Keystone Exams: Biology

Glossary to the Assessment Anchor & Eligible Content

The Keystone Glossary includes terms and definitions associated with the Keystone Assessment Anchors and Eligible Content. The terms and definitions included in the glossary are intended to assist Pennsylvania educators in better understanding the Keystone Assessment Anchors and Eligible Content. The glossary does not define all possible terms included on an actual Keystone Exam, and it is not intended to define terms for use in classroom instruction for a particular grade level or course.

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Abiotic	A term that describes a nonliving factor in an ecosystem.
Active Transport	The movement of particles from an area of low concentration to an area of high concentration that uses energy provided by ATP or a difference in electrical charges across a cell membrane.
Adenosine Triphosphate (ATP)	A molecule that provides energy for cellular reactions and processes. ATP releases energy when one of its high-energy bonds is broken to release a phosphate group.
Adhesion	The intermolecular attraction between unlike molecules. Capillary action results from the adhesive properties of water and the molecules that make up plant cells.
Agriculture	The artificial cultivation of food, fiber, and other goods by the systematic growing and harvesting of various organisms.
Allele	A variation of a gene's nucleotide sequence (an alternative form of a gene).
Allele Frequency	The measure of the relative frequency of an allele at a genetic locus in a population; expressed as a proportion or percentage.
Analogous Structure	A physical structure, present in multiple species, that is similar in function but different in form and inheritance.
Aquatic	A term that describes an organism associated with a water environment.
Atom	The smallest unit of an element that retains the chemical and physical properties of that element.
Biochemical Conversion	The changing of organic matter into other chemical forms such as fuels.
Bioenergetics	The study of energy flow (energy transformations) into and within living systems.

Biogeochemical Cycles	The movement of abiotic factors between the living and nonliving components within ecosystems; also known as nutrient cycles (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).
Biological Macromolecules	A group of biomacromolecules that interact with biological systems and their environments.
Biology	The scientific study of life.
Biome	A large area or geographical region with distinct plant and animal groups adapted to that environment.
Biosphere	The zone of life on Earth; sum total of all ecosystems on Earth.
Biotechnology	Any procedure or methodology that uses biological systems or living organisms to develop or modify either products or processes for specific use. This term is commonly associated with genetic engineering, which is one of many applications.
Biotic	A term that describes a living or once-living organism in an ecosystem.
Carbohydrate	A macromolecule that contains atoms of carbon, hydrogen, and oxygen in a 1:2:1 ratio and serves as a major source of energy for living organisms (e.g., sugars, starches, and cellulose).
Carrier (Transport) Proteins	Proteins embedded in the plasma membrane involved in the movement of ions, small molecules, and macromolecules into and out of cells; also known as transport proteins.
Catalyst	A substance that enables a chemical reaction to proceed at a usually faster rate or under different conditions (e.g., lower temperature) than otherwise possible without being changed by the reaction.
Cell	The basic unit of structure and function for all living organisms. Cells have three common components: genetic material, cytoplasm, and a cell membrane. Eukaryotic cells also contain specialized organelles.

Cell Cycle	The series of events that take place in a cell leading to its division and duplication. The main phases of the cell cycle are interphase, nuclear division, and cytokinesis.
Cellular Respiration	A complex set of chemical reactions involving an energy transformation where potential chemical energy in the bonds of "food" molecules is released and partially captured in the bonds of adenosine triphosphate (ATP) molecules.
Chloroplast	An organelle found in plant cells and the cells of other eukaryotic photosynthetic organisms where photosynthesis occurs.
Chromosomal Mutation	A change in the structure of a chromosome (e.g., deletion, the loss of a segment of a chromosome and thus the loss of segment containing genes; duplication, when a segment of a chromosome is duplicated and thus displayed more than once on the chromosome; inversion**,** when a segment of a chromosome breaks off and reattaches in reverse order; and translocation, when a segment of one chromosome breaks off and attaches to a nonhomologous chromosome).
Chromosomes	A single piece of coiled DNA and associated proteins found in linear forms in the nucleus of eukaryotic cells and circular forms in the cytoplasm of prokaryotic cells; contains genes that encode traits. Each species has a characteristic number of chromosomes.
Cloning	A process in which a cell, cell product, or organism is copied from an original source (e.g., DNA cloning, the transfer of a DNA fragment from one organism to a self-replicating genetic element such as a bacterial plasmid; reproductive cloning, the transfer of genetic material from the nucleus of a donor adult cell to an egg cell that has had its nucleus removed for the purpose of creating an embryo that can produce an exact genetic copy of the donor organism; or therapeutic cloning, the process of taking undifferentiated embryonic cells [STEM cells] for use in medical research).
Co-dominance	A pattern of inheritance in which the phenotypic effect of two alleles in a heterozygous genotype express each phenotype of each allele fully and equally; a phenotype which would not be expressed in any other genotypic combination.
Cohesion	The intermolecular attraction between like molecules. Surface tension results from the cohesive properties of water.

