

UNIT: Scientific Investigations-Motion and Forces

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GRADE: 8

TIME FRAME: **1st Marking Period**

PERFORMANCE STANDARDS

27.1 SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.

27.1.1.6.2 Students will read, interpret and examine the credibility of scientific claims in different sources of information.

27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.

27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.

27.1.1.6.6 Students will use mathematical operations to analyze and interpret the data.

27.2 SCIENCE - PHYSICAL SCIENCE (II,III,IV)

27.2.4.8.22 Students will calculate average speed of a moving object and illustrate the motion of objects in graphs of distance over time.

27.2.4.8.23 Students will describe the qualitative relationships among force, mass and changes in motion.

27.2.4.8.24 Students will describe the forces acting on an object moving in a circular path.

ESS/FOCUS QUESTIONS

1. What are the steps of the scientific method?
2. What is an investigable question?
3. What are the different types of variables?
4. How is scientific data collected and organized?
5. How are graphs constructed in order to interpret data?
6. What is motion?
7. How can motion be measured?
8. What is speed?
9. How can the average speed of a moving object be calculated?
10. How can motion and distance over time be graphed?
11. How can the speed and velocity of an object be determined?
12. What is acceleration and how can it be calculated?
13. What types of graphs can be designed to illustrate the motion of different objects?
14. What is force?
15. How are balanced and unbalanced forces related to an object's motion?
16. What factors affect the force between two objects?
17. What is the difference between force, mass and motion?
18. What types of forces act on an object moving in a circular path?

19. What is energy?
20. How are energy, work and power related?
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CONTENT

Scientific Inquiry

-Search out, describe, explain, and predict natural phenomena.

Scientific Process Skills

-Questions, hypothesis, predictions, planning, observations, interpretations, and communication.

Scientific Literacy

-Speaking, listening, presenting, interpreting, reading, and writing about science.

-The motion of an object can be described by its position, direction of motion and speed.

-An unbalanced force acting on an object changes its speed and/or direction of motion.

-Objects moving in circles must experience force acting toward the center.

SKILLS

Students will be able to:

- Explain each step of the scientific method.
 - Explain what scientific inquiry involves.
 - Differentiate between a scientific theory and law.
 - Describe how to develop a hypothesis and design an experiment.
 - Use laboratory equipment and computers with proficiency.
 - Take accurate metric measurements.
 - Collect, organize, interpret and graph quantitative data.
 - Draw conclusions and communicate findings in oral and written form.
 - Calculate the average speed of a moving object.
 - Illustrate the motion of objects by graphing distance and time.
 - Identify the properties of force, mass and changes in motion.
 - Perform calculations related to force.
 - Describe the forces acting on an object moving in a circular path.
 - Begin Science Fair Project research and background information.
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ASSURED EXPERIENCES

-Students will conduct controlled scientific experiments, formulate a hypothesis, collect and interpret data, draw conclusions and communicate results.

- Discover Activity: How Fast and How Far?
- Graphing Motion and Math Practice Lab Activity
- Skills Lab: Inclined to Roll

- Discover Activity: Will You Hurry Up?
- Calculating Acceleration and Math Practice
- Skills Lab: Stopping on a Dime
- Discover Activity: Is the Force With You?
- Consumer Lab: Sticky Sneakers
- Analyzing Data: Free Fall
- Discover Activity: What Changes Motion?
- Try This Activity: Around and Around-Calculating Force
- Discover Activity: How Pushy Is a Straw?
- Try This Activity: Colliding Cars

-Begin Science Fair Project research

ASSESSMENTS

Rubric
Pre and post tests
Research papers
Lab reports
Student project
Portfolios
Journal
Prentice Hall Progress
Monitoring

OPTIONAL ACTIVITIES

- Design a rollercoaster on which objects freely move.
- Design an experiment that demonstrates balanced and unbalanced forces.
- At Home Activity: House of Cards

