PACING GUIDE SCIENCE
Grade 8

Topic	Unit	Marking Period	Number of Days
Matter and its Interaction	Module H	1 and First Part of 2	60
Motion and Stability: Forces and Interactions	Module I	2nd Part of 2 and Marking Period 3	40
Energy	Module H	2nd Part of Marking Period 2	20
Waves and their Applications in Technologies for Information Transfer	Module J	Marking Period 4	30
Engineering Design	Throughout Modules H, I, J	1st 2nd 3rd 4th	30

Aug 2021
Reapproved by Board with updates Aug 2026

Alpha Public School
Science Curriculum Map

Grade: 8th

Standard: MS-PS1	**Content Topic:** Matter and its Interactions

Strand	Disciplinary Core Ideas / Essential Statement	Objective	Science & Engineering Practices / Skills & Lesson
MS-PS1-1	---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 (PS1.A) ----solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals) (PS1.A)	Develop models to describe the atomic composition of simple molecules and extended structures.	---develop a model to predict and / or describe phenomena STEM Reptile Egg Incubation Project Middle School Chemistry
MS-PS1-2	---Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it (PS1.A) ----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 (PS1.B)	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred	---analyze and interpret data to determine similarities and differences in findings STEM Reptile Egg Incubation Project Middle School Chemistry
MS-PS1-3	---Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it (PS1.A) ----Substances react chemically in characteristic ways. In a	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society	---Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence STEM Reptile Egg Incubation

	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 (PS1.B)		Project Middle School Chemistry
MS-PS1-4	---Gases and liquids are made of molecules or inert atoms that are moving about relative to each other (PS1.A) ---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 (PS1.A) ---The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter (PS1.A) ---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 (PS3.A) ---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 type of atom or molecule and the interactions	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	---develop a model to predict and / or describe phenomena STEM Reptile Egg Incubation Project Middle School Chemistry

	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 (PS3.A)		
MS-PS1-5	---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 (PS1.B) ----The total number of each type of atom is conserved, and thus the mass does not change (PS1.B)	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	---develop a model to describe unobservable mechanisms STEM Reptile Egg Incubation Project Middle School Chemistry
MS-PS1-6	---some chemical reactions release energy, others store energy (PS1.B) ---A solution needs to be tested, and then modified on the basis of the test results, in order to improve it (ETS1.B) ---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 (ETS1.C) --The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater	Undertake a design project to construct, test and modify a device that either releases or absorbs thermal energy by chemical processes	---undertake a design project, engaging in the design cycle, to construct and / or implement a solution that meets specific design criteria and constraints STEM Reptile Egg Incubation Project Middle School Chemistry

	refinement and ultimately to an optimal solution (ETS1.C)		

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Unit Tests in 2 formats Visualizing and Verbalizing Quizzes for each section Marzano Vocabulary Slides Formative Assessment Questions on every page of text Probing Questions on every page Why It Matters Text to Life Questions Alternative Assessment- Alternative Assessment Science Fusion for every section Test Doctor for every assessment 1-3 Performance Based Quick Labs for every lessons: Suitable Labs: Molecules in Matter Chapter 1/Lesson 1 Molecules in Motion Chapter 1/Lesson 2 The Ups and Downs of Thermometers Chapter 1/Lesson 3 Moving Molecules in a Solid Chapter 1/Lesson 4 Air, It's Really There Chapter 1 Lesson 5 What is a Chemical Reaction? Chapter 6 Lesson 1 Controlling the Amount of Products in a Chemical Reaction Chapter 6 Lesson 2 Forming Precipitate Chapter 6 Lesson 3 Temperature and Rate of a Chemical Reaction Chapter 6 Lesson 4 Researching Synthetic Materials and Their Impact on Society Chapter 6 Lesson 12 Molecules in Matter Chapter 1/Lesson 1 Molecules in Motion Chapter 1/Lesson 2 The Ups and Downs of Thermometers Chapter 1/Lesson 3 Moving Molecules in a Solid Chapter 1/Lesson 4	End of the Module Tests Use of portfolio assessments and rubric Performance Based Assessments for every unit	Text: Science Fusion Holt: Science Middle School Chemistry Better Lessons Khan Academy Edpuzzle Bozeman Science

