Course: 2000010 M/J Life Science

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BASIC INFORMATION

Course Number:	2000010
Course Title:	M/J Life Science
Course Abbreviated Title:	M/J LIF SCI
Course Path:	**Section:** Grades PreK to 12 Education Courses » **Grade Group:** Grades 6 to 8 Education Courses » **Subject:** Science » **SubSubject:** Biological Sciences »
Course Length:	Year
Status:	State Board Approved

STANDARDS (61)

HE.6.C.1.4:	Recognize how heredity can affect personal health.
HE.6.C.1.8:	Explain how body systems are impacted by hereditary factors and infectious agents.
LA.6.2.2.3:	The student will organize information to show understanding (e.g., representing main ideas within text through charting, mapping, paraphrasing, summarizing, or comparing/contrasting);
LA.6.4.2.2:	The student will record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information and include a list of sources used;

MA.6.A.3.6:	Construct and analyze tables, graphs, and equations to describe linear functions and other simple relations using both common language and algebraic notation.
MA.6.S.6.2:	Select and analyze the measures of central tendency or variability to represent, describe, analyze, and/or summarize a data set for the purposes of answering questions appropriately.
SC.6.L.14.1:	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
SC.6.L.14.2:	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
SC.6.L.14.3:	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
SC.6.L.14.4:	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.

SC.6.L.14.5:	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
SC.6.L.14.6:	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
SC.6.L.15.1:	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N.1.1:	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.6.N.1.2:	Explain why scientific investigations should be replicable.
SC.6.N.1.3:	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.

SC.6.N.1.4:	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
SC.6.N.1.5:	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
SC.6.N.2.1:	Distinguish science from other activities involving thought.
SC.6.N.2.2:	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
SC.6.N.2.3:	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
SC.6.N.3.1:	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
SC.6.N.3.2:	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
SC.6.N.3.3:	Give several examples of scientific laws.
SC.6.N.3.4:	Identify the role of models in the context of the sixth grade science benchmarks.

SC.7.L.15.1:	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
SC.7.L.15.2:	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.
SC.7.L.15.3:	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
SC.7.L.16.1:	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.2:	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
SC.7.L.16.3:	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
SC.7.L.16.4:	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.

SC.7.L.17.1:	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
SC.7.L.17.2:	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.7.L.17.3:	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N.1.1:	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.7.N.1.2:	Differentiate replication (by others) from repetition (multiple trials).
SC.7.N.1.3:	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
SC.7.N.1.4:	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.

SC.7.N.1.5:	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
SC.7.N.1.6:	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
SC.7.N.1.7:	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
SC.7.N.2.1:	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
SC.7.N.3.1:	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
SC.7.N.3.2:	Identify the benefits and limitations of the use of scientific models.
SC.8.L.18.1:	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
SC.8.L.18.2:	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.

SC.8.L.18.3:	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
SC.8.L.18.4:	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N.1.1:	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
SC.8.N.1.2:	Design and conduct a study using repeated trials and replication.
SC.8.N.1.3:	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
SC.8.N.1.4:	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
SC.8.N.1.5:	Analyze the methods used to develop a scientific explanation as seen in different fields of science.

SC.8.N.1.6:	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
SC.8.N.2.1:	Distinguish between scientific and pseudoscientific ideas.
SC.8.N.2.2:	Discuss what characterizes science and its methods.
SC.8.N.3.1:	Select models useful in relating the results of their own investigations.
SC.8.N.3.2:	Explain why theories may be modified but are rarely discarded.
SC.8.N.4.1:	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
SC.8.N.4.2:	Explain how political, social, and economic concerns can affect science, and vice versa.

RELATED GLOSSARY TERM DEFINITIONS (70)

Central tendency:	A measure used to describe data (e.g., mean, mode, median).
Equation:	A mathematical sentence stating that the two expressions have the same value. Also read the definition of equality.

