The Department of Juvenile Justice

8th Grade Physical Science

Units of Instruction Resource Manual

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**Acknowledgements**

The Georgia Department of Juvenile Justice Department of Education would like to thank the many educators who have helped to create this 8th Grade Physical Science Units of Instruction Resource Manual. The educators have been particularly helpful in sharing their ideas and resources to ensure the completion and usefulness of this manual.

Students served by the DJJ require a special effort if they are to become contributing and participating members of their communities. Federal and state laws, regulations, and rules will mean nothing in the absence of professional commitment and dedication by every staff member.

The Georgia Department of Juvenile Justice is very proud of its school system. The school system is Georgia’s 181st and is accredited by the Southern Association of Colleges and Schools (SACS). The DJJ School System has been called exemplary by the US Department of Justice. This didn’t just happen by chance; rather it was the hard work of many teachers, clerks, instructors and administrators that earned DJJ these accolades and accreditations. The DJJ education programs operate well because of the dedicated staff. These dedicated professionals are the heart of our system.

These Content Area Units of Instruction were designed to serve as a much needed tool for delivering meaningful whole group instruction. In addition, this resource will serve as a supplement to the skills and knowledge provided by the Georgia Department of Juvenile Justice Curriculum Activity Packets (CAPs).

I would like to thank all the DJJ Teaching Staff, the Content Area Leadership Teams, Kimberly Harrison, DJJ Special Education/Curriculum Consultant and Martha Patton, Curriculum Director for initiating this project and seeing it through. Thank you all for your hard work and dedication to the youth we serve.

Sincerely yours,

James “Jack” Catrett, Ed.D.

Associate Superintendent

**Mission**

The mission of Department of Juvenile Justice Science Consortium (DJJSC) is to build a multiparty effort statewide to achieve continuous, systemic and sustainable improvements in the education system serving the Science students of the Department of Juvenile Justice (DJJ).

**Vision**

To achieve the mission of the DJJSC, members work collaboratively in examining the Georgia Performance Standards. These guidelines speak specifically to teachers being able to: deliver meaning content pertaining to the Characteristics of Science and its content standards across the Science units of instruction. The DJJSC will master and develop whole-group unit lessons built around Curriculum Activity Packets (CAPs), critique student work, and work as a team to solve the common challenges of teaching within DJJ. Additionally, the DJJSC jointly analyzes student test data in order to: develop strategies to eradicate common academic deficits among students, align curriculum, and create a coherent learning pathway across grade levels. The DJJSC also reviews research articles, attends workshops or courses, and invites consultants to assist in the acquisition of necessary knowledge and skills. Finally, DJJSC members observe one another in the classroom through focus walks.

**Introduction**

The 8th Grade Physical Science Units of Instruction Resource Manual is a tool that has been created to serve as a much needed tool for delivering meaningful whole group instruction. This manual is a supplement to the skills and knowledge provided by the Georgia Department of Juvenile Justice Curriculum Activity Packets (CAPs). It is imperative that our students learn to identify and investigate problems scientifically, and to work in cooperative learning groups. Best practices in education indicate that teachers should first model new skills for students. Next, teachers should provide opportunities for guided practice. Only then should teachers expect students to successfully complete an activity independently. The 8th Grade Physical Science Units of Instruction meets that challenge.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | **The Georgia Department of Juvenile Justice**  **Office of Education**  **Direct Instruction Lesson Plan** | | |
| Teacher: | | | | |
| Subject:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date:\_\_\_\_\_\_\_\_\_\_\_\_\_to­\_\_\_\_\_\_\_\_\_\_\_­­\_\_\_\_\_\_\_  Period  □ 1st  □ 2nd  □ 3rd  □ 4th  □ 5th  □ 6th | | | Students will engage in:  □ Independent activities □ pairing  □ Cooperative learning □ hands-on  □ Peer tutoring □ Visuals  □ technology integration □ Simulations  □ a project □ centers  □ lecture □ Other | |
| Essential Question(s):  Standards:  CAPs Covered:  Grade Level:\_\_\_\_ Unit:\_\_\_\_\_\_  RTI Tier for data collection: 2 or 3  Tier 2 Students:  Tier 3 Students: | | | | |
| **Time** | **Procedures Followed:** | | | **Material/Text** |
| \_\_\_\_\_\_\_  Minutes | Review of Previously Learned Material/Lesson Connections:  Recommended Time: 2 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Display the Georgia Performance Standard(s) (project on  blackboard via units of instruction located at  <http://thevillage411.weebly.com/units-of-instruction2.html>, or print on blackboard) Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.  Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard). Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.  Recommended Time: 2 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Introduce task by stating the purpose of today’s lesson.  Recommended Time: 2 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Engage students in conversation by asking open ended questions related to the essential question(s).  Recommended Time: 2 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Begin whole group instruction with corrective feedback:  Recommended Time: 10 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Lesson Review/Reteach:  Recommended Time: 2 Minutes | | |  |
| \_\_\_\_\_\_\_  Minutes | Independent Work CAPs:  Recommended Time: 30 Minutes | | |  |
| Teacher Reflections: | | | | |