Air, It's Really There Chapter 1 Lesson 5 What is a Chemical Reaction? Controlling the Amount of Products in a Chemical Reaction Forming Precipitate Temperature and Rate of a Chemical Reaction Chemical Reaction and Engineering Design ACS Lesson 6.11 Alternative Assessment- use of portfolio and rubric		

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1)
• Book Available On line • Lab Posted on Google Classroom and done in Kami • Middle School Chemistry Multimedia Animations https://www.middleschoolchemistry.com/ • Better Lessons https://betterlesson.com/search?from=mtp_intro&types=lesson&subjects=2 • Khan Academy https://www.khanacademy.org/ • Bozeman Science http://www.bozemanscience.com/next-generation-science-standards • Quizlet	---Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small ---Macroscopic patterns are related to the nature of microscopic and atomic-level structure ---Science knowledge is based upon logical and conceptual connections between evidence and explanations ---Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used ---Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems ---The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time ---cause and effect relationships may be used to predict phenomena in natural, or designed systems ---Matter is conserved because atoms are

	conserved in physical and chemical processes ---Laws are regularities or mathematical descriptions of natural phenomena ---The transfer of energy can be tracked as energy flows through a designed or natural system

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format	Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format Pre-teach vocabulary Non-linguistic cues Manipulatives Graphic organizers Use of educational websites: www.khanacademy.org www.colorincolorado.org/	Independent research projects Advanced texts http://education.jlab.org/vocabhangman/ Science content vocabulary hangman http://kids.nationalgeographic.com/ National Geographic online http://www.bbc.co.uk/schools/scienceclips/ages/10_11/science_10_11.shtml Interactive science activities http://classroom.jc-schools.net/sci-units/plants-animals.htm#Interactive

21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy SKILLS: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason.

	CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

Alpha Public School
Science Curriculum Map

Standard: MS-PS2	**Content Topic:** Motion and Stability: Forces and Interaction

Strand	Disciplinary Core Ideas / Essential Statement	Objective	Science & Engineering Practices / Skills & Lesson
MS-PS2-1	----For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law) (PS2.A)	Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects	---apply scientific ideas or principles to design an object, tool, process or system Crashes and Collisions https://betterlesson.com/lesson/640499/crashes-and-collisions
MS-PS2-2	---The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. for any given object, a larger force causes a larger change in motion (PS2.A) ---all positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared (PS2.A)	Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object	Crashes and Collisions https://betterlesson.com/lesson/640499/crashes-and-collisions
MS-PS2-3	---Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects (PS2.B)	Ask questions about data to determine the factors that affect the strength of electric and magnetic forces	Making Electromagnets https://betterlesson.com/lesson/637179/electromagnets?from=search --Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles

MS-PS2-4	---Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass- e.g., Earth, and the sun (PS2.B)	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects	---Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem Mass vs Weight-Travel to Other Planets https://betterlesson.com/lesson/638056/mass-versus-weight-travel-to-other-planets?from=search
MS-PS2-5	---Forces that act at a distance (electric, magnetic, and gravitational0 can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively) (PS2.B)	Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact	Measurement Forces https://betterlesson.com/lesson/637564/measurement-forces?from=search

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Unit Tests in 2 formats Visualizing and Verbalizing Quizzes for each section Marzano Vocabulary Slides Formative Assessment Questions on every page of text Probing Questions on every page Why It Matters Text to Life Questions Alternative Assessment- Alternative Assessment Science Fusion for every section 1-3 Performance Based Quick Labs for every lessons: Suitable Labs: Compare impact between 2 cars -Engineering a Solution to a Collision Problem -Mass and Acceleration -Motor Me This -Build an Electromagnet -Analyzing Gravitational Force -Magnetism and Materials Rotational Derby Acceleration and Slope Investigate Acceleration	End of the Module Test Use of portfolio assessments and rubric Performance Based Assessments for every unit	Text: Science Fusion Holt: Science Middle School Chemistry Better Lessons Khan Academy Edpuzzle

Net force First Law of Skateboarding Newton's Laws of Motion Falling Water Gravity and Distance Free-Fall Distance Pressure Distance Finding the Buoyant Force Making a Static Detector Middle School Chemistry-Static Electricity Lab Alternative Assessment- Use of portfolio and rubric		

