete a paragraph to describe the processes that occur within the nitrogen cycle that recycles matter. <u>Vocabulary</u> Ammonification Assimilation Denitrification Nitrification Nitrogen fixation	Lesson 07: Recycling of Matter: Nitrogen Cycle

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 08: Diversity in Populations Part 1	**SWBAT** Compare and contrast the results of asexual and sexual reproduction and explain how genetic diversity, or lack of, affects the survival of the population over time. **TEKS** 7.13C compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time;	• Students will analyze patterns in diagrams composed of figures and shapes and describe what is happening in each step of the diagrams. (These are simplified steps of sexual and asexual reproduction.) • Students will participate in an exploratory activity where some represent organisms that reproduce sexually, and some reproduce asexually. Through this whole class activity students will learn about the advantages and disadvantages of both types of reproduction. • Students will complete a Reading to Learn to acquire more about sexual and asexual reproduction. • Students will complete a Venn diagram to explain asexual and sexual reproduction. <u>Vocabulary</u> Asexual reproduction Sexual reproduction	Lesson 08: Diversity in Populations Part 1

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 09: Diversity in Populations Part 2	**SWBAT** explain how natural and artificial selection can cause populations to change over time **TEKS** 7.13D describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations.	• Students will complete an explore learning gizmo to learn the mechanisms of natural selection. • Students will continue the explore learning gizmo to see how artificial selection can be used to breed organisms desired traits. • Students will engage in a reading to learn to deepen their understanding of the concepts of natural and artificial selection. • Student will analyze population data of two sub species of butterflies over a 6-year timespan. Students will graph and analyze the data. Students will then complete a CER to describe of one subspecies is more advantageous than the other. Students will also determine if the described scenario is natural or artificial selection. <u>Vocabulary</u> Artificial Selection Fitness Genes Mutation Natural Selection Variation	Lesson 09: Diversity in Populations Part 2

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 10: Taxonomic Classification	**SWBAT** identify the 8 taxonomic levels of organization and use these to determine relatedness of different organisms. **TEKS** 7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups;	• Students will analyze images of 4 spotted wildcats that are found living in Central and South America and describe similarities and differences that they can see. • Students will then engage in a game titled the Gene Scene that will be a review of natural selection. • Students will a analyze models of addressed envelops and describe what information in the address is specific and what is more general. • Students will then analyze three more models to learn about the 8 taxonomic levels and use them to determine the relatedness of different organisms, and how the scientific name of an organism is written. • Students will complete a table of the 8 taxonomic levels of organization and use the compete taxonomic levels of 4 organisms to determine which ones are most closely related. <u>Vocabulary</u> Binomial nomenclature Taxonomy	Lesson 10: Taxonomic Classification

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 11: Characteristics of Domains and Kingdoms	**SWBAT** classify organisms into kingdoms based on their characteristics and describe their importance to the ecosystem **TEKS** 7.14B describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter.	• Students will review the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular, and multicellular, and autotrophic and heterotrophic. • Students will complete an initial card sort to describe the characteristics of the 6 kingdoms. • Students will work as a group to complete a reading to learn about each of the 6 kingdoms. As they read, students will complete a chart of the basic characteristics of the kingdoms. • Students will return to the card sort and correct misplaced cards. • Students will classify organisms into their correct kingdoms and list the basic characteristics of the kingdoms. Students will also describe the importance of the organisms with the kingdoms to the ecosystem. Vocabulary Autotroph Eukaryotic Cell Heterotroph Multicellular Prokaryotic Cell Unicellular	Lesson 11: Characteristics of Domains and Kingdoms
Lesson 12: Dichotomous Keys	**SWBAT** interpret dichotomous keys to identify organisms or identify similarities and differences among groups of organisms **TEKS** 7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups;	• Students will engage with a flow chart or concept map to identify shapes. • Students will apply this flow chart or concept map to the basic characteristics of the 6 kingdoms. • Students will use the Explore Learning Gizmo- Dichotomous Key to practice using a dichotomous key to identify numerous organisms. Students will also practice creating a dichotomous key. • Students will use a dichotomous key to identify organisms. Vocabulary Dichotomous key	Lesson 12: Dichotomous Keys

