



Alignment Document
State of Kentucky and Aventa Learning Biology

Biology
2005-2007 Benchmark Blueprint

Big Ideas	Topics	Standards	Unit Name	Course Topic Description
SC-H-UD Unity and Diversity (Biological Science)	SC-H-UD-U Enduring Knowledge - Understandings	SC-H-UD-U-1 the many body cells in an individual can be very different from one another even though they are all descended from a single cell and thus have essentially identical genetic instructions. Different parts of the instructions are used in different types of cells.	Animal Organization Animal Organization	Animal Tissues The Reproductive System and Human Development
		SC-H-UD-U-2 within every cell are specialized parts for the transport of materials, energy transfer, protein building, waste disposal, information feedback and even movement. In addition, most cells in multi-cellular organisms perform specialized functions that others do not.	Photosynthesis and Cellular Respiration Cell Structure Cell Structure	Photosynthesis: Food Production Section 1: Cell Features The Cell Membrane
		SC-H-UD-U-3 DNA, composed of 4 nucleic acids, serves as the blueprint for the production of a variety of proteins. These dynamic and complicated proteins facilitate practically every function/process that occurs within the cell.	Genetics	Protein Synthesis
		SC-H-UD-U-4 the information passed from parents to offspring is coded in DNA molecules. The sorting and recombination	Cell Structure	Meiosis and Sexual Reproduction

		of genes through sexual reproduction results in a great variety of gene combinations that can be used to make predictions about the potential traits of offspring.	Genetics	Mendel and Heredity
		SC-H-UD-U-5 some new gene combinations make little difference, some can produce offspring with new and perhaps enhanced capabilities, while some may reduce the ability of the offspring to survive.	Genetics	RNA Lab
		SC-H-UD-U-6 the degree of kinship between organisms or species can be estimated from the similarity of their DNA sequences, which often closely matches their classification based on anatomical similarities.	Evolution	Evolution and Genetics
		SC-H-UD-U-7 in all organisms and viruses, the instructions for specifying the characteristics are carried in nucleic acids. The chemical and structural properties of nucleic acids determine how the genetic information that underlies heredity is both encoded in genes and replicated.		
	SC-H-UD-S Skills and Concepts	SC-H-UD-S-1 analyze the parts within a cell responsible for particular processes and create analogous models for those processes	Photosynthesis and Cellular Respiration	Photosynthesis Lab
			Photosynthesis and Cellular Respiration	Enzyme Lab
		SC-H-UD-S-2 identify a variety of specialized cell types and describe how these differentiated cells contribute to the function of an individual organism as a whole	Plant Structure	Plant Structure Lab
		SC-H-UD-S-3 investigate the role of	Genetics	Meet the Jeffersons Lab

	genes/chromosomes in the passing of information from one generation to another (heredity)		Notebook
	SC-H-UD-S-4 graphically represent (e.g., pedigrees, punnet squares) and predict the outcomes of a variety of genetic combinations	Genetics Genetics Genetics	Mendel and Heredity Meet the Jeffersons Lab Notebook Unit Exam
	SC-H-UD-S-5 investigate the roles of genetic mutation and variability in contributing to the survival of offspring	Evolution Evolution	Evolution and Genetics Evolution In Action Lab Notebook
	SC-H-UD-S-6 describe the structure of DNA and explain its role in protein synthesis, cell replication and reproduction	Genetics Genetics Genetics	How Proteins are Made DNA Lab RNA Lab
	SC-H-UD-S-7 describe and classify a variety of chemical reactions required for cell functions	Photosynthesis and Cellular Respiration Photosynthesis and Cellular Respiration	Photosynthesis Lab Enzyme Lab
	SC-H-UD-S-8 describe the processes by which cells maintain their internal environments within acceptable limits		
	SC-H-UD-S-9 compare internal, external and metabolic characteristics of organisms in order to classify them into groups using taxonomic nomenclature to describe and justify these classifications	Biological Diversity Biological Diversity Biological Diversity	Plants Lab Animals Lab Microbiology Lab
	SC-H-UD-S-10 compare the structures and functions of viruses to cells and describe the role of viruses in causing a variety of diseases or conditions (e.g., AIDS, common cold, smallpox, warts)		

