"Our mission is to prepare each student to be a successful and responsible member of society."
North Smithfield School District

Eighth Grade Science Curriculum

North Smithfield Scope and Sequence SCIENCE Curriculum: K–12

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Unit Design- Matter, Energy, and Chemical Interactions

Middle School – Grade 8

Texts to be used: McDougal Littell & *Unit Resource Book (URB) where noted	Matter & Energy (M&E) & Chemical Interactions (CI)

RI Statements of Enduring Knowledge - (Established Goals):
PS 1 All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another *(independent of size or amount of substance)*
PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence ***** High Priority**
PS1 (7-8) –1 **Students demonstrate an understanding of characteristic properties of matter by …** **1a** measuring mass and volume of both regular and irregular objects and using those values as well as the relationship D=m/v to calculate density. **PS1 (5-6)-2** **Students demonstrate an understanding of characteristic properties of matter by…** 2a recognizing that different substances have properties which allow them to be identified regardless of the size of the sample 2b classifying and comparing substances using characteristic properties (e.g., solid, liquid, gas; metal, non-metal). **PS1 (7-8)-2** **Students demonstrate an understanding of characteristic properties of matter by…**	***S1 (5-8) INQ+POC –2*** *** *Given data about characteristic properties of matter (e.g., melting and boiling points, density, solubility) identify, compare, or classify different substances* • Text reference: Chapter 1.2 pp.16-19 **(M& E)** • Investigation: "How do solids & liquids compare?" p.27 **(M&E)** • Discuss with class "A mixture of spices" p.26 **(M&E)** • **Density Lab Developed by Department** ***PS1 (5-8) – INQ + SAE–3*** *Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).* *Math Support/Math Practice-Calculating Volume p. 59-60* • Activity: Calculating Volume p.12 (pizza box, block of wood,etc.-(Have students actually measure and then calculate various samples) **(M& E)** • Text reference: Chapter 1.0 -1.1 pp.8-15 **(M&E)** Investigation: Measuring Volume by Displacement p. 13 **(M& E)** • Investigation: Mass and Volume UNIT RESOURCE BOOK pp..67-69 Investigation: "What happens when substances are mixed?" p.21 **(M& E)** • Investigation: "How well do oil and water mix?" p. 24 **(M& E) & URB p. 41** • Activity: Density of Materials p.49 (Also, use as an investigation with marbles & density) • Investigation: Conservation of Mass, **(CI) URB p. 150**

2a identifying an unknown substance given its characteristic properties. 2b classifying and comparing substances using characteristic properties (e.g., solid, liquid, gas; metal, non-metal). **PS1 (5-6)-3** **Students demonstrate an understanding of conservation of matter by…** 3a explaining that regardless of how parts of an object are arranged, the mass of the whole is always the same as the sum of the masses of its parts. **PS1 (7-8)-3** **Students demonstrate an understanding of conservation of matter by…** 3a citing evidence to conclude that the amount of matter before and after undergoing a physical or chemical change in a closed system remains the same. **PS1 (5-6)-4** **Students demonstrate an understanding of states of matter by…** 4a differentiate among the characteristics of solids, liquids, and gases. 4b predicting the effects of heating and cooling on the physical state, volume and mass of a substance. **PS1 (7-8)-4** **Students demonstrate an understanding of states of matter by…** 4a creating diagrams or models that represent the states of matter at the molecular level.	***PS1 (5-8) – SAE + MAS–4 ****** *Represent or explain the relationship between or among energy, molecular motion, temperature, and states of matter.* • Investigation: How does a thermometer work? **(M&E) URB p.212** • Investigation: "Freezing Point" p. 56 **(M&E) URB p.128-131** • Text reference: 2.2 – 2.3pp. 50-57 **(M& E)** • Investigation: Use "Think about" p.50 and have students observe a plastic cup or glass of ice water and dew drops forming on outer surface. Focus question: Where did the drops observed come from? • Text reference: 2.2 – 2.3pp. 50-57 **(M& E)** • Investigation: Use "Think about" p.50 and have students observe a plastic cup or glass of ice water and dew drops forming on outer surface. Focus question: Where did the drops observed come from? • Investigation: "How can you observe a flow of energy?" p. 116 **(M&E)** • **P.109 How Hot is Hot? (M&E)** ***PS1 (5-8) –MAS–5*** *Given graphic or written information, classify matter as atom/molecule or element/compound (Not the structure of an atom).* • Investigation: "How do you measure the mass of an atom?" **(M& E) URB p.30** • Investigation: "What are some signs of a chemical change?" p.47 **(M& E)** • Activity: Density of Materials p.49 (Also, use as an investigation with marbles & density) • Text reference: 1.0-1.3 pp.8-37 **(CI)** • Investigation: How small can you cut paper? P.9 **(CI)** • Investigation: How can you model the relative masses of atomic particles? P.13 **(CI)** • Class discussion: The periodic table organization p.20 & 21 **(CI)** ***PS2 (5-8)-SAE+ POC- 6*** *Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).* • Investigations: Energy Conversions pp. 84 85 **(M&E)** • Investigation: Why does a solar calculator need a large solar cell? P.86 **(M&E)** • Investigation: What improves the collection of solar energy? P.89 **(M&E)** • Class Discusion: p. 94 "in-line skater" • Discuss "Why does water warm up sol slowly?p.110 **(M&E)** Emphasize conduction of heat as a process**.**