Lesson	Objective(s) and Standard(s)	Instructional Notes	Resources
Lesson 13: Cladograms	**SWBAT** identify similarities and differences among groups of organisms by interpreting cladograms. **TEKS** 7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups;	• In the thinking task, students will analyze characteristics of made-up organisms to identify similarities. Students will create a common characteristics chart of the organisms. • Students will learn about cladograms and then use the common characteristics chart they created in the thinking task to create a cladogram of the organisms. • Students will analyze characteristics of cell phones from 1984 to the present day and create a cladogram. • Students will use a common characteristics chart to build a cladogram. Students will analyze the cladogram to describe the organisms and their possible common ancestors. Vocabulary Cladogram	Lesson 13: Cladograms
4 Flex Days			
Unit 4 Exam			

https://nri.tamu.edu/blog/2021/november/study-investigates-reintroduction-of-ocelots-to-native-texas-range/

http://blog.cincinnatizoo.org/wp-content/uploads/ocelot-range-map.jpg

https://recovertexasocelots.org/ocelot-project-process

https://english.elpais.com/science-tech/2022-12-27/the-worlds-first-known-albino-ocelot-worries-scientists.html?fbclid=IwAR2_OBTtvgLbyL3MH76AbNwm4piOxdxXyDJtEAksVfYllkrLVweBNwJ1QqY

UNPACKED STANDARDS

Focus standards for this unit.

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids; and (old 7.5B and B.12C)	Cognition: diagram and describe Content: the flow of energy and the decrease in available energy Including, but not limited to:	In 6th Grade students learned about food chains and webs because of the conservation of energy TEKS.

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	Models (diagrams) • Food chains • Food webs • Ecological pyramids (e.g., food pyramids, energy pyramids, pyramids of biomass, pyramids of numbers) Describe the trophic levels • Autotrophs (producers) ○ Possible examples may include: ▪ Algae ▪ Phytoplankton ▪ Plants ▪ Cyanobacteria ▪ Mosses ▪ Some protozoa • Heterotrophs (consumers) ○ Possible examples may include: ▪ Primary ▪ Secondary ▪ Tertiary ▪ Herbivores ▪ Carnivores ▪ Omnivores • Decomposers ○ Possible examples may include: ▪ Fungi ▪ Protists ▪ Bacteria • Detritivores (detrivores) ○ Possible examples may include: ▪ Millipedes ▪ Wood lice ▪ Types of earthworms Calculate the amount of energy available at each trophic level (10% rule) using an energy pyramid. Solar energy drives most ecosystems	
7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter	Cognition: describe Content: ecosystem sustainability through flow of energy and recycling of matter and nutrients	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**

and nutrients within the biosphere. (7.10B; B.12C an B.12D)	Including, but not limited to:
	Flow of matter and energy
	• Flow of matter is cyclic (focus on carbon and Nitrogen)
	• Flow of energy requires constant input
	Carbon cycle
	• Carbon sinks (reservoirs)
	• Processes that move carbon through the cycle
	• Organisms that move carbon through the cycle
	• Examples of disruption of carbon cycle
	  • Deforestation and other destruction of biota
	  • Urbanization
	  • Grassland conversion
	  • Burning of fossil fuels
	Nitrogen cycle
	• Nitrogen sinks (reservoirs)
	• Processes that move nitrogen through the cycle
	• Organisms that move nitrogen through the cycle
	• Examples of disruption of nitrogen cycle
	  • Misuse of fertilizers
	  • Dumping organic waste into bodies of water
	  • High concentration of animal waste
	  • Monoculture in farming
	Ecosystem sustainability
	• Biodiversity – a variety of organisms in an ecosystem or biome
	  ▪ Biodiversity increases the chances of survival within an ecosystem
	• Sustainability – ability to maintain ecological processes over long periods of time; ability of an ecosystem to maintain its structure and function over time	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**

	• Greater biodiversity leads to community stability
	• Genetic variation leads to community stability
	• Possible examples of increasing / decreasing biodiversity:
	  • Introduction of native species
	  • Introduction of invasive species
	  • Introduction of disease
	  • Natural disasters
	  • Human impact	