The Instructional Rotation Matrix has been designed to assist science teachers in providing a balanced approach to utilizing the Science Units of Instruction across all grade levels on a rotating schedule.

|  |  |  |  |
| --- | --- | --- | --- |
| Monday | Tuesday | Wednesday | Thursday |
| 6th Grade Content  Middle School | 9th Grade Content  High School | 7th Grade Content  Middle School | 10th Grade Content  High School |
| 8th Grade Content  Middle School | 11th Grade Content  High School | 6th Grade Content  Middle School | 12th Grade Content  High School |
| 7th Grade Content  Middle School | 9th Grade Content  High School | 8th Grade Content  Middle School | 10th Grade Content  High School |
| 6th Grade Content  Middle School | 11th Grade Content  High School | 7th Grade Content  Middle School | 12th Grade Content  High School |

**Georgia Performance Standards**

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

a. Understand the importance of—and keep—honest, clear, and accurate records in science.

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations.**

a. Follow correct procedures for use of scientific apparatus.

b. Demonstrate appropriate techniques in all laboratory situations.

c. Follow correct protocol for identifying and reporting safety problems and violations.

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents.

b. Find the mean, median, and mode and use them to analyze a set of scientific data.

c. Apply the metric system to scientific investigations that include metric to metric conversions (i.e., centimeters to meters).

d. Decide what degree of precision is adequate, and round off appropriately.

e. Address the relationship between accuracy and precision.

f. Use ratios and proportions, including constant rates, in appropriate problems.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

b. Use appropriate tools and units for measuring objects and/or substances.

c. Learn and use standard safety practices when conducting scientific investigations.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

a. Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines.

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS7. Students will question scientific claims and arguments effectively.**

a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.

b. Identify the flaws of reasoning in arguments that are based on poorly designed research (e.g., facts intermingled with opinion, conclusions based on insufficient evidence).

c. Question the value of arguments based on small samples of data, biased samples, or samples for which there was no control.

d. Recognize that there may be more than one way to interpret a given set of findings.

**S8CS8. Students will be familiar with the characteristics of scientific knowledge and how it is achieved.**

a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

d. Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.

e. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

g. The ethics of science require that special care must be taken and used for human subjects and animals in scientific research. Scientists must adhere to the appropriate rules and guidelines when conducting research.

**S8CS10. Students will enhance reading in all curriculum areas by:**

a. Reading in All Curriculum Areas

• Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.

• Read both informational and fictional texts in a variety of genres and modes of discourse.

• Read technical texts related to various subject areas.

b. Discussing books

• Discuss messages and themes from books in all subject areas.

• Respond to a variety of texts in multiple modes of discourse.

• Relate messages and themes from one subject area to messages and themes in another area.

• Evaluate the merit of texts in every subject discipline.

• Examine author’s purpose in writing.

• Recognize the features of disciplinary texts.

c. Building vocabulary knowledge

• Demonstrate an understanding of contextual vocabulary in various subjects.

• Use content vocabulary in writing and speaking.

• Explore understanding of new words found in subject area texts.

d. Establishing context

• Explore life experiences related to subject area content.

• Discuss in both writing and speaking how certain words are subject area related.

• Determine strategies for finding content and contextual meaning for unknown words

**S8P1. Students will examine the scientific view of the nature of matter.**

a. Distinguish between atoms and molecules.

b. Describe the difference between pure substances (elements and compounds) and mixtures.

c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

g. Identify and demonstrate the Law of Conservation of Matter.

**S8P2. Students will be familiar with the forms and transformations of energy.**

a. Explain energy transformation in terms of the Law of Conservation of Energy.

b. Explain the relationship between potential and kinetic energy.

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

d. Describe how heat can be transferred through matter by the collisions of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).

**S8P3. Students will investigate relationship between force, mass, and the motion of objects.**

a. Determine the relationship between velocity and acceleration.

b. Demonstrate the effect of balanced and unbalanced forces on an object in terms of gravity, inertia, and friction.

c. Demonstrate the effect of simple machines (lever, inclined plane, pulley, wedge, screw, and wheel and axle) on work.

