

## Active Physics Correlations with Florida Sunshine State Standards

	Communication			Home			Medicine			Predictions			Sports			Transportation			
	Standard	C1	C2	C3	H1	H2	H3	M1	M2	M3	P1	P2	P3	S1	S2	S3	T1	T2	T3
<b>The Nature of Matter</b>																			
<b>Standard 1: The student understands that all matter has observable measurable properties. (SC.A.1.4)</b>																			
1. knows that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.																			
2. knows that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together.																			
3. knows that a change from one phase of matter to another involves a gain or loss of energy.																			
4. 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.																			
5. knows that connections (bonds) form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.																			
<b>Standard 2: The student understands the basic principles of atomic theory. (SC.A.2.4)</b>																			

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1. 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 loses electrons, the charge is unbalanced.																			
2. knows the difference between an element, a molecule, and a compound.																			
3. 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.											X								
4. knows that nuclear energy is released when small, light atoms are fused into heavier ones.																			
5. 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.																			
6. understands that matter may act as a wave, a particle, or something else entirely different with its own characteristic behavior.																			
<b>Energy</b>																			
<b>Standard 1: The student recognizes that energy may be changed in form with varying efficiency. (SC.B.1.4)</b>																			

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1. 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).				X									X	X					
2. understands that there is conservation of mass and energy when matter is transformed.																			
3. knows that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object.																			
4. knows that as electrical charges oscillate, they create time-varying electric and magnetic fields that propagate away from the source as an electromagnetic wave.																			
5. 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).																			
6. knows that the first law of thermodynamics relates the transfer of energy to the work done and the heat transferred.																			

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7. knows that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer.																			
<b>Standard 2: The student understands the interaction of matter and energy. (SC.B.2.4)</b>																			
1. 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.																			
<b>Force and Motion</b>																			
<b>Standard 1: The student understands that types of motion may be described, measured, and predicted. (SC.C.1.4)</b>																			
1. knows that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion.			X									X							
2. knows that any change in velocity is an acceleration.											X		X	X				X	X
<b>Standard 2: 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. (SC.C.2.4)</b>																			
1. knows that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects.												X			X				X
2. knows that electrical forces exist between any two charged objects.					X														

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3. describes how magnetic force and electrical force are two aspects of a single force.		X				X													
4. knows that the forces that hold the nucleus of an atom together are much stronger than electromagnetic force and that is the reason for the great amount of energy released from the nuclear reactions in the sun and other stars.																			
5. knows that most observable forces can be traced to electric forces acting between atoms or molecules.																			
6. explains that all forces come in pairs commonly called action and reaction.											X			X					
<b>The Nature of Science</b>																			
<b>Standard 1: The student uses the scientific processes and habits of mind to solve problems. (SC.H.1.4)</b>																			
1. 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.																			
2. 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.																			

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3. 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 of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth.																			
4. 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.																			
5. 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 findings, and usually grow slowly from many contributors.																			

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6. 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, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings.																			
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7. 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.																			
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**Standard 2: The student understands that most natural events occur in comprehensible, consistent patterns. (SC.H.2.4)**

1. 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 that scientists operate on the belief that the rules can be discovered by careful, systemic study.										X									
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2. 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.											X								
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**Standard 3: The student understands that science, technology, and society are interwoven and interdependent. (SC.H.3.4)**

1.knows that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.	X	X	X	X				X	X	X					X		X		X
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2.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.	X	X	X					X	X										
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3.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.		X	X					X	X	X							X	X	
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4.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.																			
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5.knows that the value of a technology may differ for different people and at different times.	X	X		X	X			X											
6.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.	X	X		X	X		X	X										X	X

Active Physics students perform investigations to explore new phenomena. This is the design of the Active Physics program itself.

For The Nature of Science: Standard 1: #1, students work with this standard in virtually every lesson. The students use scientific processes and habits of mind to conduct investigations throughout the entire program.

For The Nature of Science: Standard 2: #1 and #2, the students investigate the comprehensible, patterns of natural events in virtually every lesson.