4b explaining the effect of increased and decreased heat energy on the motion and arrangement of molecules. 4c observing the physical processes of evaporation and condensation, or freezing and melting, and describe these changes in terms of molecular motion and conservation of mass. **PS1 (5-6)-5** **Students demonstrate an understanding of the structure of matter by…** 5a distinguishing between solutions, mixtures, and "pure" substances, i.e., compounds and elements **PS1 (7-8)-5** **Students demonstrate an understanding of the structure of matter by…** 5a using models or diagrams to show the difference between atoms and molecules. 5b classifying common elements and compounds using symbols and simple chemical formulas. 5c interpreting the symbols and formulas of simple chemical equation 5d using symbols and chemical formulas to show simple chemical arrangements that produce new substances (chemical change). 5e explaining that when substances undergo physical changes, the appearance may change but the chemical make-up and chemical properties do not. 5f explaining that when substances undergo chemical changes to form new substances, the properties of the new combinations may be very different from those of the old.	***PS1 (5-8) –MAS–5*** *Given graphic or written information, classify matter as atom/molecule or element/compound (Not the structure of an atom).* • Text reference: 2.1-2.2 pp.40-47 **(M& E)** • Discuss p.81 Chemical equations must be balanced **(CI)** • Text reference: 1.0-1.3 pp.8-37 **(CI)** • Investigation: How small can you cut paper? P.9 **(CI)** • Investigation: How can you model the relative masses of atomic particles? P.13 **(CI)** • Class discussion: The periodic table organization p.20 & 21 **(CI)** ***PS2 (5-8) –SAE + POC–6*** *Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).* • Ref. Chap. 3, p.71-90 (M&E) • Investigation: URB p. 183-186 Energy Conversions (M&E)

PS2 (7-8)-6 **Students demonstrate an understanding of energy by…** 6c explaining that while energy may be stored transferred, or transformed, the total amount of energy is conserved. **PS2 (7-8)-7** **Students demonstrate an understanding of heat energy by…** 7a designing a diagram, model, or analogy to show or describe the motion of molecules for a material in a warmer and cooler state.	

Texts to be used: McDougal Littell & *Unit Resource Book (URB) where noted			Matter & Energy (M&E) & Chemical Interactions (CI)
Unit	**Focus Questions** (Essential Questions)	**Instructional Activities & Investigations (INQ)**	**Big Ideas** (Understandings)
1	What is a substance? What are the physical states that matter can exist? What is mass and volume?	• Text reference: Chapter 1.4 **(M&E)** • Investigation: "How do solids & liquids compare?" p.27 **(M&E)** • Discuss with class "A mixture of spices" p.26 **(M&E)** • Text reference: Chapter1.1 pp.8-15 **(M&E)** • Investigation: Measuring Volume by Displacement p. 13 **(M& E)** • Activity: Calculating Volume p.12 (pizza box, block of wood,etc.-(Have students actually measure and then calculate various samples) **(M& E)** • Investigation: Mass and Volume URB p. 67-69 **(M&E)**	• A **substance** is a form of matter with a unique composition and distinct purposes. • A **mixture** are two or more substances mixed together but, not chemically combined.
2	What is an element? What is a compound? What is an atom? What is a molecule? What is a mixture? **NOTE: THESE QUESTIONS ARE AISO ADDRESSED IN Chemical Interactions Text**	• Text reference: Chapter 1.2 pp.16-19 **(M& E)** • Investigation: "How do you measure the mass of an atom?" URB p.30 **(M& E)** • Investigation: "What happens when substances are mixed?" p.21 **(M& E)**	• An **element** is a basic substance that cannot be broken into simpler substances during chemical interactions. • There are 90 naturally occurring elements on Earth. • Elements combine to make all the substances on Earth. • The smallest particle of an element is called an **atom.** • The **periodic table** of the elements displays all the naturally occurring and synthesized elements. • A **Compound is** two or more elements chemically combined to form a new substance.. • Substances can be represented with common names, chemical names and chemical formulas. • The smallest particle of a compound is called a