		SC-H-UD-S-11 identify and investigate areas of current research/innovation in biological science. Make inferences/predictions of the effects of this research on society and/or the environment and support or defend these predictions with scientific data	Genetics	Biotechnology and the Genetics Revolution
SC-H-BC Biological Change (Biological Science)	SC-H-BC-U Enduring Knowledge - Understandings	SC-H-BC-U-1 the survival of any given species is not assured. There are a variety of factors (e.g. reproductive success, mutation, availability of resources, competition) that may determine if a species flourishes, declines, or eventually becomes extinct.	Evolution Population Ecology	Evolution and Genetics Population Growth
		SC-H-BC-U-2 the Earth's present-day species developed from earlier, distinctly different species through a process of natural selection. All living things share a common genetic heritage.	Evolution History of Life on Earth	Descent With Modification Birth of a Planet and Establishment of Life
		SC-H-BC-U-3 some organisms have greater adaptive capabilities than others, giving them a greater chance of survival under changing environmental conditions. These adaptations may be patterns of behavior as well as physical characteristics.	Evolution Evolution	Descent With Modification Evolution and Genetics
		SC-H-BC-U-4 the endangerment/ and/or extinction of a species cannot be slowed or prevented without sufficient data to model the interactions of the factors involved.		
		SC-H-BC-U-5 in science the term theory is reserved to describe only those ideas that have been well tested through scientific investigation. Scientific theories are judged by how well they fit with other	The Nature of Science and Biology The Nature of Science and Biology	Science and the Scientific Method The Scientific Method Lab

		theories, the range of observations they explain, how well they explain observations and their usefulness in predicting new findings. Scientific theories usually grow slowly through contributions from many investigators.		
	SC-H-BC-S Skills and Concepts	SC-H-BC-S-1 identify evidence of change in species using fossils, DNA sequences, anatomical similarities, physiological similarities and embryology	Evolution History of Life on Earth	Evolution Lab History of Life Lab
		SC-H-BC-S-2 explain the role of natural selection in speciation, adaptation, diversity and phylogeny	Evolution	Evolution Lab
		SC-H-BC-S-3 compare variations, tolerances and adaptations (behavioral and physiological) of plants and animals in different biomes	Population Ecology	Biomes Lab
		SC-H-BC-S-4 generate possible solutions to real-world problems of endangered and extinct species and predict the impact of a variety of change		
		SC-H-BC-S-5 predict the likelihood of survival for a variety of existing species based upon predicted changes in environmental conditions (e.g., global warming, continental drift) and propose methods to prevent the extinction of species with insufficient ability to adapt		
		SC-H-BC-S-6 distinguish between a scientific law, theory, hypothesis and unsupported supposition/claim	The Nature of Science and Biology	The Scientific Method Lab
		SC-H-BC-S-7 investigate the historical development and revision of a variety of accepted scientific laws, theories and claims	Genetics	DNA Lab
			Genetics	RNA Lab
SC-H-ET Energy	SC-H-ET-U Enduring Knowledge -	SC-H-ET-U-1 transformations that occur		