7.13C compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time; (old 7.14B)	Cognition: compare
	Content: results of asexual and sexual reproduction
	<u>Including, but not limited to:</u>
	sexual reproduction
	• Genetic material is donated from only one parent
	• Offspring are identical (uniform) to the parent and to each other
	• Lack of diversity decreases chances of survival of species
	Sexual reproduction
	• Genetic material is donated from two parents
	• Organisms vary because they have differences in inherited traits
	  ○ Offspring differ from each parent and from each other
	• Genetic material from two parents allows for more genetic variation (diversity) in the offspring
	  ○ Diversity increases chances of survival of a species	

7.13D describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations. (old 7.11C)	Cognition: describe and give examples Content: how natural and artificial selection change the occurrence of trait <u>Including, but not limited to:</u> Changes in genetic traits through Adaptation – a change in structure or habits (behavior), often hereditary, by which an organism improves its condition in relationship to its environment	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	○ occurs over a long period of time ○ It takes many, many generations for a physical adaptation to spread throughout a population of organisms Natural selection – the process by which organisms better suited to their environment survive and reproduce Selective breeding – making deliberate crosses of plants or mating of animals, so the offspring will have a desired characteristic derived from one of the parents ○ Domestic animals ▪ Possible examples may include: ▪ Dogs ▪ Cats ▪ Cattle ○ Hybrid plants ▪ Possible examples may include: ▪ Hybrid lilies ▪ Sweet corn ▪ Better boy tomatoes ▪ Rabbage ▪ Meyer lemon trees	
7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups; and (old B.8B)	Cognition: describe Content: taxonomic systems that categorizes organisms <u>Including, but not limited to:</u> • Taxonomic system ○ Levels of classification (e.g., domain, kingdom, phylum, class, order, family, genus, species) ○ Characteristics become more specific at each progressing level ○ Organisms at each progressing level are more closely related ○ Number of species at each level decreases at each progressing level • Use a dichotomous key to classify organisms using identified characteristics	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	• Use a dichotomous key to describe all of the characteristics of a named organism • Create a dichotomous key with a given set of organisms or objects with known or observable characteristics • Interpret data from cladistic analysis as represented in cladograms or phylogenetic trees •	

7.14B describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter. (New builds on new 6.13B and B.8C)	Cognition: describe
	Content: characteristics of the recognized kingdoms and their importance in ecosystems
	<u>Including, but not limited to:</u>
	Domain Archaea
	• All organisms in this taxonomic group share the following characteristics:
	  ○ Prokaryotic cells
	  ○ Unicellular
	  ○ Asexual reproduction
	  ○ Heterotrophic
	• Some organisms in this taxonomic group share the following characteristics:
	  ○ Anaerobic cellular respiration producing methane (unique to Archaea)
	  ○ Motile or nonmotile
	Domain Bacteria
	• All organisms in this taxonomic group share the following characteristics:
	  ○ Prokaryotic
	  ○ Unicellular
	  ○ Asexual reproduction
	  ○ Unique ribosome structure
	• Some organisms in this taxonomic group share the following characteristics:
	  ○ Autotrophic or heterotrophic
	  ○ Motile or nonmotile
	
	Domain Eukarya
	• All organisms in this taxonomic group share the following characteristics:	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	○ Eukaryotic cells • Kingdom Protista ○ Some organisms in this taxonomic group share the following characteristics: ▪ Asexual and sexual reproduction ▪ Autotrophic or heterotrophic ▪ Unicellular (generally) or multicellular (rarely) ▪ Motile or nonmotile • Kingdom Fungi ○ All organisms in this taxonomic group share the following characteristics: ▪ Heterotrophic ▪ Nonmotile ○ Some organisms in this taxonomic group share the following characteristics: ▪ Asexual or sexual reproduction ▪ Unicellular (rarely) or multicellular (generally) • Kingdom Plantae ○ All organisms in this taxonomic group share the following characteristics: ▪ Autotrophic ▪ Multicellular ▪ Nonmotile ○ Some organisms in this taxonomic group share the following characteristics: ▪ Asexual (rarely) or sexual reproduction (generally) • Kingdom Animalia ○ All organisms in this taxonomic group share the following characteristics: ▪ Heterotrophic ▪ Multicellular ▪ Motile ○ Some organisms in this taxonomic group share the following characteristics: ▪ Asexual (rarely) or sexual reproduction (generally)	

Standards Clarification		
Standards	**Specificity**	**Notes/Explanations/Examples**
	Importance in the ecosystem- relate back to trophic levels.	