		• Investigation: "How well do oil and water mix?" URB, p.41**(M& E)**	**molecule.** • The relative abundance of elements varies with location in the universe.
3	What is a physical property? What is a physical change? What is a chemical property? What is a chemical change?	Text reference: 2.1 pp.40-47 **(M& E)** • Investigation: "How can a substance be changed?" p.41 **(M& E)** • **Department developed density lab** • Investigation: "What are some signs of a chemical change?" p.47 **(M& E)** • Activity: Density of Materials p.49 (Also, use as an investigation with marbles & density) (M&E)	• A **chemical change** occurs when substances interact to form new substances • A **physical change** occurs when the identity of the substance remains unchanged
4	What is a change in state and why is it a physical change? What are the effects of pressure on gases?	• Text reference: 2.2 – 2.3pp. 50-57 **(M& E)** Investigation: Use "Think about" p.50 and have students observe a plastic cup or glass of ice water and dew drops forming on outer surface. Focus question: Where did the drops observed come from? • Investigation: "Freezing Point" URB p. 128-131 **(M&E)**	• Matter is made of **particles**. Particles in gas are widely spaced. • Every substance is defined by a unique particle. • Gas is matter- it has **mass** and occupies space. • Gases are composed of widely spaced individual particles in constant motion. • Matter exists on Earth in three common **phases (states).**

		• Students should examine and construct temperature graphs of phase changes (states of matter)	• Change of state is the result of change of energy in the particles in a sample of matter. • During **phase change,** particles do not change; relationships between particles do change. • Different substances change phase at different temperatures. • The processes of phase change are **evaporation, condensation, melting, freezing, sublimation** and **deposition**. • There is nothing between gas particles except space. • Gas compresses under force and expands when force is withdrawn. • During **compression** and **expansion**, the number and character of particles in a sample of gas do not change; the space between the particles does change. •
5	How does the process of energy transfer occur?	• Investigations: Energy Conversions URB p.183-186 **(M&E)** • Investigation: Why does a solar calculator need a large solar cell? P.86 **(M&E)** • Ref. Chapter 3, p.71-90 • Investigation: What improves the collection of solar energy? P.89 **(M&E)** • Class Discusion: p. 94 “in-line skater”	• **Kinetic energy** is energy of motion. • The particles in substances gain kinetic energy as they warm, and lose kinetic energy as they cool. • Matter **expands** when the kinetic energy of its particles increases; matter **contracts** when the kinetic energy of its particles decreases. • Substances “heat up” and “cool down” as a result of **energy transfer**. • Energy transfers between particles when they collide. Energy transfer by contact is **conduction**. • Energy always transfers from particles with more kinetic energy to particles with less kinetic energy.

6	What is temperature? How does energy flow from warmer to cooler? What is conduction, convection, and radiation and how are they different?	• Investigation: How does a thermometer work? URB p.212 **(M&E)** • Text references: 4.2-4.3 **(M&E)** • Investigation: "How can you observe a flow of energy?" p. 116 **(M&E)** • Discuss "Why does water warm up soil slowly?p.110 **(M&E)** Emphasize conduction of heat as a process. • Discuss" Where in the cycle is air more dense?"p.118 **(M&E)**	• **Heat** energy flows from a warmer object to a cooler object by either conduction, convection, or radiation.
7	What is a mixture? What is a solution? What is concentration?	• Text Reference: 2.3 –pp.58-65 **(M&E)** • Investigation: How can a mixture of sand, salt, & pepper be separated? P.61 **(M&E)** • Text reference: 4.1 pp.110-121 **(CI)** • Investigation: Which substances dissolve in water? P. 111 **(CI)**	• A **solution** is a mixture in which one substance dissolves in another. • Dissolving occurs when one substance (**solute**) is reduced to particles and is distributed uniformly throughout the particles of a second substance (**solvent**) • Dissolving involves both kinetic interactions (**collisions**) and attractive forces (**bonds**). • **Concentration** is the ratio of solute particles to solvent particles. • **Mixture**: a substance which contains elements and/or compounds physically mixed together. There is no chemical reaction and they can be separated.

