

# **Grade 6 Science Pacing Guide**



**Revised  
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**Waynesboro Public  
Schools**

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## School Year 2006-07

### Scientific Investigation, Reasoning & Logic

Weeks 1-1.5

#### **Standards of Learning**

- 6.1 The student will plan and conduct investigations in which
- observations are made involving fine discrimination between similar objects and organisms;
  - a classification system is developed based on multiple attributes;
  - precise and approximate measurements are recorded;
  - scale models are used to estimate distance, volume, and quantity;
  - hypotheses are stated in ways that identify the independent (manipulated) and dependent (responding) variables;
  - a method is devised to test the validity of predictions and inferences;
  - one variable is manipulated over time, using many repeated trials;
  - data are collected, recorded, analyzed, and reported using appropriate metric measurements;
  - data are organized and communicated through graphical representation (graphs, charts, and diagrams);
  - models are designed to explain a sequence; and
  - an understanding of the nature of science is developed and reinforced.

#### **Unit Overview**

**In order to meet this standard, it is expected that students should be able to:**

explain how scientists using scientific inquiry seek to understand the natural world  
explain inference and observation  
describe scientific methods, including developing a hypothesis, and testing the hypothesis through a controlled experiment  
explain what a scientific theory is.  
Use a variety of lab equipment including: beakers, graduated cylinders, scales, thermometers.  
Use the International System of Units (SI) during labs.  
Define the terms: observation and inference.  
Make a model of an object that will be studied during the year.  
Lab Safety Rules

#### **Primary Resources**

Prentice Hall Science Explorer text: Introduction Chapter  
Video-The scientific method  
Internet resources

#### **Suggested Assessments**

Quizzes/tests  
Interactive Notebook-  
Bell work  
Classroom observations

#### **Teacher Notes**

“What’s In the Box?” activity  
Vocabulary, notes; handouts; writing labs using the scientific method  
Lab: observe and infer: Water Droplets on Waxed Paper  
Lab: How many water drops can you put on the head of a penny?  
Observe/infer-footprint overhead

**Standards of Learning**

- 6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include
- atoms are made up of electrons, protons, and neutrons;
  - atoms of any element are alike but are different from atoms of other elements;
  - elements may be represented by chemical symbols;
  - two or more atoms may be chemically combined;
  - compounds may be represented by chemical formulas;
  - chemical equations can be used to model chemical changes; and
  - a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.

**Unit Overview**

In order to meet this standard, the student should be able to:

- define matter and energy
- explain that substances can be identified or classified by their physical and chemical properties
- explain the differences among elements, compounds, and mixtures
- distinguish between physical and chemical changes
- identify different forms of energy and give examples of energy transformations that affect matter.
- Explain the difference between weight and mass
- Calculate the density of substances using SI units for mass and volume
- Identify atoms as the smallest particles of an element
- Describe Dalton's theory of atoms
- Identify chemical bonds as the force holding atoms together in molecules
- Explain that a chemical reaction is needed to obtain an element from one of its compounds.
- Name and identify elements found on earth, oceans, atmosphere and living organisms
- Model simple chemical changes with an equation and account for all atoms distinguishing the types and numbers of elements.

**Primary Resources**

Resources:

- Chapter 1 lessons 1,2,3
- Chapter 3 lesson 2
- Use periodic table to identify symbols of elements
- Videos
- Letter f. also covered w/ photosynthesis and formation of fossil fuels 6.2

**Suggested Assessments**

- Interactive Notebook & Classroom observations
- Bell work
- Quizzes/tests

**Teacher Notes**

- Lab: Identifying compounds in a mixture (mystery mixture)
- Compound demonstrations-melting sugar, separating salt water
- Measure mass-triple beams
- Lab-Bubble Time-measuring volume
- Notebook inserts:
  - Classify properties of matter;
  - Illustrate prominent elements found on earth, atmosphere, oceans and in living organisms;
  - Illustrate models of atoms-use to compare and contrast different elements;
  - Illustrate energy transformations, write and balance chemical equations (decomposition, photosynthesis);
- Vocabulary, handouts

**Standards of Learning**

- 6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include
- water as the universal solvent;
  - the properties of water in all three states;

**Unit Overview**

In order to meet this standard, it is expected that students should be to:

- Comprehend and apply key terminology related to water and its properties and use
- Model and explain the shape and composition of a water molecule
- Design an investigation to determine the relative density of liquid and solid water at different temps.
  - Compare the densities of liquid and solid water
- Comprehend the adhesive and cohesive properties of water.
- Model and explain why ice is less dense than water
- Design an investigation to demonstrate the ability of water to dissolve materials
- Design an investigation to determine the presence of water in a plant material.

