

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0607.10.1 6	Energy	Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.	Compare and contrast the three forms of potential energy.	10 conservation of energy (i.e. potential and kinetic) 15 types and forms of energy 17 energy as stored work 31 basic forms of energy—heat 130 basic forms of energy 130 law of conservation of energy 136 concept of energy as stored work 137 energy is stored work 148 forms of energy (i.e. wind) 420 compare and contrast energy conversions in chemical and nuclear change	26 kinetic and potential energy

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations		Volume 1 Student Text page	Volume 2 Investigation Manual page	
GLE 0607.10.2 6	Energy	Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.	Analyze various types of energy transformations.	5 6 10 10 15 15 16 16 18 19 30 31 130 130 131	conversion of energy types energy conversions conversion of energy conservation of energy (i.e. potential and kinetic) types and forms of energy conversion of energy from one form to another conversion of energy from one form to another forms of energy from origination at sun to use in living things kinetic theory kinetic theory observe and explain that objects at different temperatures reach an intermediate temperature basic forms of energy—heat law of conservation of energy basic forms of energy conservation of energy	26 27 50 50 52 52 53 74 100	transformation of energy from one form to another transformation of energy from one form to another objects at different temperatures reach an intermediate temperature change of temperature is energy transfer kinetic theory temperature change means heat transfer has occurred kinetic energy kinetic theory temperature changes

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				131	
					conversion of energy from potential to kinetic
				132	
					different forms of energy
				134	
					conservation of energy in a broader context
				148	
					forms of energy (i.e. wind)
				149	
					conversions of energy
				150	
					energy conversions
				278	
					kinetic theory and temperature
				284	
					heat and work
				286	
					kinetic theory
				287	
					thermal equilibrium
				287	
					heat conduction
				289	
					natural and forced convection
				290	
					thermal radiation
				303	
					kinetic theory—average kinetic energy and temperature
				422	
					chemical reactions that cause temperature changes
				424	
					chemical reactions that cause temperature changes

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GLE 0607.10.3 6	Energy	Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.	Explain the principles underlying the Law of Conservation of Energy.	5 conversion of energy types 6 energy conversions 10 conversion of energy 10 conservation of energy (i.e. potential and kinetic) 15 conversion of energy from one form to another 15 types and forms of energy 16 conversion of energy from one form to another 31 basic forms of energy—heat 130 basic forms of energy 130 law of conservation of energy 131 conservation of energy 131 conversion of energy from potential to kinetic 134 conservation of energy in a broader context 142 work and simple machines 143 output work is always less than input work 148 forms of energy (i.e. wind) 149 conversions of energy	26 transformation of energy from one form to another 27 transformation of energy from one form to another 29 work out cannot be more than work in 30 work out cannot be more than work in

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				150	energy conversions
GLE 0607.12.1 6	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Describe how simple circuits are associated with the transfer of electrical energy.	192 194 194 196 198 199 199 201 212 213 214	electric current how batteries work current in simple circuits electric circuits calculating power in a circuit electrical resistance concept of current resistance of common objects current current relationship between magnetic field and electric charge
GLE 0607.12.2 6	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Explain how simple electrical circuits can be used to determine which materials conduct electricity.	196	electric circuits
					35 36 36 36 37 37
					construct simple circuits series circuit electrical conductivity of various materials simple circuits series circuit simple circuits

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0707.07.5 7	The Earth	Major geologic events that occur over eons or brief moments in time continually shape and reshape the surface of the Earth, resulting in continuous global change.	Differentiate between renewable and nonrenewable resources in terms of their use by man.	133 energy usage and conservation 148 renewable resources	
GLE 0707.11.1 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Identify six types of simple machines	10 conservation of energy (i.e. potential and kinetic) 22 efficiency of electric motors 22 efficiency of gasoline engine 130 law of conservation of energy 140 simple machines 141 simple machines and forces 144 how a lever works 145 how a rope and pulley system works 146 how gears and ramps work	28 simple machines 29 efficiency of simple machines 30 simple machines

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0707.11.2 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Apply the equation for work in experiments with simple machines to determine the amount of force needed to do work.	22 efficiency of electric motors 22 efficiency of gasoline engine 138 maximum power output of a person 138 calculating power 143 efficiency explained 420 compare and contrast energy conversions in chemical and nuclear change	28 simple machines 29 efficiency of simple machines 30 simple machines 30 calculate work