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1)
• Book Available On line • Lab Posted on Google Classroom and done in Kami • Middle School Chemistry Multimedia Animations https://www.middleschoolchemistry.com/ • Better Lessons https://betterlesson.com/search?from=mtp_intro&types=lesson&subjects=2 • Khan Academy https://www.khanacademy.org/ • Bozeman Science http://www.bozemanscience.com/next-generation-science-standards • Quizlet	----Models can be used to represent systems and their interactions- such as inputs, processes and outputs -- and energy and matter flows within systems ---Explanations of stability and change in natural or designed systems can be constructed by examining the changes over times and forces at different scales ----Science knowledge is based upon logical and conceptual connections between evidence and explanations ---cause and effect relationships may be used to predict phenomena in natural or designed systems ---models can be used to represent systems and their interactions- such as inputs, processes and outputs- and energy and matter flows within systems

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
Visual aids Sentence Frames Modeling Anchor charts	Visual aids Sentence Frames Modeling Anchor charts	Independent research projects Advanced texts http://education.jlab.org/vocabhangman/ Science content vocabulary hangman

Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format	Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format Pre-teach vocabulary Non-linguistic cues Manipulatives Graphic organizers Use of educational websites: www.khanacademy.org www.colorincolorado.org/	http://kids.nationalgeographic.com/ National Geographic online http://www.bbc.co.uk/schools/scienceclips/ages/10_11/science_10_11.shtml Interactive science activities http://classroom.jc-schools.net/sci-units/plants-animals.htm#Interactive

21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy SKILLS: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

Standard: MS-PS3	**Content Topic:** Energy

Strand	Disciplinary Core Ideas / Essential Statement	Objective	Science & Engineering Practices / Skills & Lesson
MS-PS3-1	---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 (PS3.A)	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	---construct and interpret graphical displays of data to identify linear and nonlinear relationships https://betterlesson.com/lesson/628050/build-a-thermos?from=search Better Lessons-Build a Thermos
MS-PS3-2	---A system of objects may also contain stored (potential) energy, depending on their relative positions (PS3.A) ---when two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object (PS3.C)	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	---develop a model to describe unobservable mechanisms https://betterlesson.com/lesson/629292/potential-and-kinetic-energy?from=search Potential and Kinetic Energy
MS-PS3-3	---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 (PS3.A) --Energy is spontaneously transferred out of hotter regions or objects and into colder ones (PS3.B) ----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	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer	---apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system https://betterlesson.com/lesson/628050/build-a-thermos?from=search Better Lessons-Build a Thermos

	relevant knowledge that is likely to limit possible solutions (ETS1.A) ----A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria nad constraints of a problem (ETS1.B)		
MS-PS3-4	---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 (PS3.A) ---The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment (PS3.B)	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	---plan an investigation individually and collaboratively, and in the design; identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim https://betterlesson.com/lesson/628050/build-a-thermos?from=search Better Lessons-Build a Thermos
MS-PS3-5	---When the motion energy of an object changes, there is inevitably some other change in energy at the same time (PS3.B)	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	---construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon https://betterlesson.com/lesson/628050/build-a-thermos?from=search Better Lessons-Build a Thermos https://betterlesson.com/lesson/629292/potential-and-kinetic-energy?from=search Potential and Kinetic Energy

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)

Unit Tests in 2 formats Visualizing and Verbalizing Quizzes for each section Marzano Vocabulary Slides Formative Assessment Questions on every page of text Probing Questions on every page Why It Matters Text to Life Questions Alternative Assessment- Alternative Assessment Science Fusion for every section 1-3 Performance Based Quick Labs for every lessons: Alternative Assessment- Alternative Assessment- Science Fusion Suitable Labs • Setting Objects in Motion • Conservation of Energy • Observing the Transfer of Energy • Building a Solar Cooker • Modeling Renewable Energy • • Heat, Temperature and Conduction • Heat, Temperature and Conduction • Changing State-Evaporation • Changing State-Condensation • Changing State-Freezing • Changing State-Melting •	End of the Module Test Use of portfolio assessments and rubric Performance Based Assessments for every unit	Text: Science Fusion Holt: Science Middle School Chemistry Better Lessons Khan Academy Edpuzzle