**S8P4. Students will explore the wave nature of sound and electromagnetic radiation.**

a. Identify the characteristics of electromagnetic and mechanical waves.

b. Describe how the behavior of light waves is manipulated causing reflection, refraction diffraction, and absorption.

c. Explain how the human eye sees objects and colors in terms of wavelengths.

d. Describe how the behavior of waves is affected by medium (such as air, water, solids).

e. Relate the properties of sound to everyday experiences.

f. Diagram the parts of the wave and explain how the parts are affected by changes in amplitude and pitch.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

c. Investigate and explain that electric currents and magnets can exert force on each other.

Curriculum Map

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DJJ 8th Grade Physical Science  Georgia Performance Standards:  Curriculum Map | | | | | | | | | | | | | |
| **1st Semester** | | | | | | | | **2nd Semester** | | | | | |
| **Introduction to Matter** | | **Motion and Forces** | | **Work, Machines, and Energy** | | **The Atom** | | **Interactions of Matter** | | **Electricity** | | **Waves, Sounds, and Light** | |
| **Chapter**  1 | **CAPs**  1-3 | **Chapter**  5 | **CAPs**  13-15 | **Chapter**  8 | **CAPs**  22-24 | **Chapter**  11 | **CAPs**  31-32 | **Chapter**  13 | **CAPs**  35-38 | **Chapter**  17 | **CAPs**  47-49 | **Chapter**  20 | CAPs  57-59 |
| 2 | 4-5 | 6 | 16-18 | 9 | 25-27 | 12 | 33-34 | 14 | 39-41 | 18 | 50-52 | 21 | 60-62 |
| 3 | 6-8 | 7 | 19-21 | 10 | 28-30 |  |  | 15 | 42-44 | 19 | 53-56 | 22 | 63-65 |
| 4 | 9-12 |  |  |  |  |  |  | 16 | 45-46 |  |  | 23 | 66-68 |
| **GPS:**  S8CS1b,  S8CS3a,e  S8CS9a,b,c,f  S8P2.c  S8CS5b  S8CS8b,c  S8CS4a,b,c  S8CS6a,b,c  S8P1b,c,d,e  S8CS7.a: | | **GPS:**  S8CS3.b  S8CS4a,b  S8CS6a,b,c  S8CS9b,c,f  S8P3a,b  S8P5.a  S8CS7a,b  S8CS1.b:  S8P1c,d | | **GPS:**  S8CS1a,b  S8CS4.b  S8CS6b,c  S8CS9b  S8P3c  S8CS3a,b  S8CS5a  S8P2a,b.c,d  S8P1c,e | | **GPS:**  S8CS1b  S8CS6b,c  S8CS8b,c  S8CS9a,b  S8CS5b  S8P1f  S8P5a  S8P1d,f  S8P2d | | **GPS:**  S8CS5a,b  S8CS6b  S8P1a,d,e,f,g  S8P5b  S8P2c  S8CS4b  S8CS9b,c  S8CS1a,b  S8CS3f  S8CS8a,b,c | | **GPS:**  S8CS2  S8CS4a,b  S8CS9a,b,c,f,d  S8P1  S8P5a,b,c  S8CS6b,c  S8CS3f  S8CS5b  S8P2 | | **GPS:**  S8P4a,b,d,e,f  S8CS1b  S8CS9a,c,d,f  S8CS2c  S8CS6a,b,c  S8CS7b,a  S8CS3f  S8P5  S8CS5 | |
| **Focus CAPs:**  3,5,8,12 | | **Focus CAPs:**  15,18,21 | | **Focus CAPs:**  24,27,30 | | Focus CAPs:  32,34 | | **Focus CAPs:**  38,41,44,46 | | **Focus CAPs:**  49,52,56 | | **Focus CAPs:**  59,62,65,68 | |

**Enduring Understandings & Essential Questions**

**Introduction to Matter**

**Enduring Understandings:**

Matter can neither be created nor destroyed but can be changed from one form to another.

Matter can be described by its physical and chemical properties.

Materials (pure substances and mixtures) selected for making sports equipment are based on their properties like elasticity, strength, consistency, etc.

Energy can exist in two forms: stored, called potential energy, or when it is associated with motion, called kinetic energy.

Energy is neither created nor destroyed, but it can be transformed from one form to another.

Objects change their motion only when a net force is applied.

Balanced forces result in an object remaining at rest or moving at constant velocity.

Acceleration occurs when there is a change in velocity.

Every object exerts a gravitational force on every other object.

The force of gravity between two objects depends on their mass and the distance between them.

When an unbalanced force acts on an object, the greater the mass of the object, the smaller its acceleration.