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0707.11.3 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Distinguish between speed and velocity.	4 speed 6 speed 10 vectors 34 speed 35 understand and calculate speed 36 concept of velocity as a vector 40 understand concept of speed 54 concept of speed 55 vectors 55 speed 56 speed 56 vectors 57 vectors 58 vectors 60 calculating speed 64 calculating speed 66 calculations for speed 73 quantitative understanding of acceleration as change in speed 75 speed	8 determine the speed of an object 8 measurement and calculation of speed 9 determine speed of an object 9 speed calculation 10 speed calculation 11 vectors have magnitude and direction 11 vectors 13 concept of speed 15 calculate speed of a moving object 22 calculate speed 24 understanding of acceleration as a rate of change of velocity 27 calculate speed of a moving object 31 calculate speed of the car

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				76 speed	
				76 average speed	
				99 force as vector	
				100 force as vector	
				110 conceptual understanding of force as a vector	
				113 acceleration is a rate of change of speed	
				177 concept of speed	

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GLE 0707.11.4 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Investigate how Newton's laws of motion explain an object's movement.	4 68 73 79 80 89 96 97 100 100 101 108 109 113	Newton's second law qualitative quantitative understanding of acceleration as a rate of change of velocity Newton's second law changes in motion require force forces needed to change motion changes in motion require application of force change in motion require force quantitative understanding of force changing motion Newton's first law Newton's laws applied to real situations Newton's laws applied to planes changes in motion require force change in motion requires force Newton's second law	23 24 25

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				124	Newton's second law
GLE 0707.11.5 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Compare and contrast the basic parts of a wave.	226	frequency and amplitude and wavelength of waves
				227	the speed of waves
				234	speed of sound
				235	wavelength and frequency
				237	wavelength of sound
				44	demonstrate waves using slinky
				44	wavelength and frequency and speed of waves
				45	wave characteristics through water

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0707.11.6 7	Motion	Objects move in ways that can be observed, described, predicted, and measured.	Investigate the types and fundamental properties of waves.	225 waves transmit energy 228 longitudinal waves 228 transverse waves 229 refracted waves 229 reflected waves 230 destructive interference 236 sound waves and different media 240 absorption of sound waves 240 reflection of waves 240 waves that require substances to move 252 properties of electromagnetic waves with different wavelengths 262 absorption 262 refraction 262 wave interactions like reflection	44 reflection 44 wave as oscillation in a medium 45 making circular waves in a ripple tank 45 categorize waves by how they move

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0807.12.1 8	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Investigate the relationship between magnetism and electricity.	190 compare and contrast electrical force and magnetic force 203 what is a magnet 204 concept of force fields 204 concept of magnetic field 205 how a compass works 206 how a compass works 206 magnetic vs electric force 207 finding the poles of an electromagnet using right-hand rule 209 electromagnetic induction explained 214 how coils concentrate magnetic field 251 relationship between electricity and magnetism in the formation of electromagnetic waves 252 relationship between electricity and magnetism in making electromagnetic waves	35 concept of electric current 39 magnetic field

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0807.12.2 8	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Design an investigation to change the strength of an electromagnet.	203 what is a magnet 204 concept of magnetic field 214 relationship between magnetic field and electric charge	35 concept of electric current 39 magnetic field 40 investigate relationship between magnetism and electricity using electromagnets
GLE 0807.12.3 8	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Compare and contrast the earth's magnetic field to that of a magnet and an electromagnet.	190 compare and contrast electrical force and magnetic force 203 what is a magnet 204 concept of force fields 204 concept of magnetic field 205 how a compass works 206 how a compass works 206 magnetic vs electric force 214 how coils concentrate magnetic field 214 relationship between magnetic field and electric charge	35 concept of electric current 39 magnetic field 40 investigate relationship between magnetism and electricity using electromagnets

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0807.12.4 8	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Identify factors that influence the amount of gravitational force between objects.	70 effect of gravity on motion 72 projectile explained 82 effect of gravity on objects 96 effects of gravity 100 how gravity affects motion 100 gravity 154 Newton's law of universal gravitation 156 effect of gravity on motion 157 role of gravity in solar system 158 role of gravity in universe 160 effect of gravity on motion of objects 197 electric forces are very strong	