RESOURCES

United Streaming videos
-"Scientific Method and Measurements"
-"Science Investigations Physical Science: Investigating Motion, Forces and Energy"
-"The Physics of Motion"
-"Physical Sciences: Forces and Gravity"
-"Exploring the Laws of Motion"
-"The Blue Dragon: Slipping and Sliding"

Prentice Hall textbook: Motion, Forces and Energy
Chapters 1, 2, and 5
Prentice Hall: Guided Reading and Study Guides
Prentice Hall: Differentiated Instruction Guide

Websites:

www.phschool.com

www.harcourtschool.com

www.discoveryschool.com

VOCABULARY

Acceleration

Air resistance

Average speed

Balanced force

Centimeter

Centrifugal force

Centripetal force

Constant speed

Direction

Distance

Energy

Final speed

Fluid friction

Force

Free fall

Friction

Gravity

Inertia

Initial speed

Instantaneous speed

International System of Units

Law of Conservation of Energy

Law of Universal Gravitation

Mass

Meter

Momentum

Motion

Net force

Newton

Projectile

Reference point

Rise

Rolling friction

Run

Sliding friction

Slope

Speed

Static friction

Terminal velocity

Time

Unbalanced force

Velocity

Weight

Work

COURSE: **Science-Grade 8**

CONTACT: athompson@bridgeportedu.net or mcouncil@bridgeportedu.net

GRADE: 8

TIME FRAME: **2nd Marking Period**

PERFORMANCE STANDARDS

27.1 SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.

27.1.1.6.2 Students will read, interpret and examine the credibility of scientific claims in different sources of information.

27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.

27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.

27.1.1.6.6 Students will use mathematical operations to analyze and interpret the data.

27.1.1.6.7 Students will identify and present relationships between variables in appropriate graphs.

27.1.1.6.8 Students will draw conclusions and identify sources of error.

27.1.1.6.9 Students will provide explanations to investigated problems or questions.

27.1.1.6.10 Students will communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

27.2 SCIENCE - PHYSICAL SCIENCE (II,III,IV)

27.2.3.7.12 Students will explain the relationship between force, distance and work, and use the relationship ($W=F \times D$) to calculate work done in lifting heavy objects.

27.2.3.7.13 Students will explain how simple machines such as inclined planes, pulleys and levers are used to create mechanical advantage.

27.2.3.7.14 Students will describe how different types of stored (potential) energy can be used to make objects move.

27.5 SCIENCE - SCI & TECH IN SOCIETY (XI)

27.5.11.8.30 Students will explain how beam, truss and suspension bridges are designed to withstand the forces that act on them.

ESS/FOCUS QUESTIONS

1. What is an investigable question?
2. What are the different types of variables?
3. How is scientific data collected and organized?
4. How are graphs constructed in order to interpret data?
5. What is work and how is it measured?
6. How is force measured?
7. What is distance?
8. What is the relationship between force, distance and work?
9. What are the six kinds of simple machines?

10. How is ideal mechanical advantage measured?
 11. What is energy?
 12. What are the two basic kinds of energy?
 13. How are energy, work, and power related?
 14. What factors determine an object's mechanical advantage?
 15. What type of energy can be used to make objects move?
 16. How are different forms of energy related?
 17. What is the Law of Conservation of Energy?
 18. What is a common energy transformation?
 19. What is the difference between truss, beam, and suspension?
 20. How can a bridge be designed to withstand certain loads and destructive forces?
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CONTENT

Scientific Inquiry

-Search out, describe, explain, and predict natural phenomena.

Scientific Process Skills

-Questions, hypothesis, predictions, planning, observations, interpretations, and communication.

Scientific Literacy

-Speaking, listening, presenting, interpreting, reading, and writing about science.

Energy provides the ability to do work and can exist in many forms.

- Work is the process of making objects move through the application of force.
- Energy can be stored in many forms and can be transformed into the energy of motion.

In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.

-Bridges can be designed in different ways to withstand certain loads and potentially destructive forces.