Community (Ecological)	Different populations of organisms interacting in a shared environment.
Competition	When individuals or groups of organisms compete for similar resources such as territory, mates, water, and food in the same environment.
Concentration	The measure of the amount or proportion of a given substance when combined with another substance.
Concentration Gradient	The graduated difference in concentration of a solute per unit distance through a solution.
Consumer (Ecological)	An organism that obtains energy by feeding on other organisms or their remains.
Crossing-over	An exchange of genetic material between homologous chromosomes during anaphase I of meiosis; contributes to the genetic variability in gametes and ultimately in offspring.
Cytokinesis	The final phase of a cell cycle resulting in the division of the cytoplasm.
Decomposer	An organism that obtains nutrients by consuming dead and decaying organic matter which allows nutrients to be accessible to other organisms.
Deoxyribonucleic Acid (DNA)	A biological macromolecule that encodes the genetic information for living organisms and is capable of self-replication and the synthesis of ribonucleic acid (RNA).
Diffusion	The movement of particles from an area of high concentration to an area of low concentration; a natural result of kinetic molecular energy.
DNA Replication	The process in which DNA makes a duplicate copy of itself.

Dominant Inheritance	A pattern of inheritance in which the phenotypic effect of one allele is completely expressed within a homozygous and heterozygous genotype.
Ecology	The study of the relationships between organisms and their interactions with the environment.
Ecosystem	A system composed of organisms and nonliving components of an environment.
Embryology	The branch of zoology studying the early development of living things.
Endemic Species	A species that is found in its originating location and is generally restricted to that geographic area.
Endocytosis	A process in which a cell engulfs extracellular material through an inward folding of its plasma membrane.
Endoplasmic Reticulum (ER)	An organelle, containing folded membranes and sacs, responsible for the production, processing, and transportation of materials for use inside and outside a eukaryotic cell. There are two forms of this organelle: rough ER that has surface ribosomes and participates in the synthesis of proteins mostly destined for export by the cell and smooth ER that has no ribosomes and participates in the synthesis of lipids and steroids as well as the transport of synthesized macromolecules.
Endosymbiosis	A theorized process in which early eukaryotic cells were formed from simpler prokaryotes.
Energy Pyramid	A model that illustrates the biomass productivity at multiple trophic levels in a given ecosystem.
Energy Transformation	A process in which energy changes from one form to another form while some of the energy is lost to the environment.
Environment	The total surroundings of an organism or a group of organisms.
Enzyme	A protein that increases the rate of a chemical reaction without being changed by the reaction; an organic catalyst.