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE 0807.12.5 8	Forces in Nature	Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.	Recognize that gravity is the force that controls the motion of objects in the solar system.	70 effect of gravity on motion 72 projectile explained 82 effect of gravity on objects 96 effects of gravity 100 how gravity affects motion 156 orbits of planets and moons and other bodies 156 effect of gravity on motion 157 role of gravity in solar system 157 describe orbits of planets 158 orbit of moon 158 role of gravity in universe 160 effect of gravity on motion of objects 164 other bodies in solar system 164 orbits of other bodies in the solar system 166 compare orbits of planets 169 orbits of moons 170 orbits of other moons 171 compare orbits of planets in solar system	32 orbit of the moon

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				173 orbits on bodies in solar system	

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GLE0807.09.1 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Understand that all matter is made up of atoms.	<p>18 matter is composed of atoms</p> <p>19 describe matter as composed of atoms</p> <p>20 matter as composed of atoms</p> <p>20 recognize that compounds are composed of elements</p> <p>174 structure of atoms—electrons and protons and neutrons</p> <p>314 compounds composed of elements</p> <p>324 atoms are made up of proton and neutron and electron</p> <p>325 protons neutrons and electrons</p> <p>326 basic properties of an atom and the three subatomic particles</p> <p>329 structure of an atom and three smaller particles</p> <p>330 explain what isotopes are</p> <p>331 explain what isotopes are</p> <p>331 three subatomic particles and their charge</p>	<p>59 understand the structure of an atom based on protons and neutrons and electrons</p> <p>59 what isotopes are</p> <p>62 understand the structure of an atom based on protons and neutrons and electrons</p> <p>62 structure of an atom</p> <p>63 what isotopes are</p> <p>69 structure of an atom</p> <p>70 three subatomic particles—charge and mass</p> <p>70 structure of an atom</p>

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				339	
				properties of subatomic materials	
				339	
				structure of atoms	
				347	
				explain what isotopes are	
				363	
				recognize that compounds are made of elements	
				364	
				compounds are composed of elements	
				365	
				explain chemical reactions in terms of atoms and molecules	
				368	
				difference between ionic and covalent bonds	
				410	
				chemical reactions in terms of atoms and molecules	

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
GLE0807.09.2 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Explain that matter has properties that are determined by the structure and arrangement of its atoms.	4 mass 5 physical properties of matter 5 properties of solids and liquids and gas 5 mass and volume 18 molecular motion changed by addition of heat 19 molecular motion changed by addition of heat 24 mass of objects 96 relationship between real materials and concepts of atoms 174 compare materials—density and mass 280 physical differences between phases of matter 281 heat energy and molecular motion 281 phase changes 298 compare objects using properties—mass and density	52 common phase changes 53 phase changes 56 compare objects based on mass and volume and density 69 how electrons interact to create chemical bonds 70 how electrons interact to create bonds 74 compare materials based on density 101 volume 103 volume 104 volume 105 volume 106 mass 107 mass 108 mass

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				299	
					compare objects based on volume
				300	
					compare objects based on density
				301	
					compare objects using density
				301	
					physical differences between states of matter
				303	
					physical properties of matter
				303	
					compare objects and materials using mass and volume and density
				303	
					explain the relationship between materials and the concepts of atoms
				306	
					compare objects using density
				307	
					compare objects based on density
				308	
					compare objects based on density
				309	
					compare objects based on density
				328	
					understand how atomic structure determines the identity of elements—atomic number

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				343	
					explain common chemical properties of elements in relation to the periodic table
				345	
					idea of atomic mass
				345	
					common chemical properties in relation to the periodic table
				348	
					common chemical properties of elements based on relation to periodic table
				349	
					explain common chemical properties in relation to placement on periodic table
				351	
					relationship between materials and idea of atoms and molecules
				351	
					explain common chemical properties of elements in relation to periodic table
				352	
					how electron interactions create bonds
				352	
					properties in relation to periodic table
				353	
					chemical properties in relation to periodic table