8	What else do we know about atoms? What else do we know about molecules? What is a chemical reaction?	• Text reference: 1.0-1.3 pp.8-32 **(CI)** • Investigation: How small can you cut paper? P.9 **(CI)** • Investigation: How can you model the relative masses of atomic particles? P.13 **(CI)** • Class discussion: The periodic table organization p.20 & 21 **(CI)** • Text reference 2.0 -2.1,pp. 41-45 **(CI)** • Investigation: How are compounds different from elements? P.41 **(CI)** • Investigation: How can you model a compound? P.43 **(CI)** • Text reference: 3.0 – 3.3, pp.66-86, **(CI)** • Investigation: Changing Steel Wool, p.67(**CI)** • Investigation: A different rate, p.67 (**CI)** • Investigation: How can you identify a chemical change? P.69 **(CI)** • Investigation: How can the rate of a reaction be changed? P.74, **(CI)**	• **Atoms** are the fundamental particles of elements. • A **compound** is a substance made of two or more elements. • Atoms combine to make particles of substances: **molecules** and **ionic compounds.** • Molecules and ionic compounds are held together by attractive forces called bonds. • A **chemical reaction** is a process in which atoms of substances (**reactants**) rearrange to form new substances (**products**).
9	How do scientists interpret the symbols and formulas of simple chemical equation? How do scientists use symbols and chemical formulas to show simple chemical arrangements that produce new substances (chemical change)?.	• Investigation: Conservation of Mass, p. 79, **(CI)** • Why is it important to measure the masses of reactants and products? • Discuss p.81 Chemical equations must be balanced **(CI)** • Discuss Coefficients to Balance Equations,p.82 **(CI)**	Common symbols found on the periodic table to represent elements • Formulae of simple chemical compounds. • Note: *GSE's do not require subatomic particles/ nor recall/memorization of elements and compound formulae.

Motion & Forces (MF)

Middle School –Grade 8

Texts to be used: McDougal Littell& *Unit Resource Book (URB) where noted	Motion Forces (MF)

RI Statements of Enduring Knowledge - (Established Goals):

ESS2 The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.
PS2 Energy is necessary for change in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.
PS3 The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence

ESS2 (7-8) -8
Students demonstrate an understanding of gravitational relationships between or among objects of the solar system by…
 	
8d describing the relationship between mass and the gravitational force between objects.
 	
8e describing the relationship between distance and the gravitational force between objects.
 	
8f explaining that the sun's gravitational pull holds the Earth and other planets in their orbits, just as the planet's gravitational pull keeps their moons in orbit.
 	
ESS2 (5-6)-8
Students demonstrate an understanding of gravitational relationships between or among objects of the solar system by..
8d defining the Earth's gravity as a force that p[ulls any object on or near the Earth toward its center without touching it.
	ESS2 (5-8) MAS –6
	Compare and contrast planets based on data provided about size, composition, location, orbital movement, atmosphere, or surface features (includes moons).
	• Orbits discussion p.81 **(MF)**
	• P.80 Discussion & Reading "Gravity keeps objects in orbit." **(MF)**
	  • Orbits Transparency T22 in Unit Transparency Book; Class Discussion **(MF)**
	• **Connect this content to what was learned specifically in grade 6, Space Science.
	PS2 (5-8) –SAE + POC–6
	Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical).
	• Reference Chapter 4.0 -4.2 pp.112-129 **(MF)**
	• Investigation: "How do you work?" P.115
	• Investigation:"How much work does it take?" P.118 **(MF)**
	• Review trampoline visual, pp122 and discuss with class energy conversion and changes. **(MF)**
	• Review and discuss "Conserving Mechanical Energy" p.127 –Skateboard ramp visuals.) **(MF)**
	PS3 (5-8) – INQ + POC–8
	Use data to determine or predict the overall net effect of multiple forces (e.g., friction, gravitational, magnetic) on the position, speed, and direction of motion of objects.
	• Text Ref:3.1 pp. 77-83 **(MF)**
	  • Reference Chapter 2.0-2.1 pp.38-45 **(MF)**
	• Investigation: How can you change an object's motion?" **(MF)**
	
	PS3 (5-8) –INQ + POC–8
	Use data to determine or predict the overall net effect of multiple forces (e.g., friction,

