Virginia Science

# Grade 5

Adopted 2018

**Scientific and Engineering Practices**

1. **The student will demonstrate an understanding of scientific and engineering practices by** 5.1
    a. asking questions and defining problems 5.1.A
        i. ask testable questions based on observations and predict reasonable outcomes based on patterns 5.1.A.I
        ii. develop hypotheses as cause-and-effect relationship 5.1.A.II
        iii. define design problems that can be solved through the development of an object, tool, process, or system 5.1.A.III
    b. planning and carrying out investigations 5.1.B
        i. collaboratively plan and conduct investigations to produce data 5.1.B.I
        ii. identify independent variable, dependent variables, and constants 5.1.B.II
        iii. determine data that should be collected to answer a testable question 5.1.B.III
        iv. take¬ metric measurements using appropriate tools 5.1.B.IV
        v. use tools and/or materials to design and/or build a device that solves a specific problem 5.1.B.V
    c. interpreting, analyzing, and evaluating data 5.1.C
        i. represent and analyze data using tables and graphs 5.1.C.I
        ii. organize simple data sets to reveal patterns that suggest relationships 5.1.C.II
        iii. compare and contrast data collected by different groups and discuss similarities and differences in their findings 5.1.C.III
        iv. use data to evaluate and refine design solutions 5.1.C.IV
    d. constructing and critiquing conclusions and explanations 5.1.D
        i. construct and/or support arguments with evidence, data, and/or a model 5.1.D.I
        ii. describe how scientific ideas apply to design solutions 5.1.D.II
        iii. generate and compare multiple solutions to problems based on how well they meet the criteria and constraints 5.1.D.III
    e. developing and using models 5.1.E
        i. develop models using an analogy, example, or abstract representation to describe a scientific principle or design solution 5.1.E.I
        ii. identify limitations of models 5.1.E.II
    f. obtaining, evaluating, and communicating information 5.1.F
        i. read and comprehend reading-level-appropriate texts and/or other reliable media 5.1.F.I
        ii. communicate scientific information, design ideas, and/or solutions with others 5.1.F.II

**Force, Motion, and Energy**

2. The student will investigate and understand that energy can take many forms. Key ideas include 5.2

a. energy is the ability to do work or to cause change; 5.2.A

b. there are many different forms of energy; 5.2.B

c. energy can be transformed; and 5.2.C

d. energy is conserved. 5.2.D

3. The student will investigate and understand that there is a relationship between force and energy of moving objects. Key ideas include 5.3

a. moving objects have kinetic energy; 5.3.A

b. motion is described by an object's direction and speed; 5.3.B

c. changes in motion are related to net force and mass; 5.3.C

d. when objects collide, the contact forces transfer energy and can change objects' motion; and 5.3.D

e. friction is a force that opposes motion. 5.3.E

4. The student will investigate and understand that electricity is transmitted and used in daily life. Key ideas include 5.4

a. electricity flows easily through conductors but not insulators; 5.4.A

b. electricity flows through closed circuits; 5.4.B

c. static electricity can be generated by rubbing certain materials together; 5.4.C

d. electrical energy can be transformed into radiant, mechanical, and thermal energy; and 5.4.D

e. a current flowing through a wire creates a magnetic field. 5.4.E

5. The student will investigate and understand that sound can be produced and transmitted. Key ideas include 5.5

a. sound is produced when an object or substance vibrates; 5.5.A

b. sound is the transfer of energy; 5.5.B

c. different media transmit sound differently; and 5.5.C

d. sound waves have many uses and applications. 5.5.D

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| | **6.** The student will investigate and understand that visible light has certain characteristics and behaves in predictable ways. Key ideas include 5.6 |
| | **a.** visible light is radiant energy that moves in transverse waves; 5.6.A |
| | **b.** the visible spectrum includes light with different wavelengths; 5.6.B |
| | **c.** matter influences the path of light; and 5.6.C |
| | **d.** radiant energy can be transformed into thermal, mechanical, and electrical energy. 5.6.D |
| **Matter** | **7.** The student will investigate and understand that matter has properties and interactions. Key ideas include 5.7 |
| | **a.** matter is composed of atoms; 5.7.A |
| | **b.** substances can be mixed together without changes in their physical properties; and 5.7.B |
| | **c.** energy has an effect on the phases of matter. 5.7.C |
| **Earth and Space Systems** | **8.** The student will investigate and understand that Earth constantly changes. Key ideas include 5.8 |
| | **a.** Earth's internal energy causes movement of material within the Earth; 5.8.A |
| | **b.** plate tectonics describe movement of the crust; 5.8.B |
| | **c.** the rock cycle models the transformation of rocks; 5.8.C |
| | **d.** processes such as weathering, erosion, and deposition change the surface of the Earth; and 5.8.D |
| | **e.** fossils and geologic patterns provide evidence of Earth's change. 5.8.E |
| **Earth Resources** | **9.** The student will investigate and understand that the conservation of energy resources is important. Key ideas include 5.9 |
| | **a.** some sources of energy are considered renewable and others are not; 5.9.A |
| | **b.** individuals and communities have means of conserving both energy and matter; and 5.9.B |
| | **c.** advances in technology improve the ability to transfer and transform energy. 5.9.C |