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				354	
					relationship between real materials and arrangement of atoms
				355	
					relationship between real materials and arrangements of atoms
				357	
					describe characteristics based on place in periodic table
				365	
					how electrons are involved in bonds
				368	
					how electrons are involved in bonds
				369	
					properties of elements in relation to the periodic table
				369	
					how electron interactions help create chemical bonds
				371	
					how electrons are involved in bonds
				371	
					explain the chemical properties of elements in relation to periodic table
				372	
					how electrons are involved in bonding
				372	
					explain chemical properties based on location in periodic table

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
				373	
					how electrons are involved in bonding
				374	
					how electrons are involved in bonding
				374	
					chemical properties based on placement in periodic table
				377	
					qualitative understanding of how electron interactions create bonds
				387	
					explain how molecular motion is affected by addition of heat energy

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GLE0807.09.3 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Interpret data from an investigation to differentiate between physical and chemical changes.	<p>5 chemical changes such as burning</p> <p>20 recognize that compounds are composed of elements</p> <p>61 interpretations of patterns in data</p> <p>184 interpretations of patterns from data</p> <p>281 phase changes</p> <p>292 physical properties of vulcanized rubber</p> <p>293 physical properties of carbon nanotubes</p> <p>301 identify properties that influence development of everyday items</p> <p>313 physical properties influence the development of everyday materials</p> <p>314 compounds composed of elements</p> <p>314 formation of NaCl crystals</p> <p>316 classify materials based on physical properties</p> <p>317 classify materials based on properties</p>	<p>52 common phase changes</p> <p>53 phase changes</p> <p>71 new substances are formed when substances combine</p> <p>77 difference between chemical and physical changes</p> <p>77 how new substances are formed in chemical reactions</p> <p>78 making observations</p>

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				344	
					chemical and physical properties
				344	
					difference between chemical and physical changes
				344	
					simple chemical changes—rusting
				350	
					physical and chemical properties
				354	
					properties that influence development of everyday materials
				355	
					physical and chemical properties used to help make everyday materials
				357	
					classify by chemical and physical properties
				357	
					melting and boiling points
				358	
					physical properties of gold
				358	
					properties that make gold useful
				363	
					recognize that compounds are made of elements
				364	
					compounds are composed of elements

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				367	
					demonstrate that when two or more substances are combined new properties are seen
				368	
					difference between ionic and covalent bonds
				370	
					new substances are formed when two substances combine and it has new properties
				397	
					identify chemical properties that influence development of everyday products
				407	
					differences between chemical and physical change
				407	
					simple chemical changes
				407	
					simple chemical changes
				408	
					chemical reactions occur all around us
				408	
					difference between physical and chemical change
				409	
					explain chemical changes in terms of arrangement of molecules and atoms

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				410	
					chemical reactions in terms of arrangements of molecules and atoms
				413	
					difference between chemical and physical change
				416	
					reaction types
				417	
					common types of chemical reactions
				418	
					common types of chemical reactions
				419	
					chemical reactions occur all around us—in cars
				421	
					common types of chemical reactions
				422	
					chemical reactions all around us
				423	
					chemical reactions all around us
				424	
					chemical reactions take place all around us
				437	
					different types of reactions—factors that affect reaction rates

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GLE0807.09.4 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Distinguish among elements, compounds, and mixtures.	20 recognize that compounds are composed of elements 20 elements combine in constant proportions 166 melting points of materials 314 compounds composed of elements 328 understand how atomic structure determines the identity of elements—atomic number 345 idea of atomic mass 360 identify symbols of atoms 363 recognize that compounds are made of elements 364 compounds are composed of elements 366 understand that atoms combine in constant proportions to form compounds 367 elements combine in certain proportions to form compounds 368 difference between ionic and covalent bonds	59 atomic symbol and atomic number and mass number 63 identify symbols and atomic number and mass number 64 identify symbol and atomic number and mass number of elements 66 identify symbol and atomic number and mass number of elements 73 describe properties of true solutions

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				368 understand that elements combine in constant proportions to form compounds 370 understand that elements combine in constant proportions in compounds 371 elements combine in constant proportions in compounds 386 properties of solutions 387 properties of solutions—including roles of solvent and solute 393 properties of solutions—solvent and solute	
GLE0807.09.5 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Apply the chemical properties of the atmosphere to illustrate a mixture of gases.	356 describe components of the atmosphere	

