Missouri High School Physical Science Standards

Green indicates a chemistry topic.
Blue indicates a physics topic.
Yellow indicates topics that may be taught in either or both physics and chemistry.

MO-SPHY: 2008 Science Physical	
	MO-PHY.1.1.A PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; OBJECTS, AND THE MATERIALS THEY ARE MADE OF, HAVE PROPERTIES THAT CAN BE USED TO DESCRIBE AND CLASSIFY THEM
	1. MO-PHY.1.1.A.a. Compare the densities of regular and irregular objects using their respective measures of volume and mass
	2. MO-PHY.1.1.A.b. Identify pure substances by their physical and chemical properties (i.e., color, luster/reflectivity, hardness, conductivity, density, pH, melting point, boiling point, specific heat, solubility, phase at room temperature, chemical reactivity)
	3. MO-PHY.1.1.A.c. Classify a substance as being made up of one kind of atom (element) or a compound when given the molecular formula or structural formula (introduce electron dot diagram) for the substance
	4. MO-PHY.1.1.A.d. Compare and contrast the common properties of metals, nonmetals, metalloids (semi-conductors) and noble gases
	MO-PHY.1.1.B PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; PROPERTIES OF MIXTURES DEPEND UPON THE CONCENTRATIONS, PROPERTIES, AND INTERACTIONS OF PARTICLES
	5. MO-PHY.1.1.B.a. Compare and contrast the properties of acidic, basic, and neutral solutions
	MO-PHY.1.1.D PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; PHYSICAL CHANGES IN THE STATE OF MATTER THAT RESULT FROM THERMAL CHANGES CAN BE EXPLAINED BY THE KINETIC THEORY OF MATTER
	6. MO-PHY.11.1.D.a. Using the Kinetic Theory model, explain the changes that occur in the distance between atoms/molecules and temperature of a substance as energy is absorbed or released during a phase change
	7. MO-PHY.11.1.D.b. Predict the effect of a temperature change on the properties (i.e., pressure, density, volume) of a material (solids, liquids, gases)
	8. MO-PHY.11.1.D.c. Predict the effect of pressure changes on the properties (i.e., temperature, volume, density) of a material (solids, liquids, gases)
	MO-PHY.1.1.E PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; THE ATOMIC MODEL DESCRIBES THE ELECTRICALLY NEUTRAL ATOM
	9. MO-PHY.1.1.E.a. Describe the atom as having a dense, positive nucleus surrounded by a cloud of negative electrons
	10. MO-PHY.1.1.E.b. Calculate the number of protons, neutrons, and electrons of an element/isotopes given its mass number and atomic number
	11. MO-PHY.1.1.E.c. Describe the information provided by the atomic number and the mass

	number (i.e., electrical charge, chemical stability)
	MO-PHY.1.1.F PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; THE PERIODIC TABLE ORGANIZES THE ELEMENTS ACCORDING TO THEIR ATOMIC STRUCTURE AND CHEMICAL REACTIVITY
	12. MO-PHY.1.1.F.a. Explain the structure of the periodic table in terms of the elements with common properties (groups/families) and repeating properties (periods)
	13. MO-PHY.1.1.F.b. Classify elements as metals, nonmetals, metalloids (semi-conductors), and noble gases according to their location on the Periodic Table
	14. MO-PHY.1.1.F.c. Predict the chemical reactivity of elements, and the type of bonds that may result between them, using the Periodic Table
	MO-PHY.1.1.G PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; PROPERTIES OF OBJECTS AND STATES OF MATTER CAN CHANGE CHEMICALLY AND/OR PHYSICALLY
	15. MO-PHY.1.1.G.a. Distinguish between physical and chemical changes in matter
	MO-PHY.1.1.H PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; CHEMICAL BONDING IS THE COMBINING OF DIFFERENT PURE SUBSTANCES (ELEMENTS, COMPOUNDS) TO FORM NEW SUBSTANCES WITH DIFFERENT PROPERTIES
	16. MO-PHY.1.1.H.a. Describe how the valence electron configuration determines how atoms interact and may bond
	17. MO-PHY.1.1.H.b. Compare and contrast the types of chemical bonds (i.e., ionic, covalent)