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

Course/Grade	7th Grade	Course/Grade
6.8B describe how energy is conserved through transfers and transformations in systems such as ~~electrical circuits,~~ food webs	7.12A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids	
	7.12B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.	
6.13C describe how variations within a population can be an advantage or disadvantage to the survival of a population as environments change	7.13C compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time;	
	7.13D describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations.	
	7.14A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups;	
6.13B identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic	7.14B describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter.	

VOCABULARY GLOSSARY

Domain-specific words and definitions for this unit.

Key Content Vocabulary
List and define key vocabulary terms: • **10 % rule** -when energy is passed in an ecosystem from one trophic level to the next, only ten percent of the energy will be passed on. • **Ammonification -** the process in which decomposers (bacteria and fungi) convert amino acids from dead animals and wastes into ammonium. • **Artificial Selection** - the identification by humans of desirable traits in plants and animals, and the steps taken to enhance and continue those traits in future generations. • **Asexual reproduction** - mode of reproduction in which 1 parent produces new offspring that are genetically identical • **Assimilation -** the process in which living organisms take up nitrogen. • **Autotroph:** organisms, known as producers in a food chain, capable of synthesizing their own food by a process known as photosynthesis; all plants and some forms of bacteria and other organisms. • **Binomial nomenclature** – a naming system in which each organism receives a name of two terms of which the first identifies the genus to which it belongs and the second the species itself • **Biogeochemical cycle** - the movement of elements and compounds moving continuously between Earth and its organisms. • **Biomass** – the amount of matter that is stored in the bodies of a group of organisms. • **Carbon fixation** - the process by which carbon (particularly in the form of carbon dioxide) is converted to organic compounds by living organisms. • **Cladogram** - a graphical representation of the hypothetical relationship between organisms based on their similarities. • **Combustion** – when organic material, such as fossil fuel, is burned and returns carbon dioxide to the atmosphere. • **Condensation** - the process by which water vapor in the air is changed into liquid water. • **Consumer –** Organisms that make take in food to obtain their energy. • **Decomposition** - when complex, carbon compounds in dead organisms, urine and feces are broken down into simpler carbon compounds by bacteria or fungi and return carbon to the sediment. • **Denitrification -** the process in which bacteria in the soil convert nitrates into nitrogen gas. • **Deposition** – process by which water vapor changes directly into ice—such a snowflakes and frost. • **Dichotomous Key** – a biological tool that is a series of question or statement sets that is used to identify organisms or objects. • **Ecoregion** - a relatively large unit of land or water that is characterized by a distinctive climate, ecological features and plant and animal communities. • **Ecosystem Organization –** structure of and diversity of an ecosystem. • **Ecosystem Productivity** – the rate at which energy is added to the bodies of a group of organisms (such as primary producers) in the form of biomass. • **Ecosystem Resilience –** the ability of an ecosystem to remain unchanged or recover quickly when subjected to a disturbance or disturbances. • **Energy Pyramid -** is a graphical representation, showing the flow of energy at each *trophic level* in an ecosystem. (sometimes called a trophic pyramid or an ecological pyramid) • **Eukaryotic cell:** a cell that has a membrane-bound nucleus and other membrane-bound organelles • **Evaporation** - the process that changes liquid water to gaseous water (water vapor)

