Course: 2003310 Physical Science

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Course Number:	2003310
Course Title:	Physical Science

RELATED BENCHMARKS (58)

LA.910.2.2.3:	The student will organize information to show understanding or relationships among facts, ideas, and events (e.g., representing key points within text through charting, mapping, paraphrasing, summarizing, comparing, contrasting, or outlining);
LA.910.4.2.2:	The student will record information and ideas from primary and/or secondary sources accurately and coherently, noting the validity and reliability of these sources and attributing sources of information;
MA.912.S.1.2:	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.
MA.912.S.3.2:	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: • bar graphs • line graphs • stem and leaf plots • circle graphs • histograms • box and whisker plots • scatter plots • cumulative frequency (ogive) graphs
SC.912.L.15.2:	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
SC.912.L.16.10:	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
SC.912.L.17.11:	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
SC.912.L.17.15:	Discuss the effects of technology on environmental quality.
SC.912.L.17.16:	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
SC.912.L.17.19:	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
SC.912.L.17.20:	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

SC.912.L.18.12:	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
SC.912.N.1.1:	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.
SC.912.N.1.2:	Describe and explain what characterizes science and its methods.
SC.912.N.1.3:	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
SC.912.N.1.4:	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
SC.912.N.1.5:	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
SC.912.N.1.6:	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
SC.912.N.1.7:	Recognize the role of creativity in constructing scientific questions, methods and explanations.
SC.912.N.2.1:	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
SC.912.N.2.2:	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
SC.912.N.2.3:	Identify examples of pseudoscience (such as astrology, phrenology) in society.

SC.912.N.2.4:	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
SC.912.N.2.5:	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
SC.912.N.3.1:	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
SC.912.N.3.2:	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
SC.912.N.3.3:	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
SC.912.N.3.4:	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
SC.912.N.3.5:	Describe the function of models in science, and identify the wide range of models used in science.
SC.912.N.4.1:	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
SC.912.N.4.2:	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
SC.912.P.8.1:	Differentiate among the four states of matter.
SC.912.P.8.2:	Differentiate between physical and chemical properties and physical and chemical changes of matter.
SC.912.P.8.4:	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
SC.912.P.8.5:	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
SC.912.P.8.7:	Interpret formula representations of molecules and compounds in terms of composition and structure.
SC.912.P.8.8:	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
SC.912.P.8.11:	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.

SC.912.P.10.1:	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
SC.912.P.10.2:	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.
SC.912.P.10.3:	Compare and contrast work and power qualitatively and quantitatively.
SC.912.P.10.4:	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
SC.912.P.10.5:	Relate temperature to the average molecular kinetic energy.
SC.912.P.10.7:	Distinguish between endothermic and exothermic chemical processes.
SC.912.P.10.10:	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
SC.912.P.10.11:	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
SC.912.P.10.12:	Differentiate between chemical and nuclear reactions.
SC.912.P.10.14:	Differentiate among conductors, semiconductors, and insulators.
SC.912.P.10.15:	Investigate and explain the relationships among current, voltage, resistance, and power.
SC.912.P.10.18:	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
SC.912.P.10.21:	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
SC.912.P.12.2:	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
SC.912.P.12.3:	Interpret and apply Newton's three laws of motion.
SC.912.P.12.4:	Describe how the gravitational force between two objects depends on their masses and the distance between them.
SC.912.P.12.7:	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
SC.912.P.12.10:	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
SC.912.P.12.11:	Describe phase transitions in terms of kinetic molecular theory.
SC.912.P.12.12:	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

RELATED GLOSSARY TERM DEFINITIONS (67)

Area:	The number of square units needed to cover a surface.
Bar graph:	A graph that uses either vertical or horizontal bars to display countable data
Chart:	A data display that presents information in columns and rows.
Circle graph:	A data display that divides a circle into regions representation a portion to the total set of data. The circle represents the whole set of data.
Histogram:	A bar graph that shows how many data values fall into a certain interval. The number of data items in an interval is a frequency. The width of the bar represents the interval, while the height indicates the number of data items, or frequency, in that interval.
Line graph:	A collection of an infinite number of points in a straight pathway with unlimited length and having no width.
Plot:	To locate a point by means of coordinates, or a curve by plotted points, or to represent an equation by means of a curve so constructed.
Rate:	A ratio that compares two quantities of different units.
Scatter plot:	A graph of paired data in which the data values are plotted as points in (x, y) format.
Set:	A set is a finite or infinite collection of distinct objects in which order has no significance.
Acceleration:	Rate of change in velocity, usually expressed in meters per second per second; involves an increase or decrease in speed and/or a change in direction.
Atom:	The smallest unit of a chemical element that can still retain the properties of that element.
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).
Catalyst:	A substance that speeds up or slows down the rate of a reaction without being consumed or altered.
Chemical change:	A reaction or a change in a substance produced by chemical means that results in producing a different chemical.
Compound:	A substance made up of at least two different elements held together by chemical bonds that can only be broken down into elements by chemical processes.
Concentration:	The relative amount of a particular substance, a solute, or mixture.
Conduction:	The transmission of heat through a medium and without the motion of the medium.
Conductor:	A material or an object that conducts heat, electricity, light, or sound.