	MO-PHY.1.1.I PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; CHANGES IN PROPERTIES AND STATES OF MATTER PROVIDE EVIDENCE OF THE ATOMIC THEORY OF MATTER; MASS IS CONSERVED DURING ANY PHYSICAL OR CHEMICAL CHANGE
	18. MO-PHY.1.1.I.a. Compare the mass of the reactants to the mass of the products in a chemical reaction or physical change as support for the Law of Conservation of Mass
	MO-PHY.1.2.A PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; ENERGY HAS A SOURCE, CAN BE STORED, AND CAN BE TRANSFERRED BUT IS CONSERVED WITHIN A SYSTEM; FORMS OF ENERGY HAVE A SOURCE, A MEANS OF TRANSFER (WORK AND HEAT), AND A RECEIVER
	19. MO-PHY.1.2.A.a. Differentiate between thermal energy (the total internal energy of a substance which is dependent upon mass), heat (thermal energy that transfers from one object or system to another due to a difference in temperature), and temperature (the measure of average kinetic energy of molecules or atoms in a substance)
	20. MO-PHY.1.2.A.b. Differentiate between the properties and examples of conductors and insulators
	21. MO-PHY.1.2.A.c. Describe sources and common uses of different forms of energy: chemical, nuclear, thermal, mechanical, electromagnetic
	22. MO-PHY.1.2.A.d. Identify and evaluate advantages/disadvantages of using various sources of energy (e.g., wind, solar, geothermal, hydroelectric, biomass, fossil fuel) for human activity
	23. MO-PHY.1.2.A.e. Describe the effect of different frequencies of electromagnetic waves on the Earth and living organisms (e.g., radio, infrared, visible, ultraviolet, gamma, cosmic rays)
	24. MO-PHY.1.2.A.f. Interpret examples of heat transfer (e.g., home heating, solar panels) as convection, conduction, or radiation

	MO-PHY.1.2.B PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; ENERGY HAS A SOURCE, CAN BE STORED, AND CAN BE TRANSFERRED BUT IS CONSERVED WITHIN A SYSTEM; MECHANICAL ENERGY COMES FROM THE MOTION (KINETIC ENERGY) AND/OR RELATIVE POSITION (POTENTIAL ENERGY) OF AN OBJECT
	25. MO-PHY.1.2.B.a. Relate kinetic energy to an object's mass and its velocity
	26. MO-PHY.1.2.B.b. Relate an object's gravitational potential energy to its weight and height relative to the surface of the Earth
	27. MO-PHY.1.2.B.c. Distinguish between examples of kinetic and potential energy (i.e., gravitational) within a system
	28. MO-PHY.1.2.B.d. Describe the effect of work on an object's kinetic and potential energy
	MO-PHY.1.2.C PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; ENERGY HAS A SOURCE, CAN BE STORED, AND CAN BE TRANSFERRED BUT IS CONSERVED WITHIN A SYSTEM; ELECTROMAGNETIC ENERGY FROM THE SUN (SOLAR RADIATION) IS A MAJOR SOURCE OF ENERGY ON EARTH
	29. MO-PHY.1.2.C.a. Identify stars as producers of electromagnetic energy
	30. MO-PHY.1.2.C.b. Describe how electromagnetic energy is transferred through space as electromagnetic waves of varying wavelength and frequency
	MO-PHY.1.2.E PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; ENERGY HAS A SOURCE, CAN BE STORED, AND CAN BE TRANSFERRED BUT IS CONSERVED WITHIN A SYSTEM; NUCLEAR ENERGY IS A MAJOR SOURCE OF ENERGY THROUGHOUT THE UNIVERSE
	31. MO-PHY.1.2.E.a. Describe how changes in the nucleus of an atom during a nuclear reaction (i.e., nuclear decay, fusion, fission) result in emission of radiation
	32. MO-PHY.1.2.E.b. Identify the role of nuclear energy as it serves as a source of energy for the Earth, stars, and human activity (e.g., source of electromagnetic radiation, nuclear power plants, fuel for stars)
	MO-PHY.1.2.F PROPERTIES AND PRINCIPLES OF MATTER AND ENERGY; ENERGY HAS A SOURCE, CAN BE STORED, AND CAN BE TRANSFERRED BUT IS CONSERVED WITHIN A SYSTEM;ENERGY CAN BE TRANSFERRED WITHIN A SYSTEM AS THE TOTAL AMOUNT OF ENERGY REMAINS CONSTANT (I.E., LAW OF CONSERVATION OF ENERGY)