Friction is the force that opposes motion when one object comes in contact with another.

Simple machines are all around us and can make work easier to perform. S

**Essential Questions:**

What are scientific methods?

How are scientific questions used to answer questions?

How is a hypothesis formed and tested?

What are the two properties of all matter?

What unit of measurement is used to measure matter?

What is the relationship between mass and inertia?

What are three factors that affect how gases behave?

How can a change in pressure affect the volume of gas?

How is energy involved in changes of state?

What two changes take place when a substance loses or gains energy?

**Motion and Forces**

**Enduring Understandings:**

Energy is neither created nor destroyed; it can be transformed from one form to another.

Waves carry energy.

Mechanical waves are created when a source of energy causes a medium to vibrate.

Waves can change direction (refract, diffract, and/or reflect) when they encounter matter.

The energy of the wave changes as it travels from one medium to another.

The wavelength and amplitude determines the characteristics of waves.

The pitch of a sound wave is related to its frequency and its intensity is related to its amplitude.

The characteristics of waves are affected by the type of medium.

The colors observed by the eye are the result of the multiple wavelengths reflected by the object.

**Essential Questions:**

How do you know when you are moving?

What is the relationship between velocity and acceleration?

What is force?

What affect does force have on objects?

In what ways can unbalanced forces cause change in motion?

How is projectile force motion affected by gravity?

What effect does gravity and air resistance have on falling objects?

What is Newton’s first law of motion?

How does Newton’s first law of motion relate to objects at rest and objects in motion?

What is Newton’s second law of motion?

**Work, Machines, and Energy**

**Enduring Understandings:**

Energy appears in different forms such as mechanical energy, gravitational energy, heat eergy, and electric and magnetic energy.

Energy cannot be created or destroyed, but only changed from one form into another.

Transformations of energy usually release some energy typically in the form of heat.

Temperature changes as heat is transferred from a hotter object to a colder one.

Heat transfer occurs by conduction, convection, or radiation.

Electric forces arise from the presence of an unbalance in electric charge.

Magnetic forces arise from the movement of electrical charge.

An electric circuit allows electrons to flow from a negative pole (excess electrons) to a positive pole (deficient in electrons).

Series and parallel circuits can be used to control the amount of electric energy produced.

Every object exerts gravitational force on every other object. The force depends on the mass of the objects and the distance

**Essential Questions:**

What is the difference between work and power?

How can you calculate the amount of work being done on an object?

How can you determine when work is being done on an object?

What is the relationship between energy and work?

What is the difference between kinetic energy and potential energy?

What are the different forms of energy?

How is energy conserved within a closed system?

How do the laws of conservation and energy work?

Why is thermal energy always the result of energy conversion?

How can you use specific heat capacity to calculate heat?

What are the three methods of heating objects?

What are the differences between temperature, thermal energy, and heat?

**The Atom**

**Enduring Understandings:**

Energy appears in different forms such as mechanical energy, gravitational energy, heat energy, and electric and magnetic energy.

Energy cannot be created or destroyed, but is only changed from one form into another.

Every object exerts gravitational force on every other object.

The force depends on the mass of the objects and the distance between them.

Transformations of energy usually release some energy typically in the form of heat.

Heat energy results due to the disorderly motion of molecules.

Temperature changes as heat gets transferred.

Heat transfer occurs by conduction, convection, or radiation.

Velocity is speed in a particular direction and can be written as a positive or negative number.

Acceleration is how fast velocity changes and can be written as a positive or negative number.

Balanced forces result in an object remaining at rest or moving at constant velocity.

Simple machines are all around us, they reduce the effort to do work.

**Essential Questions:**

How has the atomic theory changed over decades?

What are the parts of an atom?

What is known about the particles inside the atom?

How is the relationship between numbers of protons and neutrons and atomic number?

How did Mendeleev arrange the elements in the first periodic table?

What is the difference between a period and a group?

How are elements arranged in the modern periodic table?

**Interactions of Matter**

**Enduring Understanding:**

Materials (pure substances and mixtures) selected for making sports equipment are based on their properties like elasticity, strength, consistency, etc.

Energy can exist in two forms: stored, called potential energy, or when it is associated with motion, called kinetic energy.

Energy is neither created nor destroyed, but it can be transformed from one form to another.

Objects change their motion only when a net force is applied.

Balanced forces result in an object remaining at rest or moving at constant velocity.

Acceleration occurs when there is a change in velocity.

Every object exerts a gravitational force on every other object.

The force of gravity between two objects depends on their mass and the distance between them.

