

**Correlation to Sunshine State Science Content Assessed by FCAT grade 10  
Foundations of Physical Science Student Text and Investigation Manual**

<b>Standard #: Strand</b>	<b>Standard</b>	<b>Grade tested</b>	<b>Benchmark</b>	<b>student text pg</b>	<b>detail</b>	<b>investigation pg</b>	<b>detail</b>
SC.A.1.4.1 The Nature of Matter	The student understands that all matter has observable, measurable properties.	10	The student knows that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.	324 324 335 388	which element is more likely to combine with other elements? use the periodic table to predict chemical formulas chemical bonding and the periodic table showing valence electrons in a diagram	136 140 141 141 158	ions find the number of electrons in outermost level when an atom ionizes modeling a chemical bond measure energy changes in 3 different reactions
SC.A.1.4.2 The Nature of Matter	The student understands that all matter has observable, measurable properties.	10	The student knows that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together.	389 389 389	forces in the nucleus electromagnetic force strong nuclear force	136	strong force
SC.A.1.4.3 The Nature of Matter	The student understands that all matter has observable, measurable properties.	10	The student knows that a change from one phase of matter to another involves a gain or loss of energy.	284	states of matter and arrangement of molecules	118 118 119 119	molecules in a liquid investigate melting investigate melting and create a graph create a temperature vs. time graph of phase change

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SC.A.1.4.4 The Nature of Matter	The student understands that all matter has observable, measurable properties.	10	The student experiments and determines that the rates of reaction among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and the presence or absence of catalysts.	364	formation of petroleum is a very slow chemical reaction	156	predict products in a double displacement reaction
SC.A.1.4.5 The Nature of Matter	The student understands that all matter has observable, measurable properties.	10	The student knows that connections (bonds) form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.	324	which element is more likely to combine with other elements?	136	ions
				324	use the periodic table to predict chemical formulas	140	find the number of electrons in outermost level
				330	ionic bonds	141	whan an atom ionizes
				331	covalent bonds	141	modeling a chemical bond
				332	distinguishing between ionic and covalent bonds	143	classify ionic compounds
				335	chemical bonding and the periodic table	143	ionic compounds
				388	showing valence electrons in a diagram		

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SC.A.2.4.1 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student knows that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or losses electrons, the charge is unbalanced.	311	protons/neutrons/electrons	132	building atom models
				311	location/size/charge of subatomic particles	133	location of electrons in atom
				315	atoms of same element have same atomic number	133	protons and neutrons
						136	ions
				318	proton/electron attraction	136	model stable and neutral atoms
						137	importance of atomic number
						137	build atomic models
						140	review subatomic particles
						141	whan an atom ionizes
SC.A.2.4.2 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student knows the difference between an element, a molecule, and a compound.	279	summary of matter classification	114	investigate a homogeneous mixture
				288	create a poster of matter classification	165	investigate solutions and colloids and suspensions
SC.A.2.4.3 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student knows that a number of elements have heavier, unstable nuclei that decay, spontaneously giving off smaller particles and waves that result in a small loss of mass and release a large amount of energy.	387	fusion and fission explained	138	fusion and fission
				393	carbon dating	160	radioactive decay
				393	radioisotopes in science and medicine	161	research pros and cons of uses for radioactive elements
				400	research pros and cons of nuclear technology		

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SC.A.2.4.4 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student knows that nuclear energy is released when small, light atoms are fused into heavier ones.	387	fusion and fission explained	138	fusion and fission
SC.A.2.4.5 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student knows that elements are arranged into groups and families based on similarities in electron structure and that their physical and chemical properties can be predicted.	320 321 329 330 332 335	groups of elements groups of elements and valence shells periodic table columns and valence electrons bonding and periodic table position periodic table and electronegativities periodic table and oxidation numbers	133 141 142	using the periodic table build model of Na and Cl atoms and explain why they bond to form a molecule arrangement of electrons and groups of elements
SC.A.2.4.6 The Nature of Matter	The student understands the basic principles of atomic theory.	10	The student understands that matter may act as a wave, a particle, or something else entirely different with its own characteristic behavior.	195 357 474	waves transmit energy chemical reactions involve rearrangement of atoms energy and radiation relationships		