Line:	A collection of an infinite number of points in a straight pathway with unlimited length and having no width.
Linear function:	A relationship between two variables such that for a fixed change in one variable, there is fixed change in the other variable. If there is one independent variable (e.g. f(x)=mx+b), then the graph of the function will be a line. If there are two independent variables (e.g. f(x,y)=ax+by+c) then the graph of the function will be a plane.
Mean:	There are several statistical quantities called means, e.g., harmonic mean, arithmetic mean, and geometric mean. However, “mean” commonly refers to the arithmetic mean that is also called arithmetic average. Arithmetic mean is a mathematical representation of the typical value of a series of numbers, computed as the sum of all the numbers in the series divided by the count of all numbers in the series. Arithmetic mean is the balance point if the numbers are considered as weights on a beam.
Median:	When the numbers are arranged from least to greatest, the middle number of a set of numbers, or the mean of two middle numbers when the set has two middle numbers is called median. Half of the numbers are above the median and half are below it.
Mode:	The most frequent value(s) of a set of data. A data set may have more than one mode if two or more data values appear the most. When no data value occurs more than once in a data set, there is no mode.
Outlier:	An outlier is a data point that lies outside the overall pattern of a distribution. An outlier is usually a point which falls more than 1.5 times the interquartile range above the third quartile or below the first quartile. Outliers can also be identified on a scatter plot.

Relation:	A relation from A to B is any subset of the cross product (Cartesian product) of A and B.
Set:	A set is a finite or infinite collection of distinct objects in which order has no significance.
Table:	A data display that organizes information about a topic into categories using rows and columns.
Asexual reproduction:	A form of reproduction in which new individuals are formed without the involvement of gametes.
Atom:	The smallest unit of a chemical element that can still retain the properties of that element.
Bacteria:	Any of a large group of one-celled organisms that lack a cell nucleus, reproduce by fission or by forming spores, and in some cases cause disease.
Biotechnology:	The manipulation (as through genetic engineering) of living organisms or their components to produce useful usually commercial products (as pest resistant crops, new bacterial strains, or novel pharmaceuticals).
Cell:	The smallest structural unit of an organism that is capable of independent functioning, consisting of cytoplasm and various organelles, all surrounded by a semipermeable cell membrane, which in some cells, is surrounded by a cell wall
Chloroplast:	A plastid in most cells of most plants that contains chlorophylls and carotenoid pigments and produces glucose through photosynthesis.
Chromosome:	A structure in living cells that consists of a single molecule of DNA bonded to various proteins and that carries the genes determining heredity.
Clone:	To produce genetic material or produce or grow a cell, group of cells, or organism from a single original cell.

Conservation of Mass:	The principle that mass cannot be created or destroyed; also conservation of matter.
Consumer:	An organism that feeds on other organisms for food.
Cytoplasm:	The material that surrounds organelles and inside the cell membrane.
Decomposer :	Any organism that feeds or obtains nutrients by breaking down organic matter from dead organisms.
Dependent variable:	Factor being measured or observed in an experiment.
Diversity:	The different species in a given area or specific period of time.
DNA:	Deoxyribonucleic acid; a nucleic acid that is genetic material; present in all organisms.
Energy:	The capacity to do work.
Environment:	The sum of conditions affecting an organism, including all living and nonliving things in an area, such as plants, animals, water, soil, weather, landforms, and air.
Evolution :	A theory that the various types of species arise from pre-existing species and that distinguishable characteristics are due to modifications through successive generations.
Experiment:	A procedure that is carried out and repeated under controlled conditions in order to discover, demonstrate, or test a hypothesis.
Fossil:	A whole or part of an organism that has been preserved in sedimentary rock.
Fungus:	A kingdom of eukaryotic organisms that reproduce by spores and have cell walls that contain chitin, examples include the mushrooms, molds, yeasts, and mildews.
Genetic:	Affecting or determined by genes.