**Primary Resources**

Ch. 2 lesson 1

**Suggested Assessments**

Bell work  
Quizzes/tests  
observations  
Interactive Notebook

**Teacher Notes**

handouts, notes, illustrate models of a polar molecule and of molecules of water in all three states  
Activities-comparing solvents  
Activity - using salt to change water's state,  
Activity - surface tension inquiry challenge,  
Activity - follow that string,  
Activity - measuring mass/dehydrating fruit, recording data/time involved to change states of water

## **Standards of Learning**

6.1 a-k

6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include

d) renewable energy sources (wood, wind, hydro, geothermal, tidal, and solar); and

6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include

c) the action of water in physical and chemical weathering;

f) the importance of water for agriculture, power generation, and public health;

6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include

c) divides tributaries, river systems, and river and stream processes

6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include

a) management of renewable resources(water, air, soil, plant life, animal life)

c) mitigation of land –use and environmental hazards through preventive measures and

d) cost/benefit tradeoffs in conservation policies

## **Unit Overview**

In order for this standard to be met, it is expected that students should be able to:

Identify what causes mechanical and chemical weathering

Identify evidence of chemical weathering in the local environment

Describe methods for managing solid waste

Explain the role of water in power generation

List four methods of recycling waste

Identify methods for managing hazardous wastes

## **Primary Resources**

Chapter 4 lesson 1

Ch 5 lessons 1,2,3

Text

Videos

Newspaper articles

## **Suggested Assessments**

Interactive notebook-handouts, notes, vocabulary

Bell work

Quizzes

## **Teacher Notes**

Labs/activities

Mech. Weathering-p.94 integrating physics act. & rusting away p. 96 & Rock shake p. 98:

**Standards of Learning**

6.1 a-k

- 6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include
- e) the origin and occurrence of water on Earth
  - f) the importance of water for agriculture, power generation, and public health
  - g) the importance of protecting and maintaining water resources
- 6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include
- a) health of an ecosystem and the a biotic factors of a watershed(7,10)
  - b) location and structure of VA's regional watershed systems(7,10)
  - c) divides, tributaries, river systems, and river and stream processes((4,5,7)
  - d) wetlands(7)
  - e) estuaries(10)
  - f) major conservation ,health, and safety issues associated with watersheds (7,10)
  - g) water monitoring and analysis using field equipment including hand held technology
- 6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include
- a) management of renewable resources
  - c) mitigation of land-use and environmental hazards through preventative measures and
  - d) cost/benefit tradeoffs in conservation policies

**Unit Overview**

Identify how Earth's water is distributed among saltwater and fresh water sources  
Describe how Earth's water moves through the water cycle  
Describe the importance of careful management of water resources  
Describe a river system and how water flows into  
Explain how ponds and lakes form  
Describe pond and lake habitats and the process of lake turnover  
Describes springs and how water moves through underground layers of soil and rock  
Explain what an aquifer is and how people obtain water from an aquifer  
Identify features of wetlands that make them suitable habitats for living things(abiotic/biotic factors)  
Explain what a wetland is and how wetlands help control flooding.  
Illustrate differences between divides, tributaries, river systems, stream processes, estuaries  
Describe desalinization- (Ch. 8 lab)

**Primary Resources**

Chapter 7 lessons 1,2,3,4  
Ch. 8 lessons 2,3  
Ch 10 pp. 302-303  
Text  
Book- life in a stream-identifying biotic and a biotic factors  
Articles-North river fish kill, p 317 shrimp farms,  
p. 322-323 Chesapeake Bay  
Videos  
Field trip-Riverfest  
Science Day Book

### **Suggested Assessments**

Interactive notebook-handouts, notes, vocabulary  
Bell work  
Quizzes

### **Teacher Notes**

Lab/ activities: water from trees  
Lab "changes in Density" (8)  
Lab "soil testing(7)  
Project wet and klutz books-well contamination  
Lab-"cleaning up an oil spill"(10)  
Testing various water samples for acidity, nitrates  
Topography maps of VA and Shenandoah valley to investigate stream flow, watershed size and location  
Watershed address  
Desalination activity (from Zoom)  
Wet/dry sponge activity-wetlands