SKILLS

- Explain each step of the scientific method.
- Explain what scientific inquiry involves.
- Differentiate between a scientific theory and law.
- Describe how to develop a hypothesis and design an experiment.
- Explain variables and interpret experimental data.
- Use laboratory equipment and computers with proficiency.
- Take accurate metric measurements.
- Collect, organize, interpret and graph quantitative data.
- Identify the six types of simple machines.
- Describe three ways that machines can make work easier.

- Demonstrate the use of simple machines.
 - Explain the relationship between work, force and distance.
 - Calculate work done by using the formula $W=FxD$.
 - Calculate mechanical advantage for each simple machine.
 - Construct a graph on the mechanical advantage of inclined planes.
 - Describe how different types of potential energy can be used to make objects move.
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ASSURED EXPERIENCES

- Prepare and finalize Science Fair Project
- Discover Activity: What Happens When You Pull at an Angle?
- Math Practice: Calculating Power
- Discover Activity: Is It a Machine?
- Try This Activity: Going Up
- Analyzing Data: Mechanical Advantage
- Math Practice: Calculating Efficiency
- Skills Lab: Seesaw Science
- Discover Activity: How Can You Increase Force?
- Try This Activity: A Paper Screw
- Build Inquiry: Assembling Pulleys
- At-Home Activity: Machines in the Kitchen
- Skills Lab: Angling for Access
- Skills Lab: Soaring Straws
- Interdisciplinary Exploration: Bridges-From Vines to Steel
- Interdisciplinary Exploration: The Structure of Modern Bridges
- Design, construct and test bridges.

ASSESSMENTS

- Science Fair Project
 - Rubric
 - Pre and post tests
 - Research papers
 - Lab reports
 - Student project
 - Portfolios
 - Journal
 - Prentice Hall Progress
 - Monitoring
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OPTIONAL ACTIVITIES

- Chapter Project: The Nifty Lifting Machine

RESOURCES

United Streaming videos:

- "Work, Energy, and the Simple Machine"

- "Work and Energy"

- "Slipping and Sliding"

- "Physical Science: Structures"

- Prentice Hall textbook: Motion, Forces and Energy
Chapters 4 and 5

- Prentice Hall: Guided Reading and Study Guides

- Prentice Hall Study Guides, Reviews and Assessments

- Prentice Hall: Differentiated Instruction Guide

- NSTA Magazine: Science Scope

- Websites:

www.phschool.com, www.harcourtschool.com, www.discoveryschool.com

VOCABULARY

Abutment	Law of Conservation of Energy
Arch bridge	Lever
Beam bridge	Load
Block and tackle	Machine
Bridge	Mechanical advantage
Bridge tower	Multiple transformations
Cable-stayed bridge	Newton
Compound machine	Output force
Distance	Output work
Efficiency	Potential energy
Energy	Power
Energy transformation	Pulley
First-Class lever	Screw
Force	Second-Class lever
Friction	Single transformations
Fulcrum	Span
Horsepower	Suspension bridge
Ideal mechanical advantage	Third-Class lever
Inclined plane	Time
Input force	Truss
Input work	Wedge
Joule	Weight
Kilowatt	Wheel and axle
Kinetic energy	Work

UNIT: **Properties of Elements, Chemical Building Blocks and Chemical Interactions**

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GRADE: 8

TIME FRAME: **3rd Marking Period**

PERFORMANCE STANDARDS

27.1 SCIENCE - SCIENTIFIC INQUIRY (I)

27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.

27.1.1.6.2 Students will read, interpret and examine the credibility of scientific claims in different sources of information.

27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.

27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.

27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.

27.1.1.6.6 Students will use mathematical operations to analyze and interpret the data.

27.1.1.6.7 Students will identify and present relationships between variables in appropriate graphs.

27.1.1.6.8 Students will draw conclusions and identify sources of error.

27.1.1.6.9 Students will provide explanations to investigated problems or questions.

27.1.1.6.10 Students will communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

27.2 SCIENCE - PHYSICAL SCIENCE (II,III,IV)

27.2.2.6.1 Students will describe the properties of common elements such as oxygen, hydrogen, carbon, iron and aluminum.

27.2.2.6.2 Students will describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.

27.2.2.6.3 Students will explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.

ESS/FOCUS QUESTIONS

1. What is matter?
2. What are the states of matter?
3. What kinds of properties are used to describe matter?
4. What is an atom?
5. What is the atomic theory and how has it evolved?
6. What is the structure of an atom?
7. What is an element?
8. What does the periodic table show about atoms and the properties of elements?
9. Why are elements called the building blocks of matter?
10. What is a metal?
11. What are the properties of metals such as iron, aluminum, gold and silver?