	33. MO-PHY.1.2.F.a. Describe the transfer of energy that occurs as energy changes from kinetic to potential within a system (e.g., car moving on rollercoaster track, child swinging, diver jumping off a board) (Do NOT assess calculations)
	34. MO-PHY.1.2.F.b. Compare the efficiency of systems (recognizing that, as work is done, the amount of usable energy decreases)
	35. MO-PHY.1.2.F.c. Classify the different ways to store energy (i.e., chemical, nuclear, thermal, mechanical, electromagnetic) and describe the transfer of energy as it changes from kinetic to potential, while the total amount of energy remains constant, within a system (e.g., using gasoline to move a car, photocell generating electricity, electromagnetic motor doing work, energy generated by nuclear reactor)
	MO-PHY.2.1.A PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; THE MOTION OF AN OBJECT IS DESCRIBED BY ITS CHANGE IN POSITION RELATIVE TO ANOTHER OBJECT OR POINT; THE MOTION OF AN OBJECT IS DESCRIBED AS A CHANGE IN POSITION, DIRECTION, AND SPEED RELATIVE TO ANOTHER OBJECT (FRAME OF REFERENCE)
	36. MO-PHY.2.1.A.a. Represent and analyze the motion of an object graphically
	37. MO-PHY.2.1.A.b. Analyze the velocity of two objects in terms of distance and time (i.e., verbally, diagrammatically, graphically, mathematically)

	MO-PHY.2.1.B PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; THE MOTION OF AN OBJECT IS DESCRIBED BY ITS CHANGE IN POSITION RELATIVE TO ANOTHER OBJECT OR POINT; AN OBJECT THAT IS ACCELERATING IS SPEEDING UP, SLOWING DOWN, OR CHANGING DIRECTION
	38. MO-PHY.2.1.B.a. Measure and analyze an object's motion in terms of speed, velocity, and acceleration (i.e., verbally, diagrammatically, graphically)
	MO-PHY.2.1.C PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; THE MOTION OF AN OBJECT IS DESCRIBED BY ITS CHANGE IN POSITION RELATIVE TO ANOTHER OBJECT OR POINT; MOMENTUM DEPENDS ON THE MASS OF THE OBJECT AND THE VELOCITY WITH WHICH IT IS TRAVELING
	39. MO-PHY.2.1.C.a. Compare the momentum of two objects in terms of mass and velocity (Do NOT assess calculations)
	40. MO-PHY.2.1.C.b. Explain that the total momentum remains constant within a system
	MO-PHY.2.2.A PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; FORCES AFFECT MOTION; FORCES ARE CLASSIFIED AS EITHER CONTACT FORCES (PUSHES, PULLS, FRICTION, BUOYANCY) OR NON-CONTACT FORCES (GRAVITY, MAGNETISM), THAT CAN BE DESCRIBED IN TERMS OF DIRECTION AND MAGNITUDE
	41. MO-PHY.2.2.A.Identify and describe the forces acting on an object (i.e., type of force, direction, magnitude in Newtons) using a force diagram (do not assess calculations)
	MO-PHY.2.2.B PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; FORCES AFFECT MOTION; EVERY OBJECT EXERTS A GRAVITATIONAL FORCE ON EVERY OTHER OBJECT
	42. MO-PHY.2.2.B.a. Describe gravity as an attractive force among all objects
	43. MO-PHY.2.2.B.b. Compare and describe the gravitational forces between two objects in terms of their masses and the distances between them
	44. MO-PHY.2.2.B.c. Describe weight in terms of the force of a planet's or moon's gravity acting on a given mass
	45. MO-PHY.2.2.B.d. Recognize all free falling bodies accelerate at the same rate due to gravity regardless of their mass
	MO-PHY.2.2.D PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; FORCES AFFECT MOTION; NEWTON'S LAWS OF MOTION EXPLAIN THE INTERACTION OF MASS AND FORCES, AND ARE USED TO PREDICT CHANGES IN MOTION
	46. MO-PHY.2.2.D.a. Recognize that inertia is a property of matter that can be described as an object's tendency to resist a change in motion, and is dependent upon the object's mass (Newton's First Law of Motion)
	47. MO-PHY.2.2.D.b. Determine the effect (i.e., direction and magnitude) of the sum of the forces acting on an object (i.e., net force)
	48. MO-PHY.2.2.D.c. Using information about net force and mass determine the effect on acceleration (Newton's Second Law of Motion)