Transformations (Unifying Concepts)	Understandings	within the nuclei of atoms release vastly greater energy than those that involve only electrons, and result in the emission of radiation and/or transformation of elements.		
		SC-H-ET-U-2 while the total amount of energy in the universe is constant, the amount that is available for useful transformations is always decreasing. Systems within the universe will cease to function once the energy differential becomes zero.		
		SC-H-ET-U-3 waves, including electromagnetic radiation, are an important form of energy transfer. Waves are governed by rules that can be investigated and used to predict/explain their behavior.		
		SC-H-ET-U-4 many elements and compounds are involved in continuous cyclic processes where they are stored by and/or flow between organisms and the environment. These processes require a continuous supply of energy to occur.	Population Ecology	The Biosphere and Mass Extinctions
		SC-H-ET-U-5 radiant energy from the sun is stored in a chemical form in plants as a result of photosynthesis. This energy transformation allows plants to use simple molecules, such as carbon dioxide and water, to assemble the complex molecules needed to increase their mass.	Photosynthesis and Cellular Respiration	Photosynthesis: Food Production
		SC-H-ET-U-6 energy stored in food is released by a series of internal chemical reactions that reorganize the molecules into a form useable by the organism.	Photosynthesis and Cellular Respiration	Cellular Respiration
		SC-H-ET-U-7 a variety of carbon	The Nature of	Chemistry of Life

	<p>compounds are essential to the processes that occur in all organisms.</p> <p>SC-H-ET-U-8 heat is a manifestation of the random motion and vibrations of atoms or molecules within a substance. Interactions between or among atoms or molecules naturally move toward states of higher disorder.</p> <p>SC-H-ET-U-9 many different sources of energy are used for a variety of purposes, including powering machines designed to do useful work. Regardless of function or energy source, the useful energy output of any machine is always less than the total energy input.</p> <p>SC-H-ET-U-10 all Earth systems/processes require either an internal or external source of energy to function. Changes to any component, or to the quantity or type of energy input, may influence all components of the system.</p> <p>SC-H-ET-U-11 weather and climate are the direct or indirect result of transfer of solar energy, and changes in one part of the system may influence all of the others. The complexity of the system and the number of variables involved requires very complex mathematical models in order to make accurate predictions.</p> <p>SC-H-ET-U-12 technological problems often create a demand for new scientific knowledge, and new technologies make it possible for scientists to conduct their research more effectively or to conduct new lines of research. The availability of</p>	<p>Science and Biology</p> <p>Photosynthesis and Cellular Respiration</p> <p>Genetics</p> <p>Cell Structure</p>	<p>Section 1: Energy Transfers</p> <p>Biotechnology and the Genetics Revolution</p> <p>Section 1: Microscopes</p>
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		new technology often sparks scientific advances.		
		SC-H-ET-U-13 technology affects society because it solves practical problems and serves human needs. Science affects society by stimulating thought or satisfying curiosity, or by influencing views of the world, or by providing knowledge necessary for new technological advances.	Genetics Cell Structure	Biotechnology and the Genetics Revolution Section 1: Microscopes
	SC-H-ET-S Skills and Concepts	SC-H-ET-S-1 classify and describe nuclear reactions and their products		
		SC-H-ET-S-2 investigate the forces inside the nucleus and evaluate the risk/benefits of nuclear energy		
		SC-H-ET-S-3 apply the law of conservation of energy and explore heat flow in real-life phenomena		
		SC-H-ET-S-4 investigate waves, the rules describing wave behavior and energy transfer via waves in real life phenomena (e.g., nuclear medicine, industrial applications)		
		SC-H-ET-S-5 investigate the flow of matter and energy between organisms and the environment and model the cyclic nature of this process	Population Ecology Population Ecology	The Biosphere and Mass Extinctions Biomes Lab
		SC-H-ET-S-6 explain the metabolic process of photosynthesis and describe the molecules it assembles to store solar energy	Photosynthesis and Cellular Respiration	Photosynthesis Lab
		SC-H-ET-S-7 describe the metabolic processes that allow energy stored in food to be made available to the organism	Photosynthesis and Cellular Respiration	Cellular Respiration
		SC-H-ET-S-8 explore the composition and function of the carbon compounds		