**Standards of Learning**

- 6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include
- b) role of sun in formation of most energy sources on earth(12)
- 6.3 The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on the Earth's surface. Key concepts include
- a) the Earth's energy budget;
  - b) the role of radiation and convection in the distribution of energy;
  - c) the motion of the atmosphere and the oceans;
  - d) cloud formation; and
  - e) the role of heat energy in weather-related phenomena including thunderstorms and hurricanes.
- 6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include
- d) the ability of large bodies of water to store heat and moderate climate;
  - f) the importance of water for agriculture, power generation, and public health; and
  - g) the importance of protecting and maintaining water resources.
- 6.6 The student will investigate and understand the properties of air and the structure and dynamics of the Earth's atmosphere. Key concepts include
- a) air as a mixture of gaseous elements and compounds;
  - b) air pressure, temperature, and humidity;
  - d) natural and human-caused changes to the atmosphere;
  - e) the relationship of atmospheric measures and weather conditions;
  - f) basic information from weather maps including fronts, systems, and basic measurements; and
  - g) the importance of protecting and maintaining air quality.
- 6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include
- a) management of renewable resources (water, air, soil, plant life, animal life);

**Unit Overview**

State in what form energy travels from the sun to Earth  
Explain what happens to energy from the sun when it reaches Earth  
Describe how temperature is measured  
Three ways heat is transferred.  
Causes of wind  
Describe how to measure relative humidity  
Explain how clouds form  
Describe main types of clouds  
Identify main types of precipitation  
How precipitation is measured and ways it might be controlled  
Explain how technology helps forecasters predict the weather  
Describe types of information shown on a weather map  
List the main kinds of storms and how they form.  
Describe safety measures to take during a storm.

### **Primary Resources**

Ch. 9 Lesson 4

Ch. 12 Lessons 1, 2, 3, 4

Ch. 13 Lessons 1, 2, 4

Ch. 14 Lessons 1

Videos-Bill Nye weather

Videos- Extreme Weather

Internet resources- Map Quest

### **Suggested Assessments**

Interactive notebook:

Bell work

Quizzes/test

### **Teacher Notes**

make a radiometer p369 TM

Activity-Build a wind vane

Activity-How can you make hail?

Model/Flip chart of clouds

Illustrate/label fronts

Activity-p. 363-364 Teacher's Manual "energy in the atmosphere"-heat distribution

Role play extreme weather safety measures

Role-play being a weather forecaster using a weather map.

Activity: "Does a plastic Bag Trap Heat?"

**Standards of Learning**

6.1 a-k

6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include

- d) atoms may be chemically combined
- g) limited number of elements

6.6 The student will investigate and understand the properties of air and the structure and dynamics of the Earth's atmosphere. Key concepts include

- a) air as a mixture of gaseous elements and compounds;
- b) air pressure, temperature, and humidity;
- c) how the atmosphere changes with altitude;

**Unit Overview**

State how the atmosphere is important to living things  
Identify gases present in Earth's atmosphere  
Identify importance of ozone  
Describe greenhouse affect  
Identify pollutants in atmosphere  
Name instruments used to measure air pressure  
Explain how altitude affects air pressure  
Describe characteristics of main layers of the atmosphere

**Primary Resources**

Chapter 11  
Science Daybook  
videos

**Suggested Assessments**

Interactive Notebook  
Bell work  
Teacher observations  
Quizzes  
Unit test

**Teacher Notes**

Lab: How does scent spread?"  
Lab: Does air have mass?"  
Lab-soda-bottle Barometer  
Activity- Is air there?"

**Scientific Investigation, Reasoning, and Logic; Force, Motion, and Energy; Matter**

**Week 15-16.5**

**Standards of Learning**

6.1 a-k

- 6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include
- a) potential and kinetic energy;
  - b) the role of the sun in the formation of most energy sources on Earth;
  - c) nonrenewable energy sources (fossil fuels including petroleum, natural gas, and coal);
  - e) energy transformations (heat/light to mechanical, chemical, and electrical energy)
- 6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include
- e) compounds may be represented by chemical formulas
  - f) chemical equations can be used to model chemical changes.

**Unit Overview**

**Energy**

Define potential and kinetic energy,  
List different forms of energy.  
Describe the conversions between different forms of energy.  
Describe the energy conversions that occurs during photosynthesis  
Explain how fossil fuels contain energy that came from the sun.