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SC.B.1.4.1 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student understands how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth).	87	concept of energy as stored work	36	energy conservation and the roller coaster
				88	potential and kinetic energy explained	37	investigating conservation of energy with rollercoaster
				90	conservation of energy explained	38	identify potential/kinetic energy conversions
				91	following an energy transformation	38	explore energy transformations
				91	following an energy transformation	38	conservation of energy and energy transformations
				91	understand basic forms of energy	39	make an energy flow chart
				91	energy conversions	39	identify type of energy involved
				92	energy transformations and conservation		
				93	different forms of energy described	188	specific heat and conservation of energy
				96	prove that energy is conserved		

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SC.B.1.4.2 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student understands that there is conservation of mass and energy when matter is transformed.	88 90 91 92 93 96	potential and kinetic energy explained conservation of energy explained energy conversions energy transformations and conservation different forms of energy described prove that energy is conserved	36 37 38 38 150 188	energy conservation and the roller coaster investigating conservation of energy with rollercoaster explore energy transformations conservation of energy and energy transformations investigate conservation of mass in effervescent tablet reaction specific heat and conservation of energy
SC.B.1.4.3 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student knows that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object.			119	investigate temperature and energy transfer in melting process

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SC.B.1.4.4 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student knows that as electrical charges oscillate, they create time-varying electric and magnetic fields that propagate away from the source as an electromagnetic wave.	105 106 107 108 108 159 163 171	charge is a fundamental property of matter static charge discussed explanation of coulomb how an electroscope works electroscopes magnetism explained understanding magnetic fields electromagnetic induction explained	42 73 73	investigate electric charge use magnetic induction to create an electric field exploring electric generators
SC.B.1.4.5 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student knows that each source of energy presents advantages and disadvantages to its use in society (e.g., political and economic implications may determine a society's selection of renewable or nonrenewable energy sources).	172 391 391 400 444	generating electric power nuclear vs. fossil fuels impact of nuclear energy reducing pollution impact of using fossil fuels	52	the cost of using electrical appliances

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SC.B.1.4.6 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student knows that the first law of thermodynamics relates the transfer of energy to the work done and the heat transferred.	84 85 91 92 96	work input and output some input work is converted to heat energy conversions where does "spent" energy go? explain the "lost" energy	31 38	work output vs. work input explore energy transformations
SC.B.1.4.7 Energy	The students recognizes that energy may be changed in form with varying efficiency.	10	The student knows that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer.	85 88 90 91 92 92 93 96 96	some input work is converted to heat potential and kinetic energy explained conservation of energy explained energy conversions where does "spent" energy go? energy transformations and conservation different forms of energy described explain the "lost" energy prove that energy is conserved	36 37 38 38 188	energy conservation and the roller coaster investigating conservation of energy with rollercoaster explore energy transformations conservation of energy and energy transformations specific heat and conservation of energy

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SC.B.2.4.1 Energy	The student understands the interaction of matter and energy.	10	The student knows that the structure of the universe is the result of interactions involving fundamental particles (matter) and basic forces (energy) and that evidence suggests that the universe contains all of the matter and energy that ever existed.	91 91 389	following an energy transformation understand basic forms of energy atoms and nuclear energy	39 39 84 158 198	make an energy flow chart identify type of energy involved waves in motion energy in chemical reactions food energy
SC.C.1.4.1 Force and Motion	The student understands that types of motion may be described, measured, and predicted.	10	The student knows that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which is observe all motion.	13 18 25	speed is relative what is the speed of an object that is standing still? conceptual models of motion		
SC.C.1.4.2 Force and Motion	The student understands that types of motion may be described, measured, and predicted.	10	The student knows that any change in velocity is an acceleration.	33 36	understanding acceleration examples of acceleration	14	acceleration is the rate at which speed changes

