

Cells

All students will apply an understanding of cells to the functioning of multicellular organisms, including how cells grow, develop and reproduce:

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<p><b>CELLS</b></p>	<p><b>KC:</b> Specialized functions of cells— respiration (see LO h-3), protein synthesis, mitosis, meiosis (see LH h-2). Basic molecules for cell growth— simple sugars, amino acids, fatty acids. Basic chemicals, molecules and atoms— water, minerals, carbohydrates, proteins, fats and lipids, nucleic acids; carbon, hydrogen, oxygen, nitrogen. Cells come only from other cells. See LO m-4 (digestion).  <b>RWC:</b> The growth of plants and animals.</p> <p><b>KC:</b> Classifications of organisms by cell type— plant, animal, bacteria; selected specialized plant and animal cells— red blood cells, white blood cells, muscle cells, nerve cells, root cells, leaf cells, stem cells; cell parts used for classification— organelle, nucleus, cell wall, cell membrane; specialized functions— reproduction (see LC h-1, LH h-2), photosynthesis (see LO m-3), transport; cell shape.  <b>RWC:</b> Reproduction, growth, response, movement, etc. of animals and plants. Functions of bacteria.</p>	<p><b>III.1.HS.1:</b> Explain how multicellular organisms grow, based on how cells grow and reproduce.</p> <p><b>III.1.HS.2:</b> Compare and contrast ways in which selected cells are specialized to carry out particular life functions.</p>		<p>Microscopes</p>

Organization of Living Things

**All students will use classification systems to describe groups of living things:**

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<b>LIVING THINGS</b>	<p><b>KC:</b> Kingdom categories— protist, fungi, moneran, animal, plant. Characteristics for classification— cell wall, cell membrane, organelle, single-celled multicellular.</p> <p><b>RWC:</b> Common local representatives of each of the five major kingdoms— Paramecium, yeast, mushroom, bacteria, frog, geranium.</p>	<p><b>III.2.HS.1:</b> Classify major groups of organisms to the kingdom level.</p>		

**All students will compare and contrast differences in the life cycles of living things:**

	<p><b>KC:</b> Infection process— disease, parasite, carrier, host, infection.</p> <p><b>RWC:</b> Life cycle of organism(s) associated with human disease(s), such as Lyme disease— tick, malaria—mosquito, parasites.</p>	<p><b>III.2.HS.2:</b> Describe the life cycle of an organism associated with human disease.</p>		<p>Microscope Hand lens</p>
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**All students will investigate and explain how living things obtain and use energy:**

<b>LIVING THINGS</b>	<p><b>KC:</b> Cellular respiration, photosynthesis (see LO m-3), oxygen, sunlight, carbon dioxide, carbohydrate, fat, protein, minerals, water. See LC h-1 (how organisms grow), LO m-3 (how plants store food) LO m-4 (how food and oxygen are distributed to cells), LEC m-2 (the sun as the ultimate source of energy for organisms) and PCM m-3 (energy transformations).</p> <p><b>RWC:</b> Food storage, such as maple tree—maple sap, potato—starch, honey bee—honey, cow—beef, milk. Weight gain and weight loss. Change in respiration rates with exercise.</p>	<p><b>III.2.HS.3:</b> Explain the process of food storage and food use in organisms.</p>		
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All students will analyze how parts of living things are adapted to carry out specific functions:

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
	<p><b>KC:</b> Related systems/cells/chemicals— excretory system, endocrine system, circulatory system, hormones, immune response, white blood cell, bacteria, virus. Factors/mechanisms under control— temperature, disease/infection, homeostasis.</p> <p><b>RWC:</b> Mechanisms for maintaining internal stability, such as body temperature, disease control.</p> <p><b>KC:</b> Available technologies— sanitation, adequate food and water supplies, inoculation, antibodies, biochemistry, medicines, organ transplants. (See PWV h-4, ultrasound/x-ray).</p> <p><b>RWC:</b> Common contexts for these technologies— health maintenance and disease prevention activities, such as exercise and controlled diets; health monitoring activities, such as cholesterol and blood pressure checks and various tests for cancer.</p>	<p><b>III.2.HS.4:</b> Explain how living things maintain a stable internal environment.</p> <p><b>III.2.HS.5:</b> Describe technology used in the prevention, diagnosis, and treatment of diseases and explain its function in terms of human body processes.</p>		

Heredity

**All students will investigate and explain how characteristics of living things are passed on through generations:**

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<b>GENETICS</b>	<p><b>KC:</b> Traits— dominant, recessive. Genetic material— gene pair, gene combination, gene sorting.</p> <p><b>RWC:</b> Common contexts— inheritance of a human genetic disease/disorder, such as sickle cell anemia; a family tree focused on certain traits; examining animal or plant pedigrees.</p> <p><b>KC:</b> Types of cell division— mitosis, meiosis. DNA replication, chromosome. Types of reproduction— sexual, asexual. Genetic variation.</p> <p><b>RWC:</b> Fruit flies, yeast, reproduction by spores, cloning.</p>	<p><b>III.3.HS.1:</b> Explain how characteristics of living things are passed on from generation to generation.</p> <p><b>III.3.HS.2:</b> Describe how genetic material is passed from parent to young during sexual and asexual reproduction.</p>		<p>A-V media, diagrams showing DNA replication during cell division.</p>