ESS2 (7-8)-8 **Students demonstrate an understanding of gravitational relationships between or among objects of the solar system by..** **8d** describing the relationship between mass and the gravitational force between objects. **8e** describing the relationship between distance and the gravitational force between objects, **8f** explaining that the sun's gravitational pull holds the Earth and other planets in their orbits just as the planet's pull keeps their moon's in orbit. **PS2 (7-8)-6** **Students demonstrate an understanding of energy by…** 6a using a real world example to explain the transfer of potential energy to kinetic energy. **PS3 (5-6)-8** **Students demonstrate an understanding of motion by…** 8a using data or graphs to compare the relative speed of objects. **Students demonstrate an understanding of force (e.g., friction, gravitational, magnetic) by…** 8b recognizing that a force is a push or a pull. 8c explaining that changes in speed or direction of motion is caused by forces. 8d showing that electric currents and magnets can exert a force on each other.	*gravitational, magnetic) on the position, speed, and direction of motion of objects.* • Investigation: How do the acceleration of two falling objects compare? P.77 • Investigation: How does gravity affect falling objects? P.82 URB p.158**(MF)** • Refer to diagram p.80 • Challenge & Extension A**(MF)** ctivity **(MF) URB p. 157** • Math in Science: p.90 Smoke Jumpers in Action • **(F&M)** • Investigation: How does design affect speed?"p.19 **(MF)** • Investigation: Inclusion activity reference p.80 teacher guide; Metal Clip balanced by gravity and magnetism **(MF)** Call on prior knowledge of students from grade four - measuring magnetic force.(See Elementary Curr. Guide)

PS3 (7-8)-7 **Students demonstrate an understanding of motion by…** 8a measuring distance and time for a moving object and using those values as well as the relationship s=d/t to calculate speed and graphically represent data. 8b solving for any unknown in the expression s=d/t given values for the other two variables. 8c differentiating among speed, velocity and acceleration. **Students demonstrate an understanding of force (e.g., friction, gravitational, magnetic) by…** 8d making and testing predictions on how unbalanced forces acting on objects change speed or direction of motion, or both. 8e describing or graphically representing that the acceleration of an object is proportional to the force on the object and inversely proportional to the object's mass. 8f. differentiating between mass and weight.	

Unit	**Focus Questions** (Essential Questions)	**Instructional Activities, & Investigations (INQ)**	**Big Ideas** (Understandings)
	Texts to be used: McDougal Littell& *Unit Resource Book (URB) where noted	Motion & Forces (M&F)) Space Science (SS)	
1	What is the relationship between mass and gravitational force/attraction/weight?	• Text Ref:3.1 pp. 71-83 **(MF)** • Investigation: How do the acceleration of two falling objects compare? P.77 **(MF)** • Investigation: How does gravity affect falling objects? P.82 URB p.158 • Refer to diagram p.80 **(MF)**	• Mass is the amount of matter and/or inertia of an object. • Mass is measured on a mechanical balance or inertial balance (as used in space on space station when in orbit.) • Mass does not change with location and is usually measured in the fundamental unit-the gram (kg, cg, mg, etc.). • Gravity is a force exerted on masses. • Weight varies with location and is the measure of the gravitational pull on the object. Weight changes in small amounts due to small changes to the gravitational pull of the Earth in various locations (i.e. slightly less in Denver Colorado than in Rhode Island…but not much difference.) yet mass would not change there or on the moon. Weight on the Moon is approximately 1/6 Earth. • Weight is measured in Newton's in the metric system and pounds in the Common US system (also called English System) Do Not spend a lot of time converting systems of measurement except as a general example of use of algebraic skills consistant with Math GLE's)
2	How does weight or gravitational pull vary?	• Challenge & Extension Activity **(MF)** **URB p.157** • Math in Science: p.90 Smoke Jumpers in Action **(MF)**	• As objects get further apart the gravitational pull gets less. • As objects get more massive then the gravitational attraction between them gets greater. *Misconception that this is not the cause of the

