Virginia Science

Physical Science

The student will demonstrate an understanding of scientific and engineering practices by PS.1

a asking questions and defining problems PS.1A

- i. ask questions that require empirical evidence to answer PS.1A.I
- ii. develop hypotheses indicating relationships between independent and dependent variables PS.1A.II
- iii. offer simple solutions to design problems PS.1A.III

b planning and carrying out investigations PS.1B

- ii. evaluate the accuracy of various methods for collecting data PS.1B.II
- i. independently and collaboratively plan and conduct observational and experimental investigations; identify variables, constants, and controls where appropriate and include the safe use of chemicals and equipment PS.1B.I
- iii. take metric measurements using appropriate tools and technologies PS.1B.III
- iv. apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system PS.1B.IV

c interpreting, analyzing, and evaluating data PS.1C

- i. construct and interpret data tables showing independent and dependent variables, repeated trials, and means PS.1C.I
- ii. construct, analyze, and interpret graphical displays of data and consider limitations of data analysis PS.1C.II
- iii. apply mathematical concepts and processes to scientific questions PS.1C.III
- iv. use data to evaluate and refine design solutions to best meet criteria PS.1C.IV

d constructing and critiquing conclusions and explanations PS.1D

- i. construct scientific explanations based on valid and reliable evidence obtained from sources (including the students' own investigations) PS.1D.I
- ii. construct arguments supported by empirical evidence and scientific reasoning PS.1D.II
- iii. generate and compare multiple solutions to problems based on how well they meet the criteria and constraints PS.1D.III
- iv. differentiate between a scientific hypothesis, theory, and law PS.1D.IV

e developing and using models PS.1E

i. construct, develop, and use models and simulations to illustrate and/or explain observable and unobservable phenomena PS.1E.I

ii. evaluate limitations of models PS.1E.II

f obtaining, evaluating, and communicating information PS.1F

i. read scientific texts, including those adapted for classroom use, to determine the central idea and/or obtain scientific and/or technical information PS.1F.I

ii. gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication PS.1F.II

iii. construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning PS.1F.III

The student will investigate and understand that matter is composed of atoms. PS.2

a our understanding of atoms has developed over time; PS.2A

b the periodic table can be used to predict the chemical and physical properties of matter; PS.2B

c the kinetic molecular theory is used to predict and explain matter interactions. PS.2C

The student will investigate and understand that matter has properties and is conserved in chemical and physical processes. PS.3

a pure substances can be identified based on their chemical and physical properties; PS.3A

b pure substances can undergo physical and chemical changes that may result in a change of properties; PS.3B

c compounds form through ionic and covalent bonding; PS.3C

d balanced chemical equations model the conservation of matter. PS.3D

The student will investigate and understand that the periodic table is a model used to organize elements based on their atomic structure. PS.4

a symbols, atomic numbers, atomic mass, chemical groups (families), and periods are identified on the periodic table; PS.4A

b elements are classified as metals, metalloids, and nonmetals. PS.4B

The student will investigate and understand that energy is conserved PS.5

a energy can be stored in different ways; PS.5A

b energy is transferred and transformed; PS.5B

c energy can be transformed to meet societal needs. PS.5C

The student will investigate and understand that waves

a energy may be transferred in the form of longitudinal and transverse waves; PS.6A

are important in the movement of energy PS.6	b mechanical waves need a medium to transfer energy; PS.6B
	c waves can interact PS.6C
	d energy associated with waves has many applications. PS.6D
The student will investigate and understand that electromagnetic radiation has characteristics. PS.7	a electromagnetic radiation, including visible light, has wave characteristics and behavior; PS.7A
	b regions of the electromagnetic spectrum have specific characteristics and uses. PS.7B
The student will investigate and understand that work, force, and motion are related PS.8	a motion can be described using position and time; PS.8A
	b motion is described by Newton's laws. PS.8B
The student will investigate and understand that there are basic principles of electricity and magnetism. PS.9	a an imbalance of charge generates static electricity; PS.9A
	b materials have different conductive properties; PS.9B
	c electric circuits transfer energy; PS.9C
	d magnetic fields cause the magnetic effects of certain materials; PS.9D
	e electric current and magnetic fields are related; PS.9E
	f many technologies use electricity and magnetism. PS.9F