Eukaryote	A type of organism composed of one or more cells containing a membrane-bound nucleus, specialized organelles in the cytoplasm, and a mitotic nuclear division cycle.
Evolution	A process in which new species develop from preexisting species (biological evolution or macroevolution); a change in the allele frequencies of a population of organisms from generation to generation (genetic evolution or microevolution).
Exocytosis	A process in which a cell releases substances to the extracellular environment by fusing a vesicular membrane with the plasma membrane, separating the membrane at the point of fusion and allowing the substance to be released.
Extinction	A term that typically describes a species that no longer has any known living individuals.
Extracellular	Located outside a cell.
Facilitated Diffusion	A process in which substances are transported across a plasma membrane with the concentration gradient with the aid of carrier (transport) proteins; does not require the use of energy.
Food Chain	A simplified path illustrating the passing of potential chemical energy (food) from one organism to another organism.
Food Web	A complex arrangement of interrelated food chains illustrating the flow of energy between interdependent organisms.
Forensics	The science of tests and techniques used during the investigation of crimes.
Fossils	The preserved remains or traces of organisms that once lived on Earth.
Founder Effect	A decrease in genetic variation caused by the formation of a new population by a small number of individuals from a larger population.

Frame-shift Mutation	The addition (insertion mutation) or removal (deletion mutation) of one or more nucleotides that is not indivisible by three, therefore resulting in a completely different amino acid sequence than would be normal. The earlier in the sequence nucleotides are added or removed, the more altered the protein will be.
Freezing Point	The temperature at which a liquid changes state to a solid.
Gamete	A specialized cell (egg or sperm) used in sexual reproduction containing half the normal number of chromosomes of a somatic cell.
Gene	A sequence of nucleotides composing a segment of DNA that provides a blueprint for a specific hereditary trait.
Gene Expression	The process in which a nucleotide sequence of a gene is used to make a functional product such as protein or RNA.
Gene Recombination	A natural process in which a nucleic acid molecule (usually DNA but can be RNA) is broken and then joined to a different molecule; a result of crossing-over.
Gene Splicing	A type of gene recombination in which the DNA is intentionally broken and recombined using laboratory techniques.
Gene Therapy	The intentional insertion, alteration, or deletion of genes within an individual's cells and tissues for the purpose of treating a disease.
Genetic Drift	A change in the allele frequency of a population as a result of chance events rather than natural selection.
Genetic Engineering	A technology that includes the process of manipulating or altering the genetic material of a cell resulting in desirable functions or outcomes that would not occur naturally.
Genetically Modified Organism	An organism whose genetic material has been altered through some genetic engineering technology or technique.

Genetics	The scientific study of inheritance.
Genotype	The genetic composition of an organism with reference to a single trait, a set of traits, or the entire complement of traits of an organism.
Golgi Apparatus	An organelle found in eukaryotic cells responsible for the final stages of processing proteins for release by the cell.
Gradualism	A proposed explanation in evolutionary biology stating that new species arise from the result of slight modifications (mutations and resulting phenotypic changes) over many generations.
Habitat	An area that provides an organism with its basic needs for survival.
Homeostasis	The regulatory process in which an organism regulates its internal environment.
Homeostatic Mechanism	A regulatory mechanism that contributes to maintaining a state of equilibrium (e.g., thermoregulation, water regulation, and oxygen regulation).
Homologous Structure	A physical characteristic in different organisms that is similar because it was inherited from a common ancestor.
Hypothesis	A proposed, scientifically testable explanation for an observed phenomenon.
Impermeable	Not permitting passage of a substance or substances.
Incomplete Dominance	A pattern of inheritance in which two alleles, inherited from the parents, are neither dominant nor recessive. The resulting offspring have a phenotype that is a blending of the parental traits.
Inheritance	The process in which genetic material is passed from parents to their offspring.