		• Orbits discussion p.81 **(MF)**	"weightless" phenomenon experienced by astronauts in orbit around the earth. They are in free fall but, still weigh only slightly less as they do on earth.
3	What keeps planets in orbit around the sun? What keeps "moon(s) orbiting planets? How does the motion and orbit of the earth relate to the night/day, seasons, tides, that we observe on earth?**	• P.80 Discussion & Reading "Gravity keeps objects in orbit." **(MF)** • Orbits Transparency T22 in Unit Transparency Book; Clsss Discussion **(MF)** • **Connect this content to what was learned specifically in grade 6, Space Science. • Reference Chapter 4.0 -4.2 pp.112-129 **(MF)** • Investigation: "How do you work?" P.115 • Investigation:"How much work does it take?" P.118 **(MF)**	• The sun's gravitational pull holds the Earth and other planets in their orbits, just as the planet's gravitational pull keeps their moons in orbit. • Tides are caused by the moon's gravitational pull on the earth due to its proximity.
4	What is the difference between potential and kinetic energy?	• Review trampoline visual, pp122 and discuss with class energy conversion and changes. **(MF)** • **Ref: Chap. 3 Energy, p71-76 (ME)* (This chapter introduces Energy)** • Review and discuss "Conserving Mechanical Energy" p.127 –Skateboard ramp visuals.) **(MF)**	• Potential energy is stored energy due to work having been done on the object. It is relative to position. • Kinetic energy is energy due to motion. The faster an object moves the more kinetic energy it has. • Both potential and kinetic energy depend on an object's mass. The more mass it has the more kinetic energy it has. • Energy can be transformed from potential to kinetic and vice versa.

5	How are position, speed, and acceleration of an object determined graphically? How do we measure distance and time for a moving object and use those values as well as the relationship s=d/t to calculate speed and graphically represent data. How do we solve for any unknown in the expression s=d/t given values for the other two variables. How do we differentiate among speed, velocity and acceleration?	• Investigation: How does design affect speed?"p.19 **(MF)** • Reference Chapter 1.0 -1.3 pp. 8-37 **(MF)** • Activity: How do you describe the location of an object? P.9 **(MF)** • Investigation: "When does an object accelerate?" p. 27 **(MF)** • Investigation: "Acceleration & Slope", p32,33 • Reference Chapter 2.0-2.1 pp.38-45 **(MF)** • Investigation: How can you change an object's motion?" **(MF) p.41**	• Speed is determined as the rate of change of position in a certain amount of time. • Velocity is the speed in a particular direction. • Acceleration is the change of speed or velocity with respect to time. • Speed (velocity) can be inferred-described-calculated from a position time graph by looking at the slope of the lines. • Acceleration can be inferred-described-calculated by looking at a speed (velocity) and time graph.
6 7	How do we recognize when a force has been applied to an object? What do forces do to the motion of an object? How do multiple forces such as friction and others affect the motion of an object (net force)? How does current affect magnetic force? How is magnetic force measured? (See grade 4 FOSS M&E Kit)	• Reference Chapter 2.2 pp. 49-55 **(MF)** • How are force and acceleration related? P. 49 **(MF)** • • Reference Chapter 2.3 p-p.57-61 & 3.2 p.85-89 **(MF)** • Investigation:" Friction in Air" p. 88 How does the shape of an object affect how it falls? • Investigation: Inclusion activity reference p.80 teacher guide; Metal Clip balanced by gravity and magnetism **(MF)** • <u>Call on prior knowledge of students from grade four - measuring magnetic force.(See Elementary Curr. Guide)</u>	• A force is a push or pull • Net forces applied to an object change the motion of an object by either changing the speed and/or direction of the motion of the object. • The strength of an electromagnet is determined by the current and the number of "windings" around the object to be magnetized. *This is an opportunity to make prior knowledge connections to students grade four kit experiences with Magnetism & Electricity Kit. See Elementary Curriculum.

Unit Design- Electricity & Magnetism

Middle School – Grade 8

Texts to be used:	
McDougal Littell & *Unit Resource Book (URB) where noted	Electricty & Magnetism (E&M)

RI Statements of Enduring Knowledge - (Established Goals):

PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *** **High Priority**
PS2 (7-8)- 6 **Students demonstrate an understanding of energy by…** **6a** using a real world example to explain the transfer of potential energy to kinetic energy. **6b** constructing a model to explain the transformation of energy from one form to another. (e.g. an electrical circuit changing electrical energy to light energy in a light bulb). **6c** explaining that while energy may be stored, transferred, or transformed, the total amount of energy is conserved. **'6d** describing the effect of changing voltage in an electrical circuit. .	***PS2 (5-8)-SAE+ POC- 6*** Given a real-world example, show that within a system, energy transforms from one form to another (i.e., chemical, heat, electrical, gravitational, light, sound, mechanical). • Particular effort should be made to engage student prior knowledge from fourth grade activities in Electricity & Magnetism Kit (see grade 4 curriculum) • Text reference:Chapter 1.3 pp. 28-35 **(E&M)** • Investigate what makes a circuit. Have students light a light bulb with battery as an open inquiry then have students do Investigation: How does resistance affect the flow of charge? P.28 **(Pay close attention to energy transfer including heat produced)** • Text reference: 3.0 -3.3, pp. 76-95, **(E&M)** • Investigation: What is the source of magnetism? P. 88 (**E&M)** • Investigation: How can a motor produce current? (**E&M)** • Investigation: How do magnets behave? p. 79, **(E&M)** **Connect to Forces & Motion and to student's prior activities in grade four science kit Magnetism & Electricity