12. What is a nonmetal?
 13. What are the properties of nonmetals?
 14. What are the properties of nonmetals such as nitrogen, oxygen, carbon, iodine, sulfur and bromine?
 15. What is a gas?
 16. What is an inert or noble gas?
 17. What is a physical change?
 18. What is a chemical change?
 19. What is a mixture?
 20. What are the properties of a mixture?
 22. Explain how mixtures can be separated.
 23. What is a compound?
 24. What is density?
 25. What are the characteristics of a solution?
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CONTENT

Scientific Inquiry

-Search out, describe, explain, and predict natural phenomena.

Scientific Process Skills

-Questions, hypothesis, predictions, planning, observations, interpretations, and communication.

Scientific Literacy

-Speaking, listening, presenting, interpreting, reading, and writing about science.

Materials can be classified as pure substances or mixtures, depending on their chemical and physical properties.

-Mixtures are made of combinations of elements and/or compounds, and they can be separated by using a variety of physical means.

-Pure substances can be either elements or compounds, and they cannot be broken down by physical means.

SKILLS

-Explain each step of the scientific method and what scientific inquiry involves.

-Successfully perform the embedded task.

-Identify the properties used to describe matter.

-Describe the characteristics of solids, liquids, and gases.

-Explain the history of an atom and atomic structure.

-Identify and explain the parts of an atom.

-Interpret models of atoms and explain how these models are useful to scientists.

-Explain the importance of Dmitri Mendeleev's work.

-Explain the modern periodic table of elements.

-Identify the information that can be found in each square of the periodic table.

- Predict the properties of elements by their location in the periodic table.
- Describe how the organization of the periodic table is used to predict the properties of elements.
- Define elements and explain how they relate to compounds.
- Describe how the properties of simple compounds are different from the properties of the elements of which they are made.
- Describe the properties of elements such as hydrogen, oxygen, carbon, aluminum, and iron.
- Explain physical and chemical changes.
- Explain how mixtures can be separated by using the properties of the substances from which they made.
- Explain particle size, density, solubility, and boiling point.

ASSURED EXPERIENCES

- Embedded Tasks: Slipping and Sliding

- Discover Activity: What is a Mixture?
- Chapter Project: Models of Compounds
- Skills Lab: Making Sense of Density
- Discover Activity: Is a New Substance Formed?
- Discover Activity: Where Was the Energy?
- Discover Activity: What are Solids, Liquids, and Gases?
- Discover Activity: What Happens When You Breathe on a Mirror?
- Skills Lab: Melting Ice
- Discover Activity: Can You Graph Gas Behavior?
- Skills Lab: It's a Gas
- Discover Activity: Why Use Aluminum?
- Consumer Lab: Copper or Carbon? That Is the Question
- Discover Activity: What Are the Properties of Charcoal?
- Try This Activity: Show Me the Oxygen
- Discover Activity: Can Helium Be Made From Hydrogen?
- Skills Lab: Comparing Atom Sizes
- Analyzing Data: Temperature and Solubility
- Design Your Own Lab: Speedy Solutions
- Discover Activity: Can Water and Oil Mix?
- Discover Activity: What Happens When Chemicals React?
- Skills Lab: Where's the Evidence?
- Skills Lab: Making Sense of Density
- Discover Activity: Can You Speed Up or Slow Down a Reaction?

ASSESSMENTS

Embedded Task
 Science Fair Project
 Rubric

Pre and post tests
Research papers
Lab reports
Student project
Portfolios
Journal
Prentice Hall Progress
Monitoring

OPTIONAL ACTIVITIES

-Build and evaluate a prototype of a scientific tool or instrument.