Convection:	Heat transfer in a gas or liquid by the circulation of currents from one region to another.
Current :	The amount of electric charge flowing past a specified circuit point per unit time.
Electromagnetic spectrum:	The entire range of electromagnetic radiation. At one end of the spectrum are gamma rays, which have the shortest wavelengths and high frequencies. At the other end are radio waves, which have the longest wavelengths and low frequencies. Visible light is near the center of the spectrum.
Electron:	A stable elementary particle in the lepton family having a mass at rest of 9.107 × 10^-28 grams and an electric charge of approximately -1.602 × 10^-19 coulombs. Electrons orbit about the positively charged nuclei of atoms in distinct orbitals of different energy levels, called shells.
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.
Fission :	The process by which an atomic nucleus splits into two or more large fragments of comparable mass, simultaneously producing additional neutrons and vast amounts of energy; or, a process by which single-cell organisms reproduce asexually.
Force:	A vector quantity that exists between two objects and, when unbalanced by another force, causes changes in velocity of objects in the direction of its application; a push or pull.
Fossil:	A whole or part of an organism that has been preserved in sedimentary rock.
Frame of reference:	A set of coordinate axes in terms of which position or movement may be specified or with reference to which physical laws may be mathematically stated.
Freeze:	To pass from the liquid to the solid state by loss of heat from the substance/system.
Frequency:	The number of cycles or waves per unit time.
Fusion :	The process by which two lighter atomic nuclei combine at extremely high temperatures to form a heavier nucleus and release vast amounts of energy.
Gas:	One of the fundamental states of matter in which the molecules do not have a fixed volume or shape.
Heat:	Energy that transfers between substances because of a temperature difference between the substances; the transfer of energy is always from the warmer substance to the cooler substance
Inference :	The act of reasoning from factual knowledge or evidence.
Insulator:	A material or an object that does not easily allow heat, electricity, light, or sound to pass through it. Air, cloth and rubber are good electrical insulators; feathers and wool make good thermal insulators.
Investigation :	A systematic process that uses various types of data and logic and reasoning to better understand something or answer a question.

Kinetic energy:	The energy possessed by a body because of its motion.
Law :	A statement that describes invariable relationships among phenomena under a specified set of conditions.
Light:	Electromagnetic radiation that lies within the visible range.
Mass:	The amount of matter an object contains.
Matter:	Substance that possesses inertia and occupies space, of which all objects are constituted.
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.
Motion:	The act or process of changing position and/or direction.
Natural resource:	Something, such as a forest, a mineral deposit, or fresh water, that is found in nature and is necessary or useful to humans.
Neutron:	A subatomic particle having zero charge, found in the nucleus of an atom.
Nonrenewable resource:	A resource that can only be replenished over millions of years.
Nuclear reaction:	A process, such as fission, fusion, or radioactive decay, in which the structure of an atomic nucleus is altered through release of energy or mass or by being broken apart.
Observation :	What one has observed using senses or instruments.
Organism:	An individual form of life of one or more cells that maintains various vital processes necessary for life.
Periodic table:	A tabular arrangement of the elements according to their atomic numbers so that elements with similar properties are in the same column.
pH:	The measure of the acidity or alkalinity of a solution.
Pollution:	Any alteration of the natural environment producing a condition harmful to living organisms; may occur naturally or as a result of human activities.
Power:	The rate at which work is done, expressed as the amount of work per unit time and commonly measured in units such as the watt and horsepower.
Proton:	A subatomic particle having a positive charge and which is found in the nucleus of an atom.
Radiation:	Emission of energy in the form of rays or waves.
Resistance :	The opposition of a body or substance to current passing through it, resulting in a change of electrical energy into heat or another form of energy.

Scientist:	A person with expert knowledge of one or more sciences, that engages in processes to acquire and communicate knowledge.
Semiconductor:	Any of various solid crystalline substances, such as germanium or silicon, having electrical conductivity greater than insulators but less than good conductors, and used especially as a base material for computer chips and other electronic devices.
Space:	The limitless expanse where all objects and events occur. Outer space is the region of the universe beyond Earth's atmosphere.
Speed of light:	A fundamental physical constant that is the speed at which electromagnetic radiation propagates in a vacuum and that has a value fixed by international convention of 299,792,458 meters per second.
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.
Vacuum:	A space empty of matter.
Velocity:	The time rate at which a body changes its position vector; quantity whose magnitude is expressed in units of distance over time.
Voltage:	A measure of the difference in electric potential between two points in space, a material, or an electric circuit, expressed in volts.
Wavelength:	The distance between crests of a wave.