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SC.C.2.4.1 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student knows that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects.	52 54 55	gravity depends on mass Newton's law of universal gravitation calculating gravitational force between objects		
SC.C.2.4.2 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student knows that electrical forces exist between any two charged objects.	105 106 107 108 108 389 389 389	charge is a fundamental property of matter static charge discussed explanation of coulomb how an electroscope works electroscopes forces in the nucleus electromagnetic force strong nuclear force	42 136	investigate electric charge strong force
SC.C.2.4.3 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student describes how magnetic force and electrical force are two aspects of a single force.	106 106 164 166 166	electrical force is incredibly strong! electrical forces what is an electromagnet? building an electromagnet increased current vs. strength of magnetic field	66 67	build an electromagnet find out what happens to strength of electromagnet when current is increased

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SC.C.2.4.4 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student knows that the forces that hold the nucleus of an atom together are much stronger than electromagnetic force and that this is the reason for the great amount of energy released from the nuclear reactions in the sun and other stars.	389 389 389	forces in the nucleus electromagnetic force strong nuclear force	136	strong force
SC.C.2.4.5 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student knows that most observable forces can be traced to electric forces acting between atoms or molecules.	105 106 106 106 107 108 108 389 389 389	charge is a fundamental property of matter electrical force is incredibly strong! electrical forces static charge discussed explanation of coulomb how an electroscope works electroscopes forces in the nucleus electromagnetic force strong nuclear force	42 136	investigate electric charge strong force

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SC.C.2.4.6 Force and Motion	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.	10	The student explains that all forces come in pairs commonly called action and reaction.	59	Newton's third law summarized 45  Newton's third law in detail	22  23	car and ramp and Newton's 3rd law  using 3rd law to explain common phenomena

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SC.H.1.4.1 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student knows that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.	7	experimentation begins with a question	6	asking questions and learning about natural world
				9	steps in the scientific method	7	compare results with hypothesis
				10	forming a hypothesis	7	design your own experiment
				19	design your own experiment	7	perform your own experiment
				19	design your own experiment	9	design three experiments using car and ramp
				42	devise an experiment	10	conduct car/ramp experiment
						16	decide how to vary the force on the car for this experiment
						16	investigate Newton's 2nd law
						26	what variables can be changed?
						34	investigate motion on a rollercoaster
						75	perform self-designed experiment
						75	design pendulum experiment
						75	plan three experiments to determine which variable affects the period of a pendulum

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						<p>93 decision trees and the advantage of doing multiple trials</p> <p>151 design experiment to find out if mass is conserved</p> <p>166 what three factors influence dissolving rate?</p> <p>166 which factor will produce fastest dissolving rate?</p>	

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SC.H.1.4.2 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student knows that from time to time, major shifts occur in the scientific view of how the world works, but that more often the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.	10	process of reviewing hypothesis explained	35	what evidence is there in support of your hypothesis?
				34	Aristotle vs. Newton	39	critique group's explanation of energy transformations
				45	Newton's Laws of Motion	39	review energy theory in context of everyday scenarios
				54	Newton and the force of gravity	39	analyze energy transformations in different scenarios
				105	Benjamin Franklin	77	show how energy loss data could be applied to designing a real clock
				107	Charles-Augustin Coulomb	77	compare law of conservation of energy to motion of pendulum
				312	contributions of Fermi	151	review your hypothesis
				321	contributions of Mendeleev	151	do the data support the hypothesis
				393	contributions of Marie and Pierre Curie	157	add new rules to list based on findings
						167	did you prove or disprove your hypothesis?
						167	what was happening at molecular level?