	49. MO-PHY.2.2.D.d. Identify forces acting on a falling object (i.e., weight, air resistance) and how those forces affect the rate of acceleration
	50. MO-PHY.2.2.D.e. Analyze force pairs (i.e., action/reaction forces) when given a scenario (e.g., handball hits concrete wall, shotgun firing) and describe their magnitudes and directions. (Newton's Third Law of Motion)
	MO-PHY.2.2.E PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; FORCES AFFECT MOTION; PERPENDICULAR FORCES ACT

	INDEPENDENTLY OF EACH OTHER
	51. MO-PHY.2.2.E.a. Predict the path of an object when the net force changes
	MO-PHY.2.2.F PROPERTIES AND PRINCIPLES OF FORCE AND MOTION; FORCES AFFECT MOTION; WORK TRANSFERS ENERGY INTO AND OUT OF A MECHANICAL SYSTEM
	52. MO-PHY.2.2.F.a. Describe the relationships among work, applied net force, and the distance an object moves
	53. MO-PHY.2.2.F.b. Explain how the efficiency of a mechanical system can be expressed as a ratio of work output to work input
	54. MO-PHY.2.2.F.c. Describe power in terms of work and time
	55. MO-PHY.2.2.F.d. Describe and analyze the relationships among force, distance, work, efficiency, and power
	MO-PHY.6.1.B COMPOSITION AND STRUCTURE OF THE UNIVERSE AND THE MOTION OF THE OBJECTS WITHIN IT; THE UNIVERSE HAS OBSERVABLE PROPERTIES AND STRUCTURE; THE EARTH HAS A COMPOSITION AND LOCATION SUITABLE TO SUSTAIN LIFE
	56. MO-PHY.6.1.B.a. Explain how Earth's environmental characteristics and location in the universe (e.g., atmosphere, temperature, orbital path, magnetic field, mass-gravity, location in solar system) provide a life-supporting environment
	MO-PHY.6.1.C COMPOSITION AND STRUCTURE OF THE UNIVERSE AND THE MOTION OF THE OBJECTS WITHIN IT; THE UNIVERSE HAS OBSERVABLE PROPERTIES AND STRUCTURE; MOST OF THE INFORMATION WE KNOW ABOUT THE UNIVERSE COMES FROM THE ELECTROMAGNETIC SPECTRUM
	57. MO-PHY.6.1.C.a. Identify information that the electromagnetic spectrum provides about the stars and the universe (e.g., chemical composition, temperature, age of stars, location of black holes, motion of celestial bodies)
	MO-PHY.6.2.C COMPOSITION AND STRUCTURE OF THE UNIVERSE AND THE MOTION OF THE OBJECTS WITHIN IT; REGULAR AND PREDICTABLE MOTIONS OF OBJECTS IN THE UNIVERSE CAN BE DESCRIBED AND EXPLAINED AS THE RESULT OF GRAVITATIONAL FORCES; THE REGULAR AND PREDICTABLE MOTIONS OF A PLANET AND MOON RELATIVE TO THE SUN EXPLAIN NATURAL PHENOMENA ON A PLANET, SUCH AS DAY, MONTH, YEAR, SHADOWS, MOON PHASES, ECLIPSES, TIDES, AND SEASONS
	58. MO-PHY.6.2.C.a. Predict the moon rise/set times, phases of the moon, and/or eclipses when given the relative positions of the moon, planet, and Sun
	59. MO-PHY.6.2.C.b. Explain how the gravitational forces, due to the relative positions of a planet, moon, and Sun, determine the height and frequency of tides
	MO-PHY.6.2.D COMPOSITION AND STRUCTURE OF THE UNIVERSE AND THE MOTION OF THE OBJECTS WITHIN IT; REGULAR AND PREDICTABLE MOTIONS OF OBJECTS IN THE UNIVERSE CAN BE DESCRIBED AND EXPLAINED AS THE RESULT OF GRAVITATIONAL FORCES; GRAVITY IS A FORCE OF ATTRACTION BETWEEN OBJECTS IN THE SOLAR SYSTEM THAT GOVERNS THEIR MOTION
	60. MO-PHY.6.2.D.a. Explain orbital motions of moons around planets, and planets around the Sun, as the result of gravitational forces between those objects
	MO-PHY.7.1.A SCIENTIFIC INQUIRY; SCIENCE UNDERSTANDING IS DEVELOPED THROUGH THE USE OF SCIENCE PROCESS SKILLS, SCIENTIFIC KNOWLEDGE, SCIENTIFIC INVESTIGATION, REASONING,

	AND CRITICAL THINKING; SCIENTIFIC INQUIRY INCLUDES THE ABILITY OF STUDENTS TO FORMULATE A TESTABLE QUESTION AND EXPLANATION, AND TO SELECT APPROPRIATE INVESTIGATIVE METHODS IN ORDER TO OBTAIN EVIDENCE RELEVANT TO THE EXPLANATION
	61. MO-PHY.7.1.A.a. Formulate testable questions and hypotheses
	62. MO-PHY.7.1.A.b. Analyzing an experiment, identify the components (i.e., independent variable, dependent variables, control of constants, multiple trials) and explain their importance to the design of a valid experiment