Interphase	The longest-lasting phase of the cell cycle in which a cell performs the majority of its functions, such as preparing for nuclear division and cytokinesis.
Intracellular	Located inside a cell.
Isolating Mechanisms	Features of behaviors, morphology, or genetics which serve to prevent mating or breeding between two different species (e.g., temporal isolation, in which individuals are active at different times of the day, seasons, or mating periods; ecological isolation, in which individuals only mate in their specific habitat; behavioral isolation, when there are no sexual cues between representatives of the species; mechanical isolation, when there is no sperm transfer during an attempted mating; and gametic incompatibility, when there is sperm transfer without fertilization occurring). If mating can take place, there are four factors that prevent hybrid viability: zygotic mortality (fertilization but no zygote), hybrid inviability (embryo is not viable), hybrid sterility (resulting adult is sterile), and hybrid breakdown (first generation is viable but future generations are not).
Law (Scientific)	A law that generalizes a body of observations. At the time it is made, no exceptions have been found to a law. It explains things but does not describe them; serves as the basis of scientific principles.
Limiting Factor	Chemical or physical factor that limits the existence, growth, abundance, or distribution of an individual organism or a population.
Lipids	A group of organic compounds composed mostly of carbon and hydrogen including a proportionately smaller amount of oxygen; are insoluble in water, serve as a source of stored energy, and are a component of cell membranes.
Macromolecule	A polymer with a high molecular mass. Within organisms there are four main groups: carbohydrates, lipids, proteins, and nucleic acids.
Mechanism (Scientific)	The combination of components and processes that serve a common function.

Meiosis	A two-phase nuclear division that results in the eventual production of gametes with half the normal number of chromosomes.
Migration (Genetics)	The permanent movement of genes into or out of a population resulting in a change in allele frequencies.
Mitochondrion	A membrane-bound organelle found in most eukaryotic cells; site of cellular respiration.
Mitosis	A nuclear division resulting in the production of two somatic cells having the same genetic complement as the original cell.
Molecule	The smallest particle of a substance that retains the chemical and physical properties of the substance and is composed of two or more atoms held together by chemical forces.
Monomer	A molecule of any compound that can react with other molecules of the same or different compound to form a polymer. Each biological macromolecule has characteristic monomers.
Multicellular	Made up of more than one cell.
Multiple Alleles	More than two forms of a gene controlling the expression of a trait.
Mutation	A permanent transmissible change of genetic material (e.g., chromosomal mutations and gene mutations).
Natural Selection	A process in nature in which organisms possessing certain inherited traits are better able to survive and reproduce compared to others of their species.
Nondisjunction	The process in which sister chromatids fail to separate during and after mitosis or meiosis.

Nonnative Species	A species normally living outside a distribution range that has been introduced through either deliberate or accidental human activity; also can be known as introduced, invasive, alien, nonindigenous, or exotic.
Nucleic Acid	A biological macromolecule (DNA or RNA) composed of the elements C, H, N, O, and P that carries genetic information.
Nucleus	A membrane-bound organelle in eukaryotic cells functioning to maintain the integrity of the genetic material and, through the expression of that material, controlling and regulating cellular activities.
Organ	An anatomical unit composed of tissues serving a common function.
Organ System	An anatomical system composed of a group of organs that work together to perform a specific function or task.
Organelle	A subunit within a cell that has a specialized function.
Organic Molecule	A molecule containing carbon that is a part of or produced by living systems.
Organism	A form of life; an animal, plant, fungus, protist or bacterium.
Osmosis	The movement of water or another solvent through permeable membranes from an area of higher water concentration (dilute) to an area of lower water concentration (concentrated).
Passive Transport	The transportation of materials across a plasma membrane without using energy.
pH	The measure of acidity or alkalinity (basicity) of an aqueous solution scaling from 1 (highly acidic) to 14 (highly alkaline) with a midpoint of 7 (neutral).
Phenotype	The observable expression of a genotype.

Photosynthesis	A process in which solar radiation is chemically captured by chlorophyll molecules and through a set of controlled chemical reactions resulting in the potential chemical energy in the bonds of carbohydrate molecules.
Plasma Membrane	A thin, phospholipid and protein molecule bilayer that encapsulates a cell and controls the movement of materials in and out of the cell through active or passive transport.
Plastids	A group of membrane-bound organelles commonly found in photosynthetic organisms and mainly responsible for the synthesis and storage of food.
Point Mutation	A single-base substitution causing the replacement of a single-base nucleotide with another nucleotide (e.g., silent mutation, in which there is no change in an amino acid; missense mutation, in which there is a different amino acid; and nonsense mutation, in which there is an insertion of a stop codon in the amino acid which stops protein synthesis).
Polygenic Trait	A trait in which the phenotype is controlled by two or more genes at different loci on different chromosomes.
Population	A group of individuals of the same species living in a specific geographical area and reproducing.
Population Dynamics	The study of short- and long-term changes in the number of individuals for a given population, as affected by birth, death, immigration, and emigration.
Principle (Scientific)	A concept based on scientific laws and axioms (rules assumed to be present, true, and valid) where general agreement is present.
Producer (Ecological)	An organism that uses a primary energy source to conduct photosynthesis or chemosynthesis.
Prokaryote	A single-celled organism that lacks a membrane-bound nucleus and specialized organelles.