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1)
• Book Available On line • Lab Posted on Google Classroom and done in Kami • Middle School Chemistry Multimedia Animations https://www.middleschoolchemistry.com/ • Better Lessons https://betterlesson.com/search?from=mtp_intro&types=lesson&subjects=2	---proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes ---models can be used to represent systems and their interactions--such as inputs, processes, and outputs-- and energy and matter flows within systems ---The transfer of energy can be tracked as energy flows through a design or natural system

• Khan Academy https://www.khanacademy.org/ • Bozeman Science http://www.bozemanscience.com/next-generation-science-standards • Quizlet	---Science knowledge is based upon logical and conceptual connections between evidence and explanations ---Energy may take different forms (e.g., energy in fields, thermal energy, energy of motion)

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format	Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format Pre-teach vocabulary Non-linguistic cues Manipulatives Graphic organizers Use of educational websites: www.khanacademy.org www.colorincolorado.org/	Independent research projects Advanced texts http://education.jlab.org/vocabhangman/ Science content vocabulary hangman http://kids.nationalgeographic.com/ National Geographic online http://www.bbc.co.uk/schools/scienceclips/ages/10_11/science_10_11.shtml Interactive science activities http://classroom.jc-schools.net/sci-units/plants-animals.htm#Interactive

21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy SKILLS: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being.

	CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

Standard: MS-PS4	**Content Topic:** Waves and Their Applications Technologies for Information Transfer

Strand	Disciplinary Core Ideas / Essential Statement	Objective	Science & Engineering Practices / Skills & Lesson
MS-PS4-1	---A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude (PS4.A)	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	---use mathematical representations to describe and / or support scientific Properties of Waves Better Lessons https://betterlesson.com/lesson/633219/properties-of-waves-making-waves-visible?from=search
MS-PS4-2	---A sound wave needs a medium through which it is transmitted (PS4.A) ---When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light (PS4.B) ---The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends (PS4.B) ----A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media (PS4.B) ---However, because light can travel through space, it cannot be a matter wave, like sound or water waves (PS4.B)	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials	---develop and use a model to describe phenomena Can You Hear It-Designing Cheap Amplifier for your Smart Phone https://betterlesson.com/lesson/620072/can-you-hear-it-now-engineering-cheap-and-effective-sound-amplifiers-for-smartphones-2-3-day-lesson?from=search https://betterlesson.com/lesson/634169/engineering-earthquake-structures-day-4?from=search Engineering Earthquake Resistant Structure

MS-PS4-3	---digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information (PS4.C)	Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information that analog signals	---use mathematical representations to describe and / or support scientific https://betterlesson.com/lesson/634169/engineering-earthquake-structures-day-4?from=search Engineering Earthquake Resistant Structure

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Unit Tests in 2 formats Visualizing and Verbalizing Quizzes for each section Marzano Vocabulary Slides Formative Assessment Questions on every page of text Probing Questions on every page Why It Matters Text to Life Questions **Alternative Assessment**- Alternative Assessment Science Fusion for every section Test Doctor for every assessment 1-3 Performance Based Quick Labs for every lessons: Suitable Labs: Springy Waves Use a graphical representation to describe the parts of a wave -Investigate Waves -Generate Mechanical Waves -Modeling Analog and Digital Signals	End of the Module Test Use of portfolio assessments and rubric Performance Based Assessments for every unit	Text: Science Fusion Holt: Science Middle School Chemistry Better Lessons Khan Academy Edpuzzle

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1)
• Book Available On line • Lab Posted on Google Classroom and done in Kami • Middle School Chemistry Multimedia Animations https://www.middleschoolchemistry.co	---graphs and charts can be used to identify patterns in data ---structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be

m/ • Better Lessons https://betterlesson.com/search?from=mtp_intro&types=lesson&subjects=2 • Khan Academy https://www.khanacademy.org/ • Bozeman Science http://www.bozemanscience.com/next-generation-science-standards • Quizlet	shaped and used ----structures can be designed to serve particular functions ----technologies extend the measurement, exploration, modeling and computational capacity of scientific investigations

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format	Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format Pre-teach vocabulary Non-linguistic cues Manipulatives Graphic organizers Use of educational websites: www.khanacademy.org www.colorincolorado.org/	Independent research projects Advanced texts http://education.jlab.org/vocabhangman/ Science content vocabulary hangman http://kids.nationalgeographic.com/ National Geographic online http://www.bbc.co.uk/schools/scienceclips/ages/10_11/science_10_11.shtml Interactive science activities http://classroom.jc-schools.net/sci-units/plants-animals.htm#Interactive

21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students.