Genotype:	The genetic information contained in a cell, an organism, or an individual.
Heredity:	The passage of biological traits or characteristics from parents to offspring through the inheritance of genes.
Homeostasis:	The tendency of an organism or cell to regulate its internal conditions, such as the chemical composition of its body fluids, so as to maintain health and functioning, regardless of outside conditions.
Hypothesis :	A tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation.
Independent variable:	The factor that is changed in an experiment in order to study changes in the dependent variable.
Investigation :	A systematic process that uses various types of data and logic and reasoning to better understand something or answer a question.
Law :	A statement that describes invariable relationships among phenomena under a specified set of conditions.
Light:	Electromagnetic radiation that lies within the visible range.
Matter:	Substance that possesses inertia and occupies space, of which all objects are constituted.
Meiosis:	The process of nuclear division in cells during which the number of chromosomes is reduced by half.
Membrane:	A thin layer of tissue that surrounds or lines a cell, a group of cells, or a cavity; any barrier separating two fluids.

Mitochondrion:	A spherical or elongated organelle in the cytoplasm of nearly all eukaryotic cells that uses enzymes and membranes to make chemical energy available to the cell to make food to usable energy.
Mitosis:	A process of nuclear division in eukaryotic cells during which the nucleus of a cell divides into two nuclei, each with the same number of chromosomes.
Model :	A systematic description of an object or phenomenon that shares important characteristics with the object or phenomenon. Scientific models can be material, visual, mathematical, or computational and are often used in the construction of scientific theories.
Molecule:	The smallest unit of matter of a substance that retains all the physical and chemical properties of that substance; consists of a single atom or a group of atoms bonded together.
Natural selection:	The theory stating every organism displays slight variations from related organisms, and these variations make an organism more or less suited for survival and reproduction in specific habitats.
Nucleus:	The center region of an atom where protons and neutrons are located; also a cell structure that contains the cell genetic material of the cell.
Observation :	What one has observed using senses or instruments.
Organ:	A structure containing different tissues that are organized to carry out a specific function of the body (e.g., heart, lungs, brain, etc.)
Organelle:	A differentiated structure within a cell, such as a mitochondrion, vacuole, or chloroplast, that performs a specific function.

Organism:	An individual form of life of one or more cells that maintains various vital processes necessary for life.
Parasite:	An organism that grows, feeds, and is sheltered on or in a different organism while contributing nothing to the survival of its host.
Phenotype:	The observable characteristics of an organism resulting from the interaction of its genetic makeup and its environment.
Photosynthesis:	A chemical process by which plants use light energy to convert carbon dioxide and water into carbohydrates (sugars).
Producer :	An organism, usually a plant or bacterium, that produces organic compounds from simple inorganic molecules and energy (typically light energy) from the environment.
Pseudoscientific:	A theory, methodology, or practice that is considered to be without scientific foundation.
Replication:	In scientific research, conducting an experiment to confirm findings or to ensure accuracy. In molecular biology, the process by which genetic material is copied in cells.
Reproduction:	The sexual or asexual process by which organisms generate new individuals of the same kind and perpetuate the species.
Scientist:	A person with expert knowledge of one or more sciences, that engages in processes to acquire and communicate knowledge.
Sense:	Any of the faculties by which stimuli from outside or inside the body are received and felt, as the faculties of hearing, sight, smell, touch, taste, and equilibrium.
Sexual reproduction:	Reproduction involving the union of male and female gametes producing an offspring with traits from both parents.

Space:	The limitless expanse where all objects and events occur. Outer space is the region of the universe beyond Earth's atmosphere.
Theory :	A set of statements or principles devised to explain a group of facts or phenomena, especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena.
Tissue:	Similar cells acting to perform a specific function.
Vacuole:	A cavity in the cytoplasm of a cell, bound by a single membrane and containing water, food, or metabolic waste.
Variable:	An event, condition, or factor that can be changed or controlled in order to study or test a hypothesis in a scientific experiment.
Virus:	A noncellular, usually disease-causing, particle with an outer protein code and a core of genetic material that is capable of growth and replication in living host cells.