RESOURCES

United Streaming videos:

- "Physical Science Elements"
- "Discovering the Elements"
- "Science Investigations-Physical Science-Investigating Chemical Properties"
- "Investigating Chemical Reactions"
- "Changes in the Properties of Matter-Physical and Chemical

-Prentice Hall textbooks: Chemical Building Blocks
Chemical Interactions

-Prentice Hall: Guided Reading and Study Guides

-Prentice Hall: Differentiated Instruction Guide

-Prentice Hall: CMT Practice Workbook and Content Review Guide

-Prentice Hall Textbook Study Guides, Reviews and Assessments

Websites:

<http://www.phschool.com>
www.discoveryschool.com
www.harcourtschool.com

VOCABULARY

Atom	Chemical reaction
Atomic mass	Chemistry
Atomic number	Closed system
Boiling point	Coefficient
Chemical	Combustion
Chemical bond	Compound
Chemical change	Conductivity
Chemical energy	Corrosion
Chemical formula	Density
Chemical property	Ductile

Ductile
Electron
Element
Endothermic reaction
Energy level
Exothermic reaction
Gas
Halogen
Liquid
Malleable
Matter
Melting point
Metalloid
Mixture
Molecular compound
Molecule
Neutron
Noble gas
Nucleus
Open system
Periodic table
Physical change
Physical property
Plasma
Proton
Quark
Reactant
Replacement
Solid
Solubility
Solute
Solution
Solvent
Sublimation
Substance
Symbol
Synthesis
Transition metal
Valence electrons

UNIT: **Carbon Compounds** MAP LEVEL: 4
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GRADE: 8
TIME FRAME: **4th Marking Period**

PERFORMANCE STANDARDS

27.1 SCIENCE - SCIENTIFIC INQUIRY (I)

- 27.1.1.6.1 Students will identify questions that can be answered through scientific investigation.
- 27.1.1.6.2 Students will read, interpret and examine the credibility of scientific claims in different sources of information.
- 27.1.1.6.3 Students will design and conduct appropriate types of scientific investigations to answer different questions.
- 27.1.1.6.4 Students will identify independent and dependent variables, and those variables that are kept constant, when designing an experiment.
- 27.1.1.6.5 Students will use appropriate tools and techniques to make observations and gather data.
- 27.1.1.6.6 Students will use mathematical operations to analyze and interpret the data.
- 27.1.1.6.7 Students will identify and present relationships between variables in appropriate graphs.
- 27.1.1.6.8 Students will draw conclusions and identify sources of error.
- 27.1.1.6.9 Students will provide explanations to investigated problems or questions.
- 27.1.1.6.10 Students will communicate about science in different formats, using relevant science vocabulary, supporting evidence and clear logic.

27.2 SCIENCE - PHYSICAL SCIENCE (II,III,IV)

- 27.2.2.9.13 Students will explain how the structure of the carbon atom affects the type of bonds it forms in organic and inorganic molecules.
 - 27.2.2.9.14 Students will describe combustion reactions of hydrocarbons and their resulting by-products.
 - 27.2.2.9.15 Students will explain the general formation and structure of carbon-based polymers, including synthetic polymers such as polyethylene and biopolymers such as carbohydrate.
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ESS/FOCUS QUESTIONS

1. What are the steps of the scientific method?
2. What is an investigable question?
3. What are the different types of variables?
4. How is scientific data collected and organized?
5. How are graphs constructed in order to interpret data?
6. What are the four forms of pure carbon?
7. How is carbon able to form a huge variety of compounds?
8. What are some properties of organic compounds?

9. What is a hydrocarbon?
 10. What are some properties of hydrocarbons?
 11. What are some characteristics of substituted hydrocarbons, esters, and polymers?
 12. What are the four main classes of organic compounds in living things?
 13. How are the organic compounds in living things different from one another?
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CONTENT

Scientific Inquiry

-Search out, describe, explain, and predict natural phenomena.