**Primary Resources**

Video-“Exploring Energy” (KC Library)  
Video-Bill Nye “Energy”  
Ch. 15 text

**Suggested Assessments**

Interactive Notebook  
Tests  
Quizzes

**Teacher Notes**

Activity - How high does a ball bounce?  
Activity-kinetic energy-skate boards and add-ons  
Lab-Soaring straws  
Escher prints(on CD)  
Activity- go for the Green (microscopes)  
Lab- Can you feel the power?

**Standards of Learning**

6.1 a-k

6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include

- b) the role of the sun in the formation of most energy sources on Earth;
- c) nonrenewable energy sources (fossil fuels including petroleum, natural gas, and coal);
- d) renewable energy sources (wood, wind, hydro, geothermal, tidal, and solar); and
- e) energy transformations (heat/light to mechanical, chemical, and electrical energy).

6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include

- a) management of renewable resources (water, air, soil, plant life, animal life);
- b) management of nonrenewable resources (coal, oil, natural gas, nuclear power, mineral resources);

**Unit Overview**

**Energy Resources**

Differentiate between renewable and non-renewable energy resources  
Explain how fuels provide energy  
List the three major fossil fuels  
Explain why fossil fuels are considered nonrenewable resources.  
Explain how the sun provides energy and describe ways to collect this energy.  
Identify and describe various sources of renewable energy  
Describe nuclear fission and nuclear fusion reactions.  
Explain how a nuclear power plant produces electricity.  
List ways to ensure there will be enough energy for the future  
Identify ways to conserve energy

**Primary Resources**

Ch 8 lesson 4  
Ch 16 lesson 1,2,3,4  
Text  
Science Daybook  
Videos  
Newspaper articles

**Suggested Assessments**

Interactive notebook  
Quizzes  
Tests  
Teacher observations

**Teacher Notes**

Activity-What is in a piece of Coal?  
Activity- Can you capture Solar Energy?  
Lab- cooking with sunshine  
Models of power plants  
Activity- build a solar house

**Standards of Learning**

6.1 a-k

- 6.8 The student will investigate and understand the organization of the solar system and the relationships among the various bodies that comprise it. Key concepts include
- the sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets;
  - relative size of and distance between planets;
  - the role of gravity;
  - revolution and rotation;
  - the mechanics of day and night and the phases of the moon;
  - the unique properties of Earth as a planet;
  - the relationship of the Earth's tilt and the seasons;
  - the cause of tides; and
  - the history and technology of space exploration.

**Unit Overview****Earth, Moon, & Sun**

Identify the effects of Earth's rotation and revolution  
Explain the causes of the seasons on Earth  
Describe the causes of the moon's phases  
Describe what causes solar and lunar eclipses  
Identify the cause of the tides  
Explain how rockets travel in space  
List uses for satellites, space stations, and the Space Shuttle  
Describe how scientists have used the telescope to study the moon.  
Explain what scientists learned about the moon from space exploration  
Describe the origin and structure of the moon.

**The Solar System**

Explain two factors that keep planets in their orbits  
Explain Heliocentric and geocentric models of the solar system differ  
Explain observations and views of scientists such as Kepler and Copernicus  
Describe how sun produces energy  
Identify main characteristics of the inner planets  
Compare the gas giant planets  
Compare Pluto with the other planets  
Identify the characteristics of comets and asteroids  
Describe the formation of meteoroids  
Identify the conditions needed for living things on Earth  
Know the names of all planets  
Develop a time line for space Exploration

## **Primary Resources**

### **Earth, Moon, & Sun**

Chapter 18 & 19 text  
Internet- NASA  
Posters  
Science Journal/ magazines  
Science Daybook

### **The Solar System**

Text  
Chapter 19  
Models of solar system  
Video-Bill Nye-planets  
School House Rock "Interplanet Janet" and "Victim of Gravity"  
Posters  
NASA website

## **Suggested Assessments**

Interactive notebook  
Bell work  
Unit quizzes and tests

## **Teacher Notes**

### **Earth, Moon, & Sun**

Activity- Why does Earth have day and night  
Model night and day using Earth, sun and moon  
Activity- How does moon move  
Lab- A month of phases  
Activity- How do rockets work?  
Model Eclipses using Earth moon and sun  
Model tides using Earth moon and sun

### **The Solar System**

Activity –time line of space exploration  
Activity- draw model of solar system w/ relative sizes and distances  
Activity- which ways do comet tails point?