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SC.H.1.4.3 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student understands that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding ect.			21 35 45 151 157	construct reasonable explanation based on data study data and determine importance of height on speed of marble analyze data and explain a rule does your experiment agree with law of conservation of mass? add new rules to list based on findings

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SC.H.1.4.4 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student knows that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis.	23 24 24 34 45 54 73 105 107 312 321 393	why make models? what is a scientific model? scientific models Aristotle vs. Newton Newton's Laws of Motion Newton and the force of gravity impact of Da Vinci's work Benjamin Franklin Charles-Augustin Coulomb contributions of Fermi contributions of Mendeleev contributions of Marie and Pierre Curie		

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SC.H.1.4.5 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The students understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected finding, and usually grow slowly from many contributors.	320 391	the quests of alchemists scientific discovery and the atomic age		
SC.H.1.4.6 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student understands that, in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that, in the long run, theories are judged by how they fit with other theories.			39 39 39 77 77	critique group's explanation of energy transformations review energy theory in context of everyday scenarios analyze energy transformations in different scenarios show how energy loss data could be applied to designing a real clock compare law of conservation of energy to motion of pendulum

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SC.H.1.4.7 The Nature of Science	The student uses the scientific processes and habits of mind to solve problems.	10	The student understands the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings.	20	explain your reasoning	9	present conclusions to the class
						15	discuss and test ideas with your group
						19	explain how you arrived at your answer
						29	discuss what you learned about gears
						37	describe the flow of energy based on experimental graph
						39	give a brief presentation to the class
						47	discuss an explanation with your group
						47	present and defend an explanation
						129	explain your answer and justify
						145	present findings and methods used
						145	present findings to the class
						151	present results to the class

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SC.H.2.4.1 The Nature of Science	The student understands that most natural events occur in comprehensible, consistent patterns.	10	The student knows that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex, but scientists operate on the belief that the rules can be discovered by careful, systemic study.			6	asking questions and learning about natural world
SC.H.2.4.2 The Nature of Science	The student understands that most natural events occur in comprehensible, consistent patterns.	10	The student knows that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns.	11	control and experimental variables	6	asking questions and learning about natural world
				26	independent and dependent variables	7	doing a controlled experiment
				28	identifying cause and effect relationships	21	determine effect of increasing mass
				41	identify cause and effect	21	choose independent and dependent variables for graph
						27	recognize variables

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SC.H.3.4.1 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.	11	controlling variables in experiments	7	what variables should be controlled?
				19	did you run a controlled experiment?	13	graph distance vs. time
				20	what factors could explain the variability in their data?	15	construct a quantitative graphical model
				23	why make models?	37	organize data into a graph of speed vs. height
				24	what is a scientific model?	51	graph voltage vs. current
				24	scientific models	70	designing and testing different electric motors
				24	making a graph	121	graph mass vs. volume
				26	creating graphs	129	control the height of the liquid
				41	make a graph	147	organize observations into a category table
						151	does your experiment agree with law of conservation of mass?
						165	why was plain water tested?
						165	what does the word "control" mean?
						181	construct a graphical model
						183	construct a temperature vs. time graph

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SC.H.3.4.2 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.	73	relationship between science and technology	70	using engineering design cycle
SC.H.3.4.3 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.	34 73 73	Newton's research impacted mathematics impact of Da Vinci's work impact of technology		
SC.H.3.4.4 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that funds for science research come from federal government agencies, industry, and private foundations and that this funding often influences the areas of discovery.	400	clean air act of 1970		

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SC.H.3.4.5 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that the value of a technology may differ for different people and at different times.	73	relationship between science and technology	70	using engineering design cycle
SC.H.3.4.6 The Nature of Science	The student understands that science, technology, and society are interwoven and interdependent.	10	The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.	74 135	sample engineering problem circuit board explained	70 70 71 71 71	designing and testing different electric motors proposing and comparing different electric motor designs testing a motor for performance did draining the batteries affect motor speed? which motor gave the highest speed and why?