	63. MO-PHY.7.1.A.c. Design and conduct a valid experiment
	64. MO-PHY.7.1.A.d. Recognize it is not always possible, for practical or ethical reasons, to control some conditions (e.g., when sampling or testing humans, when observing animal behaviors in nature)
	65. MO-PHY.7.1.A.e. Acknowledge some scientific explanations (e.g., explanations of astronomical or meteorological phenomena) cannot be tested using a controlled laboratory experiment, but instead by using a model, due to the limits of the laboratory environment, resources, and/or technologies
	66. MO-PHY.7.1.A.f. Acknowledge there is no fixed procedure called “the scientific method”, but that some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations
	67. MO-PHY.7.1.A.g. Evaluate the design of an experiment and make suggestions for reasonable improvements
	MO-PHY.7.1.B SCIENTIFIC INQUIRY; SCIENCE UNDERSTANDING IS DEVELOPED THROUGH THE USE OF SCIENCE PROCESS SKILLS, SCIENTIFIC KNOWLEDGE, SCIENTIFIC INVESTIGATION, REASONING, AND CRITICAL THINKING; SCIENTIFIC INQUIRY RELIES UPON GATHERING EVIDENCE FROM QUALITATIVE AND QUANTITATIVE OBSERVATIONS
	68. MO-PHY.7.1.B.a. Make qualitative and quantitative observations using the appropriate senses, tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders)
	69. MO-PHY.7.1.B.b. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second
	70. MO-PHY.7.1.B.c. Determine the appropriate tools and techniques to collect, analyze, and interpret data
	71. MO-PHY.7.1.B.d. Judge whether measurements and computation of quantities are reasonable
	72. MO-PHY.7.1.B.e. Calculate the range, average/mean, percent, and ratios for sets of data
	73. MO-PHY.7.1.B.f. Recognize observation is biased by the experiences and knowledge of the observer (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results)
	MO-PHY.7.1.C SCIENTIFIC INQUIRY; SCIENCE UNDERSTANDING IS DEVELOPED THROUGH THE USE OF SCIENCE PROCESS SKILLS, SCIENTIFIC KNOWLEDGE, SCIENTIFIC INVESTIGATION, REASONING, AND CRITICAL THINKING; SCIENTIFIC INQUIRY INCLUDES EVALUATION OF EXPLANATIONS (LAWS/PRINCIPLES, THEORIES/MODELS) IN LIGHT OF EVIDENCE (DATA) AND SCIENTIFIC PRINCIPLES (UNDERSTANDINGS)
	74. MO-PHY.7.1.C.a. Use quantitative and qualitative data as support for reasonable explanations (conclusions)
	75. MO-PHY.7.1.C.b. Analyze experimental data to determine patterns, relationships,

	perspectives, and credibility of explanations (e.g., predict/extrapolate data, explain the relationship between the independent and dependent variable)
	76. MO-PHY.7.1.C.c. Identify the possible effects of errors in observations, measurements, and calculations, on the validity and reliability of data and resultant explanations (conclusions)
	77. MO-PHY.7.1.C.d. Analyze whether evidence (data) and scientific principles support proposed explanations (laws/principles, theories/models)
	MO-PHY.7.1.D SCIENTIFIC INQUIRY; SCIENCE UNDERSTANDING IS DEVELOPED THROUGH THE USE OF SCIENCE PROCESS SKILLS, SCIENTIFIC KNOWLEDGE, SCIENTIFIC INVESTIGATION, REASONING, AND CRITICAL THINKING; THE NATURE OF SCIENCE RELIES UPON COMMUNICATION OF RESULTS AND JUSTIFICATION OF EXPLANATIONS
	78. MO-PHY.7.1.D.a. Communicate the procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables (allowing for the recording and analysis of data relevant to the experiment such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities); graphs (bar, single, and multiple line); equations and writings
	79. MO-PHY.7.1.D.b. Communicate and defend a scientific argument
	80. MO-PHY.7.1.D.c. Explain the importance of the public presentation of scientific work and supporting evidence to the scientific community (e.g., work and evidence must be critiqued, reviewed, and validated by peers; needed for subsequent investigations by peers; results can influence the decisions regarding future scientific work)
