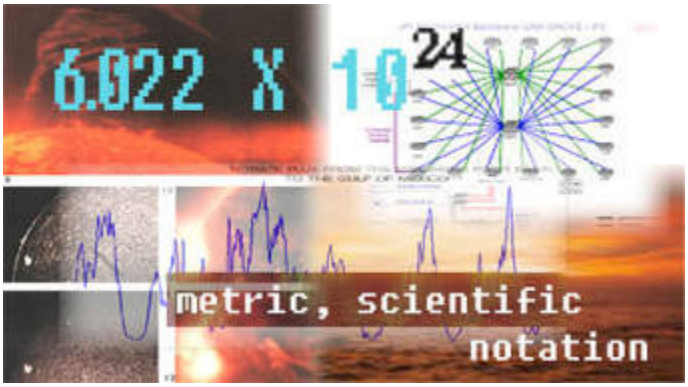
8th Grade Physical Science

Year-At-A-Glance (re:2018)



First 9 weeks Period

Mini Unit on the Metric System, Unit Analysis, and Scientific Notation

Standards Addressed:

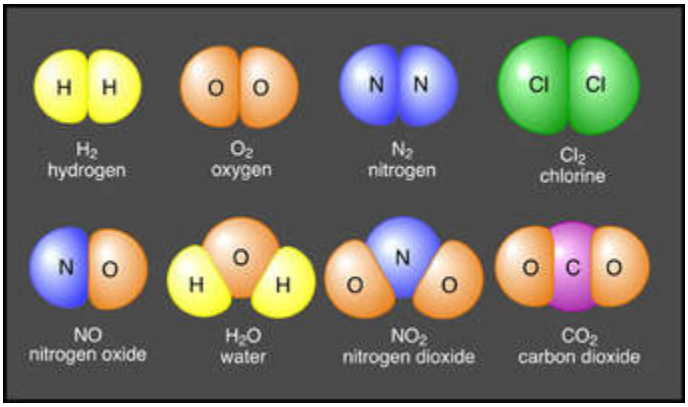
Common Core Math	NGSS
8.EE.8-Analyze and solve pairs of simultaneous linear equations. 8.EE.3-Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger. 8.EE.4-Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. 8.F.1-Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.) 8.F.5-Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. 8.SP.1-Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	Science and Engineering Practices- Develop and use models, analyze and interpret data, and use math and computational thinking. Cross Cutting Concepts- Patterns, scale, proportion, and quantity, and structure and function.

Waves and Their Applications

- Waves
- Information Transfer

Standards Addressed:

NGSS	DCI	CCC and SEP
(MS-PS4-1) Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS4-2) Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS4-3) Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	(PS4.A Wave Properties) A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (PS4.B Electromagnetic Radiation) When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and frequency (color) of the light. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials such as air and water, air and glass; where the light path bends. A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (PS4.C Information Technologies and Instrumentation) Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.	SEPs • Developing and using models • Using Mathematics and computational thinking • Obtaining, evaluating, and communicating information • Scientific knowledge is based on empirical evidence • Analyzing and interpreting data CCCs • Patterns • Systems and system models • Energy and matter • Structure and function • Scale, proportion, and quantity • Stability and change • Influence of science, engineering, and technology on society and the natural world • Science is a human endeavor



Second 9 weeks Period

Chemistry Part One

- Structure of Matter
- States of Matter and Changes of State

Standards Addressed:

NGSS	DCI	CCC and SEP
(MS-PS1-1) Develop models to describe the atomic composition of simple molecules and extended structures. (MS-PS1-4) Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	(PS1.A) Structure and Properties of Matter. Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.	SEPs • Developing and using models • Obtaining, evaluating, and communicating information • Analyzing and interpreting data • Construct explanation CCCs • Patterns • Structure and function • Scale, proportion, and quantity • Cause and Effect

Third 9 weeks Period

Chemistry Part Two

- Chemical Processes and Equations
- Chemistry of Materials

Standards Addressed:

NGSS	DCI	CCC and SEP
(MS-PS1-2) Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. (MS-PS1-3) Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. (MS-PS1-5) Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (MS-PS1-6) Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	(PS1.A) Structure and Properties of Matter. Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (PS1.B) Chemical Reactions Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. Some chemical reactions release energy, others store energy. (PS3.A) Definitions of Energy The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary) The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the	SEPs • Developing and using models • Obtaining, evaluating, and communicating information • Analyzing and interpreting data • Constructing explanations and designing solutions. CCCs • Patterns • Structure and Function • Cause and Effect • Energy and Matter

	type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary) (ETS1.B) Developing Possible Solutions. A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (secondary) (ETS1.C) Optimizing the Design Solution. Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of the characteristics may be incorporated into the new design. (secondary) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (secondary)	

Fourth 9 weeks Period

Energy and Energy Transfer

- Energy
- Energy Transfer
- Newton’s Laws of Motion

Standards Addressed:

NGSS	DCI	CCC and SEP
(MS-PS3-1) Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. (MS-PS3-2) Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (MS-PS3-3) Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-4) Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. (MS-PS3-5) Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-ETS1-2) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-4) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	(PS3.A) Definitions of Energy Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1) A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2) Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3), (MS-PS3-4). (PS3.B) Conservation of Energy and Energy Transfer. When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (PS3.C) Relationship Between Energy and Forces. When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2) (ETS1.A) Defining and Delimiting Engineering Problems. The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (ETS1.B) Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.	SEPs • Developing and using models • Analyzing and interpreting data • Planning and Carrying Out Investigations • Constructing Explanations and Designing Solutions • Scientific knowledge is Based on Empirical Evidence CCCs • Scale, Proportion, and Quantity • Systems and System Models • Energy and Matter