Entrepreneurial Literacy Civic Literacy Health Literacy <u>SKILLS:</u> Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

Standard: MS-ETS1	**Content Topic:** Engineering Design

Strand	Disciplinary Core Ideas / Essential Statement	Objective	Science & Engineering Practices / Skills & Lesson
MS-ETS1-1	---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.A)	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions	Middle School Chemistry Chapter 11 Chemical Reaction and Engineering Design
MS-ETS1-2	---There are systematic processes for evaluation solutions with respect to how well they meet the criteria and constraints of a problem (ETS1.B)	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem	Middle School Chemistry Chapter 11 Chemical Reaction and Engineering Design
MS-ETS1-3	---There are systematic processes for evaluation solutions with respect to how well they meet the criteria and constraints of a problem (ETS1.B) ---Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors (ETS1.B) ---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 those characteristics may be incorporated into the new	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success	Middle School Chemistry Chapter 11 Chemical Reaction and Engineering Design

	design (ETS1.C)		
MS-ET1-4	---A solution needs to be tested, and then modified on the basis of the test results, in order to improve it (ETS1.B) ---Models of all kinds are important for testing solutions (ETS1.B) ---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 (ETS1.C)	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	Middle School Chemistry Chapter 11 Chemical Reaction and Engineering Design

Formative, Summative and Alternative Assessments	Benchmark Assessments	Core Instructional and Supplemental Materials (including various texts at each grade level)
Unit Tests in 2 formats Visualizing and Verbalizing Quizzes for each section Marzano Vocabulary Slides Formative Assessment Questions on every page of text Probing Questions on every page Why It Matters Text to Life Questions **Alternative Assessment-** Alternative Assessment Science Fusion for every section Test Doctor for every assessment 1-3 Performance Based Quick Labs for every lessons: Lab-What's in the Box Technology-Chromebook for Vocab Quizlet Lab-Which Scientist Am I? Modeling Eye Images Interpreting Models Designing a Procedure to test whether plants grow toward the light	End of the Module Test Use of portfolio assessments and rubric Performance Based Assessments for every unit	Text: Science Fusion Holt: Science Middle School Chemistry Better Lessons Khan Academy Edpuzzle

Modeling Heights of Students Investigating Water Usage Investigating Density Alternative Assessment- Alternative Assessment Book- Science Fusion		

Technology	Crosscutting Concepts / Interdisciplinary Connections across grade levels and content areas (at least 1)
• Book Available On line • Lab Posted on Google Classroom and done in Kami • Middle School Chemistry Multimedia Animations https://www.middleschoolchemistry.com/ • Better Lessons https://betterlesson.com/search?from=mtp_intro&types=lesson&subjects=2 • Khan Academy https://www.khanacademy.org/ • Bozeman Science http://www.bozemanscience.com/next-generation-science-standards • Quizlet	---all human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment ---The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources and economic conditions

Differentiation (IEPs / 504s)	Differentiation (ELL)	Differentiation (G &T)
Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping	Visual aids Sentence Frames Modeling Anchor charts Modify rubric Teacher directed grouping	Independent research projects Advanced texts http://education.jlab.org/vocabhangman/ Science content vocabulary hangman http://kids.nationalgeographic.com/ National Geographic online http://www.bbc.co.uk/schools/scienc

Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format	Chunk learning at teacher discretion Re-read text at teacher discretion Text in auditory format Pre-teach vocabulary Non-linguistic cues Manipulatives Graphic organizers Use of educational websites: www.khanacademy.org www.colorincolorado.org/	eclips/ages/10_11/science_10_11.shtml Interactive science activities http://classroom.jc-schools.net/sci-units/plants-animals.htm#Interactive

21st Century Education	Career Education
THEMES: Global Awareness Financial, Economic, Business and Entrepreneurial Literacy Civic Literacy Health Literacy SKILLS: Creativity and Innovation Critical Thinking and Problem Solving Communication and Collaboration Information Literacy Media Literacy ICT Literacy Life and Career Skills	Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP3. Attend to personal health and financial well-being. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP10. Plan education and career paths aligned to personal goals. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.