	MO-PHY.8.1.B IMPACT OF SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY; THE NATURE OF TECHNOLOGY CAN ADVANCE, AND IS ADVANCED BY, SCIENCE AS IT SEEKS TO APPLY SCIENTIFIC KNOWLEDGE IN WAYS THAT MEET HUMAN NEEDS; ADVANCES IN TECHNOLOGY OFTEN RESULT IN IMPROVED DATA COLLECTION AND AN INCREASE IN SCIENTIFIC INFORMATION
	81. MO-PHY.8.1.B.a. Recognize the relationships linking technology and science (e.g., how technological problems may create a demand for new science knowledge, how new technologies make it possible for scientists to extend research and advance science)
	MO-PHY.8.2.A IMPACT OF SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY; HISTORICAL AND CULTURAL PERSPECTIVES OF SCIENTIFIC EXPLANATIONS HELP TO IMPROVE UNDERSTANDING OF THE NATURE OF SCIENCE AND HOW SCIENCE KNOWLEDGE AND TECHNOLOGY EVOLVE OVER TIME; PEOPLE OF DIFFERENT GENDER AND ETHNICITY HAVE CONTRIBUTED TO SCIENTIFIC DISCOVERIES AND THE INVENTION OF TECHNOLOGICAL INNOVATIONS
	82. MO-PHY.8.2.A.a. Recognize contributions to science are not limited to the work of one particular group, but are made by a diverse group of scientists representing various ethnic and gender groups
	83. MO-PHY.8.2.A.b. Recognize gender and ethnicity of scientists often influence the questions asked and/or the methods used in scientific research and may limit or advance science knowledge and/or technology
	MO-PHY.8.2.B IMPACT OF SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY; HISTORICAL AND CULTURAL PERSPECTIVES OF SCIENTIFIC EXPLANATIONS HELP TO IMPROVE UNDERSTANDING OF THE NATURE OF SCIENCE AND HOW SCIENCE KNOWLEDGE AND TECHNOLOGY EVOLVE OVER TIME; SCIENTIFIC THEORIES ARE DEVELOPED BASED ON THE BODY OF KNOWLEDGE THAT EXISTS AT ANY PARTICULAR TIME AND MUST BE RIGOROUSLY QUESTIONED AND TESTED FOR VALIDITY
	84. MO-PHY.8.2.B.a. Identify and describe how explanations (laws/principles, theories/models) of scientific phenomena have changed over time as a result of new evidence (e.g., model of the

	solar system, basic structure of matter, structure of an atom, Big Bang and nebular theory of the Universe)\
	85. MO-PHY.8.2.B.b. Identify and analyze current theories that are being questioned, and compare them to new theories that have emerged to challenge older ones (e.g., theories of evolution, extinction, global warming)
	MO-PHY.8.3.B IMPACT OF SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY; SCIENCE AND TECHNOLOGY AFFECT, AND ARE AFFECTED BY, SOCIETY; SOCIAL, POLITICAL, ECONOMIC, ETHICAL AND ENVIRONMENTAL FACTORS STRONGLY INFLUENCE, AND ARE INFLUENCED BY, THE DIRECTION OF PROGRESS OF SCIENCE AND TECHNOLOGY
	86. MO-PHY.8.3.B.a. Identify and describe major scientific and technological challenges to society and their ramifications for public policy (e.g., global warming, limitations to fossil fuels, genetic engineering of plants, space and/or medical research)
	87. MO-PHY.8.3.B.b. Identify and evaluate the drawbacks (e.g., design constraints, unintended consequences, risks) and benefits of technological solutions to a given problem (e.g., use of alternative energies to reduce the use of carbon fuels, use of satellite communications to gather information)
	MO-PHY.8.3.D IMPACT OF SCIENCE, TECHNOLOGY AND HUMAN ACTIVITY; SCIENCE AND TECHNOLOGY AFFECT, AND ARE AFFECTED BY, SOCIETY; SCIENTIFIC INFORMATION IS PRESENTED THROUGH A NUMBER OF CREDIBLE SOURCES, BUT IS AT TIMES INFLUENCED IN SUCH A WAY TO BECOME NON-CREDIBLE
	88. MO-PHY.8.3.D.a. Evaluate a given source for its scientific credibility (e.g., articles in a new periodical quoting an “eye witness,” a scientist speaking within or outside his/her area of expertise)
	89. MO-PHY.8.3.D.b. Explain why accurate record-keeping, openness, and replication are essential for maintaining an investigator’s credibility with other scientists and society