Text to be used: **McDougal Littell** Electricty & Magnetism (E&M)			
	Focus Questions (Essential Questions)	**Instructional Activities & Investigations (INQ)**	**Big Ideas** (Understandings)
1	**How do moving electrical charges transfer energy?**	• Particular effort should be made to engage student prior knowledge from fourth grade activities in Electricity & Magnetism Kit (see grade 4 curriculum) • Text reference:Chapter 1.3 pp. 28-35 **(E&M)** • Investigate what makes a circuit. Have students light a light bulb with battery as an open inquiry then have students do Investigation: How does resistance affect the flow of charge? P.28 **(Pay close attention to energy transfer including heat produced)**	• What is a circuit in terms of electrical energy flow? • How is energy distributed or used in a circuit? • How is energy transformed when a circuit is used to light a light bulb? • Circuits control the flow of electrical energy?
2	**How is magnetism created by moving charges?** **How can magnetism create electrical current?**	Text reference: 3.0 -3.3, pp. 76-99, **(E&M)** Investigation: What is the source of magnetism? P. 88 (**E&M)** Investigation: How can a motor produce current? (**E&M) p.95**	• Electric current and magnetism are related. • Magnetism can create an electrical current • Electric current can produce magnetism.
3	**How does magnetic force vary with distance?****	Investigation: How do magnets behave? p. 79, **(E&M) ****Connect to Forces & Motion and to student's prior activities in grade four science kit Magnetism & Electricity	• Magnetic force is an inverse square law.

The Changing Earth

Grade 8

Texts to be used:	
McDougal Littell & *Unit Resource Book (URB) where noted	The Changing Earth (CE)

RI Statements of Enduring Knowledge - (Established Goals):

ESS1 - The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

ESS2 - The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.

PS2 - Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence
ESS1 (5-6)–1 **Students demonstrate an understanding of processes and change over time within earth systems by …** **1a** identifying and describing the layers of the earth. ***1b*** *plotting location of volcanoes and earthquakes and explaining the relationship between the location of these phenomena and faults.* **Students demonstrate an understanding of characteristic properties of matter by …** **1a** measuring mass and volume of both regular and irregular objects and using those values as well as the relationship D=m/v to calculate density. *ESS1 (7-8)–1* Students demonstrate an understanding of processes and change over time within earth systems by … **1a** citing evidence and developing a logical argument for plate movement using fossil evidence, layers of sedimentary rock, location of mineral deposits, and shape of the continents. **ESS1 (7-8)–3Students demonstrate an understanding of processes and change over time within earth systems by …** **3a** evaluating slow processes (e.g. weathering, erosion, mountain building, sea floor spreading) to determine how the earth has changed and will continue to change over time.	***ESS1 (5-8) INQ+ POC –1*** **Use geological evidence provided to support the idea that the Earth's crust/lithosphere is composed of plates that move.** • Text Reference: Chapter 1.0-1.1 pp. 6-13 **(CE)** • Investigation: Earth's Moving surface p.7 **(CE)** • Investigation: Will a denser material sink or float? **(CE** • How can you model the layers of the earth?** **(CE)** ***ESS1 (5-8) POC –3*** *Explain how earth events (abruptly and over time) can bring about changes in Earth's surface: landforms, ocean floor, rock features, or climate.* • Text reference: Chapter 1.2-1.3 • Use visuals to show what the earth was like 200 million years ago, 180 million, etc. **(CE)** • Class discussion: Mid Ocean ridges, etc. and sea floor spreading, p.21 • Investigation: Convection and Plate Movements,p. 20,21 **(CE)** • Investigation: Magnetic reversals, p.25 **(CE)** • Investigation: What happens when plates move apart? P. 22 **(CE)** • Investigation: What happens when tectonic plates collide? P. 30 **(CE)** • Text reference: 2.0 -2.3, pp. 44 -67 **(CE)** • Investigation: How does energy travel? P. 51 **(CE)** • Class discussion Seismic waves diagram p. 55 **(CE)**** ***ESS1 (5-8) INQ+ POC –5***