Scientific Process Skills

-Questions, hypothesis, predictions, planning, observations, interpretations, classifying and communication.

Scientific Literacy

-Speaking, listening, presenting, interpreting, reading, and writing about science.

Due to its unique chemical structure, carbon forms many organic and inorganic compounds.

- Carbon atoms can bond to one another in chains, rings and branching networks to form a variety of structures, including fossils fuels, synthetic polymers and the large molecules of life.

SKILLS

- What is an investigable question?
- What are the different types of variables?
- How is scientific data collected and organized?
- How are graphs constructed in order to interpret data?
- Investigate carbon bonding by making models.
- Identify carbon in food.
- Explain that structure influences function.
- Describe the function of carbon in living things and recognize that carbon is the basis of life.
- Identify the reasons why carbon can form many different compounds.
- Describe how carbon can form many different compounds.
- Describe three structures of carbon-based molecules.
- Explain how carbon-based molecules are designed for specific uses.
- Describe how a material's properties depend on its molecular structure.
- Collect, organize, interpret, and graph a nutrition label that shows calories, amount of fat, carbohydrates, and protein.
- Describe how plants, animals, and plastics are related to each other.
- Model the different carbon arrangements.
- Identify the 4 forms of pure carbon and describe their characteristics and properties.
- Differentiate between organic and inorganic compounds.
- Design models of hydrocarbons and describe their combustion reactions.

- Analyze data/graphs of the boiling points of hydrocarbons.
 - Explain the relationship between hydrocarbons, substituted hydrocarbons, esters, and polymers.
 - Describe what composites are made of.
 - Identify benefits and problems that relate to the use of synthetic polymers.
 - Construct a historical timeline of the development of polymers.
 - Demonstrate a simple lab experiment showing the presence of Vitamin C or design an experiment to find out if Vitamin C content of orange juice changes over time and temperature.
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ASSURED EXPERIENCES

- Chapter Project: Check Out the Fine Print
 - Discover Activity: Why Do Pencils Write?
 - Discover Activity: What Do You Smell?
 - Analyzing Data: Boiling Points of Hydrocarbons
 - Lab Zone Teacher Demo: Alcohol Solubility
 - Skills Lab: How Many Molecules?
 - Discover Activity: What Is in Milk?
 - Tech and Design in History: Advances in Organic Chemistry
 - Try This Activity: Alphabet Soup
 - Try This Activity: Like Oil or Water?
 - Writing in Science: Food Advertisements
 - Consumer Lab: Are You Getting Your Vitamins?
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ASSESSMENTS

Rubric
Pre and post tests
Research papers
Lab reports
Student project
Portfolios
Journal
Prentice Hall Progress Monitoring

OPTIONAL ACTIVITIES

- Science: Chemistry of Soap and Soapmaking
- Mathematics: A Year's Supply of Soap

RESOURCES

United Streaming Videos:

- "Elements of Chemistry: Carbon The Element of Life"
- "Physical Science: Elements"
- "The Elements"

- Prentice Hall textbooks: Chemical Interactions
Chapter 4

- Prentice Hall: Guided Reading and Study Guides

- Prentice Hall: Differentiated Instruction Guide

- Prentice Hall: CMT Practice Workbook and Content Review Guide

- Prentice Hall Textbook Study Guides, Reviews and Assessments

- NSTA magazine: Science Scope

Websites:

- <http://www.phschool.com>
- www.discoveryschool.com
- www.harcourtschool.com
- www.SciLinks.org

VOCABULARY

Alcohol

Amino acid

Carbohydrate

Carboxyl group

Cellulose

Cholesterol

Complex carbohydrate

Diamond

Double bonds

Ester

Fatty acid

Fullerene

Glucose

Graphite

Halogen

Hydrocarbon

Hydroxyl group

Isomer

Lipid

Monomer

Nanotube

Nucleic Acid

Nucleotide

Organic acid

Organic compound

Polymer

Protein

Saturated hydrocarbon

Simple carbohydrate

Starch

Structural formulas

Substituted hydrocarbon

Triple bonds

Unsaturated hydrocarbon