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GLE0807.09.6 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Use the periodic table to determine the characteristics of an element.	328 understand how atomic structure determines the identity of elements—atomic number 345 recognizing groups or families on the periodic table 345 describe periodic table 345 idea of atomic mass 346 identify metals and nonmetals on the periodic table 348 recognizing metals and nonmetals and metalloids 348 recognizing groups and families of periodic table 348 describing periodic table 350 recognizing groups and families and periodic table 350 describe periodic table 352 describe periodic table 353 groups on periodic table 360 identify symbols of atoms	59 atomic symbol and atomic number and mass number 61 periodic table 63 identify symbols and atomic number and mass number 64 build and describe periodic table 64 identify symbol and atomic number and mass number of elements 65 identify groups or families on periodic table 66 periodic table 66 identify symbol and atomic number and mass number of elements 67 identify metals and nonmetals and metalloids 67 recognizing groups or families 67 periodic table 68 periodic table

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GLE0807.09.7 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Explain the Law of Conservation of Mass.	411 write balanced chemical equations 411 conservation of mass 412 write balanced chemical equations 413 balance equations 417 balance chemical equations 420 conservation of mass 421 balanced chemical reactions	79 investigate law of conservation of mass 80 law of conservation of mass

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GLE0807.09.8 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Interpret the events represented by a chemical equation.	20 elements combine in constant proportions 366 understand that atoms combine in constant proportions to form compounds 367 elements combine in certain proportions to form compounds 368 understand that elements combine in constant proportions to form compounds 370 understand that elements combine in constant proportions in compounds 371 elements combine in constant proportions in compounds 409 chemical reactions can be represented as systems of reactants and products 409 explain chemical changes in terms of arrangement of molecules and atoms 410 chemical reactions can be represented as systems with reactants and products	80 investigate and recognize that the chemical reactions can be represented as systems with reactants and products

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GLE0807.09.9 8	Matter	The composition and structure of matter is known, and it behaves according to principles that are generally understood.	Explain the basic difference between acids and bases.	385 differentiate between acids and bases 394 acids donate H- ions 394 differentiate between acids and bases 395 bases accept H- ions 395 differentiate between acids and bases 396 differentiate between strong and weak acids and bases 396 acids donate H- ions and bases accept H- ions 397 determine pH ranges of solutions 398 pH range 399 strong acids and bases 399 pH ranges 400 acids and bases 401 pH ranges 401 differentiate between acids and bases 401 strong and weak acids 402 pH ranges of solutions 402 acids and bases	75 determine pH ranges of solutions 75 differentiate between acids and bases 76 determine pH range of solutions

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				403 acids and bases	
INQ.1 6-8	Inquiry	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.	Design and conduct open ended scientific investigations	34 recognizing variables 41 recognizing and controlling variables in observations and experiments 45 identifying cause and effect relationships 54 variables 102 design an experiment that others could follow	7 test hypothesis against observations 7 develop procedure someone else could follow 9 test hypothesis against observations 10 recognize and control variables 12 design a procedure others can follow 13 conduct car/ramp experiment 24 control variables 43 recognizing and controlling variables 43 design scientific experiments 58 conduct scientific vocabulary 80 recognizing and controlling variables 92 design experiment that someone else can follow

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Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page		
INQ.2 6-8	Inquiry	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.	Use appropriate tools and techniques to gather, organize, analyze, and interpret data.	12	measurement	4	measurements
				42	basic statistical analysis of data—average	5	measurement and selecting appropriate tools
				42	collect data with precision as a central consideration	13	selecting ramp and photogates
				45	basic statistical analysis	14	construct a graphical model
				48	precision of data	15	construct a graphical model
				48	averages	17	make graph from data
				60	graphs	22	make model from data
				61	making and evaluating graphs	23	making measurements
				61	interpretations of patterns in data	27	making a graph from data
				62	constructing a graph	49	measuring
				63	constructing graph from data	50	collect data with precision as a central consideration
				76	measurements	77	measurements
				102	design experiments	95	measuring
				184	measuring	96	measuring
				184	interpretations of patterns from data	97	measuring
				222	harmonic motion graphs	98	measuring
				294	making a graph	101	measurements
340	make and evaluate graphs	102	measurements				
				103	measurements		

Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
				401 design experiment—including choosing equipment 411 design experiment with appropriate equipment	110 lab notebook 111 making graphs

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page		
INQ.3 6-8	Inquiry	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.	Synthesize information to determine cause and effect relationships between evidence and explanations.	24	repeatability of investigations is necessary for verification	3	identifying cause and effect relationships
				28	interpreting observations and proposing explanations	3	identify cause and effect relationships
				29	recognize that repeatability of investigations is necessary	5	repeatability of results
				29	construct explanations supported by direct and indirect evidence	6	construct reasonable explanations supported by direct and indirect data
				30	review theories based on observations	7	interpreting observations and proposing explanations
				31	review scientific hypothesis based on comparison with evidence	10	analyze hypothesis based on observation
				33	critique based on evidence	14	explain using data
				33	recognize repeatability of investigation is necessary for verification of evidence	20	analyze hypothesis based on comparison with evidence
				41	analyze hypothesis based on data	24	cause and effect relationships
				43	recognize that repeatability of investigation is necessary for validation of scientific evidence	38	construct explanations based on evidence
						40	constructing explanations
						49	explanations based on evidence
		58	interpret observations				
		76	interpret observations				
		80	interpret observations				

Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
				44	
				45	
				61	
				62	
				63	
				242	
				270	
				404	
				444	

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page		
INQ.4 6-8	Inquiry	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.	Recognize possible sources of bias and error, alternative explanations, and questions for further exploration.	24	error in experiments	5	collaboration
				24	repeatability of investigations is necessary for verification	5	repeatability of results
				29	recognize that repeatability of investigations is necessary	5	errors in data
				33	recognize repeatability of investigation is necessary for verification of evidence	5	analysis of errors in measurement
				42	average, accuracy, and error	8	average speed of cart
				43	recognize that repeatability of investigation is necessary for validation of scientific evidence	8	average walking speed
				43	analysis of error	9	find average speed
				44	averages and significant differences	10	find average speed
				44	analysis of errors in both measurements and interpretation	18	calculate average speed
				45	find the average of a data set	55	find average volume
				45	analysis of errors in measurement	58	average density
				51	find the average of a data set		

Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
				184 systematic error	
				380 plastics and evaporation	
				424 explore hot and cold pack claims	
				442 good fats vs. bad fats	
				444 nutrition labels	

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
INQ.5 6-8	Inquiry	Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.	Communicate scientific understanding using descriptions, explanations, and models.	7 testing models 29 communication is important to science 48 design and test a model to solve a problem 97 create and interpret dimensional drawings 99 dimensioned drawings 102 sketches 119 diagrams 124 design and test a model that solves a problem 150 design a model to solve a problem 150 sketches 269 communication as essential to science 318 oral presentation of results 318 write up results 325 design and test model 380 writing up results	32 communicating as essential to science 32 sketches 38 diagrams 41 making sketches 45 sketch the wave fronts 45 sketches 92 formal lab report 93 communicating results is essential to science 93 lab reports 93 writing up results 94 lab report 94 writing up results 110 lab report 111 making graphs

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
TE.1 6-8	Technology and Engineering	Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.	Explore how technology responds to social, political, and economic needs.	8 8 90 91 292 359	engineers design practical devices for solving problems engineers design practical devices for solving problems economic value of applied technology applications of science can affect the lives of individuals materials scientists societal impact of scientific knowledge
TE.2 6-8	Technology and Engineering	Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.	Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.	7 7 39 48 124 150 214 325	testing models design cycle steps of design cycle design and test a model to solve a problem design and test a model that solves a problem design a model to solve a problem propose a solution to a problem design and test model

**Correlation to Tennessee Middle School Learning Expectations
CPO Science Physical Science (Middle School)**

Standard #: Grade level	Topic	Conceptual Strand	Learning Expectations	Volume 1 Student Text page	Volume 2 Investigation Manual page
TE.3 6-8	Technology and Engineering	Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.	Compare the intended benefits with the unintended consequences of a new technology.	23 using hybrid cars 148 economic and environmental consequences of wind 148 economic and environmental consequences of wind 149 economic and environmental impact of wind energy 400 acid rain 404 simulate the effects of acid rain 416 environmental impacts of end products of chemical reactions 419 environmental impacts of end products of chemical reactions	