3b evaluating fast processes (e.g. erosion, volcanoes and earthquakes) to determine how the earth has changed and will continue to change over time. 3c **investigating the effect of flowing water on landforms (e.g. stream table, local environment).** **ESS1 (5-6)–3** **Students demonstrate an understanding of processes and change over time within earth systems by …** **3a** describing events and the effect they may have on climate (e.g. El Nino, deforestation, glacial melting, and an increase in greenhouse gases). **ESS1 (5-6)-5** **Students demonstrate an understanding of processes and change over time by …** **5a** representing the processes of the rock cycle in words, diagrams, or models. **5b** citing evidence and developing a logical argument to explain the formation of a rock, given its characteristics and location. (e.g. classifying rock type using identification resources). **PS2 (7-8) -7** **Students demonstrate an understanding of heat energy by…** **7a** designing a diagram, model, or analogy to show or describe the motion of molecules for a material in a warmer and cooler state. **7b** explaining the difference among conduction, convection and radiation and creating a diagram to explain how heat energy travels in different directions and through different materials by each of these methods. ***IN THIS UNIT EMPHASIS IS ON HEAT ENERGY FLOW WITHIN THE EARTH AND ITS SURFACE**	*Using data about a rock's physical characteristics make and support an inference about the rock's history and connection to rock cycle.* • Investigation: How does pressure affect a solid material? P. 45 **(CE)** ***PS2 (5-8) INQ+SAE+POC – 7*** *Use data to draw conclusions about how heat can be transferred (convection, conduction, radiation).* • Investigation: Convection and Plate Movements,p. 20,21 **(CE)**

Texts to be used: McDougal Littell & *Unit Resource Book (URB) where noted — The Changing Earth (CE)			
	Focus Questions (Essential Questions)	**Instructional Activities & Investigations (INQ)**	**Big Ideas** (Understandings)
1	**What are the layers of the earth?**	• Text Reference: Chapter 1.1 pp. 6-13 **(CE)** • Investigation: Earth's Moving Surface p.7 **(CE)** • Investigation: Will a denser material sink or float? **(CE) p.9** • How can you model the layers of the earth?** **(CE) p.12**	• Earth is made up of materials with different **densities.** • Denser materials generally sank over the time that the **layers** formed. • **Core**, **Mantle**, & **Crust** and the mantle & crust form the **lithosphere.** • Earth Layers have different properties • **(INCLUDE REFERENCE TO ROCK CYCLE previously addressed in grade 6)
2	**What are plates and how are they related to Pangaea and continental drift?**	• Text reference: Chapter 1.2-1.3 p.14-36 • Use visuals to show what the earth was like 200 million years ago, 180 million, etc. **(CE) p.16** • Class discussion: Mid Ocean ridges, etc. and sea floor spreading, p.16-17	• Continents have changed position over time • Pangaea and continental drift • Plate tectonics is a theory that explains our observations. • Sea floor spreading • Convection is heat transfer by the movement of material and causes currents that produce continental drift.
3	**What are convection currents within the earth?**	• Investigation: Convection and Plate Movements,p. 20,21 **(CE)** • Investigation: Magnetic reversals, p.25 **(CE)** • Investigation: What happens when plates move apart? P. 22 **(CE)**	• The sea floor spreads apart at divergent boundaries • Evidence for sea floor spreading is based on the Earth's magnetic field reversals. • Continents split apart at divergent boundaries
4	**What are volcanos and what does their locations tell us?**	• Use NECAP released tasks and text diagrams in conjunction for classroom discussions.	• Hot spots at various locations or heated rock rises in plumes or columns causing volcanoes to develop. • Hot spots can be used to trackplate movements.
5	**What happens when plates collide?**	• Investigation: What happens when tectonic plates collide? P. 30 **(CE)**	• **Convergent** boundaries, where two continental plates collide, can cause **subduction.**
6	**What are faults?**	• Text reference: 2.0 -2.3, pp. 44 -67 **(CE)**	• Faults are cracks or fractures in the Earth's lithosphere. • Faults are categorized among "Normal", Strike-Slip, and reverse faults.

6	**What is an earthquake?**	• Investigation: How does pressure affect a solid material? P. 45 **(CE)**	• The buildup of pressure yields earthquakes when released.
7	**How do the properties of waves tell us about the earth's structure and Earthquakes?**	• Investigation: How does energy travel? P. 51 **(CE)** • Class discussion Seismic waves diagram p. 55 **(CE)****	• When waves travel through different materials they bend. At boundaries between materials (layers of the earth) some of the energy is transmitted, some reflected, and some refracted or bent. • Primary and Secondary waves • **Connect to what students learned in grade 7 about waves in general.