- **Fitness -** an organism's ability to pass its genetic material to its offspring.
- **Genes** – the basic unit of heredity passed from parent to child. Genes are made up of sequences of DNA.
- **Genetic Variation** - the difference in DNA among individuals or the differences between populations.
- **Heterotroph:** organisms, known as consumers in a food chain, which cannot synthesize their own food; carnivores, herbivores, and omnivores
- **Infiltration** - the process by which precipitation or water soaks into subsurface soils and moves into rocks through cracks and pore spaces.
- **Multicellular:** organisms made of many cells
- **Mutation** - an alteration in the genetic material of a cell of a living organism
- **Natural Selection -** the process in nature by which organisms better adapted to their environment tend to survive and reproduce more than those less adapted to their environment.
- **Nitrification -** the process in which bacteria convert ammonium into nitrates.
- **Nitrogen fixation** - the process that causes the nitrogen molecules found in the atmosphere to break apart so they can combine with other atoms.
- **Percolation** - the movement of water through subsurface soil pores until it reaches the water table.
- **Photosynthesis -** plants absorb carbon dioxide and sunlight to create fuel—glucose and other sugars—for building plant structures.
- **Plant Uptake –** the process in which water is taken from the groundwater and soil moisture into plants by their roots.
- **Precipitation** - water that falls from the atmosphere to the Earth's surface.
- **Producer –** Organism that makes their own food.
- **Prokaryotic cell:** a simple, single-celled (unicellular) organism that lacks a nucleus, or any other membrane-bound organelles.
- **Respiration –** process by carbon moves from the biosphere (plants and animals) to the atmosphere.
- **Run Off** - precipitation that does not soak into the soil but instead moves on the Earth's surface toward streams, rivers, and lakes.
- **Sexual reproduction** – the production of new organisms by the combination of genetic information of two individuals.
- **Sublimation** - the conversion between the solid and the gaseous phases of matter, with no intermediate liquid stage.
- **Taxonomy** - the science of finding, describing, and categorizing organisms with the goal to name the species.
- **Transpiration** - occurs when plants take up liquid water from the soil and release water vapor into the air from their leaves
- **Trophic level**- a level or a position in a food chain, a food web, or an ecological pyramid.
- **Unicellular:** organisms made of one cell

Consumable Materials and Lab Supplies for Unit 1 (1 per group of 4 students unless noted)

Lesson	Commercial Vendor	Lab Supplies (Science Vendor)
Lesson 01: Ecosystem Stability and Ecoregions of Texas	<u>Ecosystem Jenga (per group 4-8)</u> • 1 Jenga Game • 1 die (Jenga games can be found at dollar stores or ask for donations from staff who may not be using them anymore.)	

	• Paint or paint pen to prepare Jenga games. See advanced prep on the teacher page.	
Lesson 02: Flow of Energy Part 1	**Energy Efficiency Activity** Per teacher • 30 foam cups • 30 plastic plates or markers (cones from PE?) Per group • 2 large plastic containers or buckets	**Energy Efficiency Activity** Per teacher • Timing device • Meter stick Per group • Graduated cylinder
Lesson 03: Flow of Energy Part 2	None	None
Lesson 04: Flow of Energy Part 3	Gloves-per student Per group Owl Pellet Paper Plate	Gloves-per student Per group Owl Pellet Ruler Dissection Tweezers (forceps) Dissection Probe (blunt probe) Hand Lens
Lesson 05: Recycling of Matter- The Water Cycle	9 Large cups 1 small cup (5 oz Dixie cup) per student. (Can be reused by other classes)	
Lesson 06: Recycling of Matter- The Carbon Cycle	6 Large cups 1 small cup (5 oz Dixie cup) per student. (Can be reused by other classes)	
Lesson 07: Recycling of Matter- The Nitrogen Cycle	6 Large cups 1 small cup (5 oz Dixie cup) per student. (Can be reused by other classes)	
Lesson 08: Diversity in Populations Part 1	Copy or Combine Tokens, markers, or chips. (It is suggested to use 1" x 1" squares of colored paper, but you can use any type of marker such as colored chips or beads.)	
Lesson 09: Diversity in Populations Part 2	One-to-one device with internet connection	
Lesson 10: Taxonomic Classification	No materials but there are cards etc. See advanced prep in the lesson.	
Lesson 11: Characteristics of Domains and Kingdoms	No materials but there are cards etc. See advanced prep in the lesson.	
Lesson 12: Dichotomous Key	One-to-one device with internet connection	
Lesson 13: Cladograms	No materials but there are cards etc. See advanced prep in the lesson.	