		involved in metabolism		
		SC-H-ET-S-9 apply the concept of entropy to molecular interactions and to interactions within the universe		
		SC-H-ET-S-10 analyze a variety of energy sources, their potential uses and their relative costs/benefits		
		SC-H-ET-S-11 investigate the relationship of energy input vs. useful energy output in mechanical systems		
		SC-H-ET-S-12 model and explain the relationships and energy flow existing in various Earth systems	Population Ecology	Biomes Lab
		SC-H-ET-S-13 use weather data to model the complex interactions responsible for weather and climate		
		SC-H-ET-S-14 describe how science and technology interact. Research and investigate the impact of technology on society and how technological advances have driven scientific research		
SC-H-I Interdependence (Unifying Concepts)	SC-H-I-U Enduring Knowledge - Understandings	SC-H-I-U-1 human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.	Population Ecology	Population Growth
		SC-H-I-U-2 unique among organisms, humans have the capability to impact other species on a global scale both directly (e.g. selective breeding, genetic engineering, foreign species introductions) and indirectly (e.g. habitat crowding, pollution, climate change).	Population Ecology Population Ecology Population Ecology	Population Growth Community and Ecosystem Dynamics The Biosphere and Mass Extinctions
		SC-H-I-U-3 the appearance of new species always impacts the environment. In some cases this impact can have global and profound significance (e.g.	History of Life on Earth History of Life on	Birth of a Planet and Establishment of Life The Time of Ancient Life

		when ancient bacteria transformed the atmosphere to an oxygen-rich environment).	Earth	
		SC-H-I-U-4 every ecosystem contains natural checks and balances, both biotic and abiotic, that serve to limit the size and range of the populations contained within it.	Population Ecology	Population Growth
		SC-H-I-U-5 human creativity, inventiveness and ingenuity have brought new risks as well as improvements to human existence. People control technology and are ultimately responsible for its effects.	Genetics Population Ecology	Biotechnology and the Genetics Revolution The Biosphere and Mass Extinctions
		SC-H-I-U-6 science/technology occasionally provides the means to do questionable things. Decisions about doing these things require exercising a sense of responsibility. Just because something can be done does not mean it should be done.	Genetics	Biotechnology and the Genetics Revolution
		SC-H-I-U-7 the critical assumptions behind any line of reasoning must be made explicit, so that the validity of the position being taken can be judged.		
	SC-H-I-S Skills and Concepts	SC-H-I-S-1 explore ways to eradicate or lessen environmental problems caused by human interaction (e.g., examine programs for habitat restoration or wildlife protection, automotive/industrial emissions standards)		
		SC-H-I-S-2 investigate changes in ecosystems and propose potential solutions to problems by documenting and communicating solutions to others through multi-media presentations		

	<p>SC-H-I-S-3 analyze and describe the effects of events (e.g., fires, hurricanes, deforestation, mining, population growth and municipal development) on environments from a variety of perspectives. Use data to propose ways of lessening impacts perceived as negative</p>		
	<p>SC-H-I-S-4 examine existing models of global population growth and the factors affecting population change (e.g., geography, diseases, natural events, birth/death rates). Propose and defend solutions to identified problems of population change</p>		
	<p>SC-H-I-S-5 analyze examples of environmental changes resulting from the introduction, removal, or reintroductions of indigenous or non-indigenous species to an ecosystem. Use information to predict future impacts of similar changes in other ecosystems</p>		
	<p>SC-H-I-S-6 analyze and synthesize research, for questions about, theories and related technologies that have advanced our understanding of interdependence</p>		
	<p>SC-H-I-S-7 explore the causes, consequences and possible solutions to persistent, contemporary and emerging global issues relating to environmental quality</p>	Population Ecology	The Biosphere and Mass Extinctions
	<p>SC-H-I-S-8 Investigate controversial scientific proposals (e.g., human cloning, genetic modification of crops, nuclear waste storage), use scientific</p>	Genetics	Biotechnology and the Genetics Revolution



		evidence/data to support or defend a position and debate the ethical merits of implementing the proposed actions		
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