Protein	A macromolecule that contains the principal components of organisms: carbon, hydrogen, oxygen, and nitrogen; performs a variety of structural and regulatory functions for cells.
Protein Synthesis	The process in which amino acids are arranged in a linear sequence through the processes of transcription of DNA and to RNA and the translation of RNA to a polypeptide chain.
Pumps (Ion or Molecular)	Any of several molecular mechanisms in which ions or molecules are transported across a cellular membrane requiring the use of an energy source (e.g., glucose, sodium [Na+], calcium [Ca+], and potassium [K+]).
Punctuated Equilibrium	A proposed explanation in evolutionary biology stating that species are generally stable over long periods of time. Occasionally there are rapid changes that affect some species which can quickly result in a new species.
Recessive Inheritance	A pattern of inheritance in which the phenotypic effect of one allele is only expressed within a homozygous genotype. In a heterozygous condition with a dominant allele, it is not expressed in the phenotype.
Ribosome	A cellular structure composed of RNA and proteins that is the site of protein synthesis in eukaryotic and prokaryotic cells.
Science	A body of evidence-based knowledge gained through observation and experimentation related to the natural world and technology.
Selective Breeding	The process of breeding organisms that results on offspring with desired genetic traits.
Semiconservative Replication	The process in which the DNA molecule uncoils and separates into two strands. Each original strand becomes a template on which a new strand is constructed, resulting in two DNA molecules identical to the original DNA molecule.
Sex-linked Trait	A trait, associated with a gene that is carried by either the male or female parent (e.g., color blindness and sickle-cell anemia).

Speciation	A process typically caused by the genetic isolation from a main population resulting in a new genetically distinct species.
Species	The lowest taxonomic level of biological classification consisting of organisms capable of reproduction that results in fertile offspring.
Specific Heat	The measure of the heat energy required to increase the temperature of a unit quantity of a substance by a certain temperature interval.
Succession	A series of predictable and orderly changes within an ecosystem over time.
Symbiotic Relationship	A relationship between two organisms (i.e., mutualism, in which both organisms benefit; parasitism, in which one organism benefits and the other organism is harmed; and commensalism, in which one organism benefits and the other organism does not benefit or is not harmed).
System	A set of interacting or interdependent components, real or abstract, that form an integrated whole. An open system is able to interact with its environment. A closed system is isolated from its environment.
Temperature	A measure of the average kinetic energy (energy of motion) of particles in a sample of matter. This physical property can determine the rate and extent to which chemical reactions can occur within living systems. It is commonly measured in degrees Celsius (°C) or Fahrenheit (°F).
Terrestrial	A term that describes an organism associated with a land environment.
Theory (Scientific)	An explanation of observable phenomena based on available empirical data and guided by a system of logic that includes scientific laws; provides a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature or behavior of a specific set of phenomena.
Tissue	An anatomical unit composed of cells organized to perform a similar function.

Transcription	The process in which a strand of messenger RNA (mRNA) is synthesized by using the genetic information found on a strand DNA as a template.
Translation	The process in which the messenger RNA (mRNA) molecule on a ribosome is decoded to produce a sequence of amino acids for protein synthesis.
Translocation	The process in which a segment of a chromosome breaks off and attaches to another chromosome.
Trophic Level	The position of an organism in relation to the flow of energy and inorganic nutrients through an ecosystem (e.g., producer, consumer, and decomposer).
Unicellular	Made up of a single cell.
Vestigial Structure	A physical characteristic in organisms that appears to have lost its original function as a species has changed over time.