**All students will explain how new traits can be established by changing or manipulating genes:**

<b>GENETICS</b>	<p><b>KC:</b> Genetic changes— variation, new gene combinations, mutation. Natural and human-produced sources of mutation— radiation, chemicals. See LE m-2 (how new traits become established in populations).</p> <p><b>RWC:</b> Products of genetic engineering, such as medical advances— insulin, cancer drugs; agricultural related products, such as navel oranges, new flower colors, higher-yield grains; effects of natural and man-made contamination; examples of variations due to new gene combinations, such as hybrid organisms or new plant varieties resulting from multiple sets of genes.</p>	<p><b>III.3.HS.3:</b> Explain how new traits may arise in individuals through changes in genetic material (DNA).</p>		
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Evolution

All students will explain how scientists construct and scientifically test theories concerning the origin of life and evolution of species:

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<b>EVOLUTION</b>	<p><b>KC:</b> Common types of evidence used—hominid fossils, vestigial structures, DNA, protein structure.</p> <p><b>RWC:</b> Skeletal comparisons, such as modern human to hominid fossils; anatomical and biochemical similarities of humans and other higher primates, such as blood proteins; similarity of early human embryo stages to those of other vertebrates; vestigial structures, such as appendix, tail bone.</p>	<p><b>III.4.HS.1:</b> Describe what biologists consider to be evidence for human evolutionary relationships to selected animal groups.</p>		

All students will compare ways that living organisms are adapted (suited) to survive and reproduce in their environments and explain how species change through time:

<b>EVOLUTION</b>	<p><b>KC:</b> Concept of species; how new species or varieties are established— natural selection, inheritable, non-inheritable characteristics, species variation.</p> <p><b>RWC:</b> Contemporary examples of natural selection, such as bacteria resistance to antibiotics, insect resistance to pesticides; examples of artificial selection, such as agricultural selection to increase production, selecting desired traits for pets; examining pros and cons; historical examples of natural selection, such as possible evolution of the giraffe.</p>	<p><b>III.4.HS.2:</b> Explain how a new species or variety may originate through the evolutionary process of natural selection.</p>		
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Ecosystems

**All students will explain how parts of an ecosystem are related and how they interact:**

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<b>ECOSYSTEMS</b>	<p><b>KC:</b> Competition, territory, carrying capacity, natural balance, population, dependence, survival; biotic, abiotic factors.  <b>RWC:</b> Animals that live in packs or herds and plant colonies, such as— wolves, bison, lilies and other bulb plants, various forms of algae.</p>	<p><b>III.5.HS.1:</b> Describe common ecological relationships between and among species and their environments.</p>		

**All students will explain how energy is distributed to living things in an ecosystem:**

	<p><b>KC:</b> Participants and relationships— food chain, food web, energy pyramid, energy flow, producers, consumers, decomposers. See LO m-3 (producers), PCM h-4 (conservation of energy).  <b>RWC:</b> Energy pyramids for food webs in various ecosystems.</p>	<p><b>III.5.HS.2:</b> Explain how energy flows through familiar ecosystems.</p>		
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**All students will investigate and explain how communities of living things change over a period of time:**

<b>ECOSYSTEMS</b>	<p><b>KC:</b> Carrying capacity, competition, parasitism, predation, loss of habitat.  <b>RWC:</b> Common factors that influence relationships, such as weather, disease, predation, migration.</p> <p><b>KC:</b> Succession, pioneer, climate/physical conditions, introduction of new/different species, elimination of existing species, biodiversity; cataclysmic changes.  <b>RWC:</b> Climax forests comprised of maple, beech, or conifers; effects of urban sprawl or clear cutting forests; effects of cataclysmic changes such as the eruption of Mt. St. Helens.</p>	<p><b>III.5.HS.3:</b> Describe general factors regulating population size in ecosystems.</p> <p><b>III.5.HS.4:</b> Describe responses of an ecosystem to events that cause it to change.</p>		
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All students will describe how materials cycle through an ecosystem and get reused in the environment:

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Contexts)	UNIT BENCHMARKS	SUGGESTED ASSESSMENT	POSSIBLE RESOURCES
<b>ECOSYSTEMS</b>	<p><b>KC:</b> Common nutrients/elements— nitrogen, sulfur, carbon, phosphorous. Inorganic compounds containing nutrients— soil minerals, carbon dioxide. Organic compounds in living communities— proteins, fats, carbohydrates. See LO h-3 (cell respiration) and LO m-3 (photosynthesis).</p> <p><b>RWC:</b> Movement of food materials through various food webs, including decomposition.</p>	<p><b>III.5.HS.5:</b> Describe how carbon and soil nutrients cycle through selected ecosystems.</p>		

All students will analyze how humans and the environment interact:

<b>ECOSYSTEMS</b>	<p><b>KC:</b> Common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals. Land management, biodiversity, sustainability. Loss of habitat. See PME h-1 (risk/benefit analysis), EH h-2 (water pollution).</p> <p><b>RWC:</b> Common factors that influence ecosystems, such as pollution of ecosystems from fertilizer, insecticide, and other chemicals.</p>	<p><b>III.5.HS.6:</b> Explain the effects of agriculture and urban development on selected ecosystems.</p>		
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