When an unbalanced force acts on an object, the greater the mass of the object, the smaller its acceleration.

Friction is the force that opposes motion when one object comes in contact with another.

Simple machines are all around us and can make work easier to perform.

**Essential Questions:**

What is chemical bonding?

What role does the electron play in the formation of chemical bonds?

How do chemical reactions produce new substances that have different chemical and physical properties?

What are four signs that may indicate that a chemical reaction may be taking place?

What are the properties of ionic and covalent compounds?

What is nuclear fission?

What are the advantages and disadvantages of fission?

What is nuclear fission?

What are the advantages and disadvantages of nuclear fission?

**Electricity**

**Enduring Understanding:**

Electricity is energy that flows through circuits to power devices. A home can be wired using series and parallel circuits.

The larger the energy source, the greater the output. (e.g. Conductors allow energy to move, while insulators inhibit the movement of energy flow).

Energy has a source and can be distributed by various mediums and can undergo either a physical or chemical change. (e.g. Electrical energy has a source, is carried by wires, and is converted into heat, light, or motion).

All forms of energy involve a system that is capable of transferring or transforming energy.

A written plan must be followed in the correct sequence to make sure it is done in the same way each time.

**Essential Questions:**

How do charged objects interact by using the law of electric charges?

What are three ways an object can become charged?

What are two examples of static electricity and electric discharge?

What is electric current?

What is the relationship between resistance and electric charge?

How can a cell generate electrical energy?

What are the properties of magnets?

Why are some materials magnetic?

What makes the earth a giant magnet?

What are the basic functions of a computer?

How can information be stored on CD-Rs and CD-RWs?

What is a computer network?

**Waves, Sound, and Light**

**Enduring Understanding:**

Wavelength and amplitude determine the characteristics of waves.

Energy is neither created nor destroyed; it can be changed from one form to another.

Waves carry energy.

Mechanical waves are created when a source of energy causes a medium to vibrate.

The pitch of a wave is related to its frequency and its intensity is related to its amplitude.

**Essential Questions:**

What are wave properties?

How is frequency and wavelength related to the speed of a wave?

How does vibration cause sound?

How is sound transmitted through a medium?

How does the speed of sound work in different media?

How are frequency and pitch related?

How are amplitude and loudness related?

What are the parts of the human eye?

What are three common vision problems?

What is surgical eye correction?

**Introduction to Matter**

**Georgia Performance Standards**

**S8CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.**

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

a. Analyze scientific data by using, interpreting, and comparing numbers in several

c. Apply the metric system to scientific investigations that include metric to metric conversions (i.e., centimeters to meters).

**S8CS9. Students will understand the features of the process of scientific inquiry.**

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

**S8P2. Students will be familiar with the forms and transformations of energy.**

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8CS8. Students will be familiar with the characteristics of scientific knowledge and how it is achieved.**

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

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c. Learn and use standard safety practices when conducting scientific investigations.

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a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8P1. Students will examine the scientific view of the nature of matter.**

b. Describe the difference between pure substances (elements and compounds) and mixtures.

c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

**S8CS7. Students will question scientific claims and arguments effectively.**

a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.

**Task: 1**

**Essential Question(s):**

What are scientific methods?

How are scientific questions used to answer questions?

How is a hypothesis formed and tested?

**Resources:**

[How is a controlled experiment performed Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E16/E16.html)

[Scientific Explanations Concept Lesson](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::248::/sites/dl/free/007877846x/164155/634_Fig_2.swf::Scientific%20Explanations)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The World of Physical Science: Scientific Method p.12

8. Engage students in conversation by asking students the following question: How can you prove the world is not flat? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How is a controlled experiment performed Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E16/E16.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [How is a controlled experiment performed Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E16/E16.html) as a whole group activity. Students will complete the journal activity independently.

**Task: 2**

**Essential Question(s):**

What are the two properties of all matter?

What unit of measurement is used to measure matter?

What is the relationship between mass and inertia?

**Resources:**

[Measuring Matter Virtual Video Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078617049/161752/00076709.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

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5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Properties of Matter: What is Matter? P.38

8. Engage students in conversation by asking students the following question: What are some of the ingredients or components of the following items: loaf of bread, a textbook, and a bicycle? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

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**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Measuring Matter Virtual Video Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078617049/161752/00076709.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

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**Activity**

Quick lab

The teacher and Students will complete the Space Case Lab p.39

Procedures

1. Crumble a piece of paper. Fit it tightly in the bottom of a clear plastic cup so that it won’t fall out.
2. Turn the cup upside down. Lower the cup straight down into a bucket half-filled with water. Be sure that the cup is completely underwater.
3. Lift the cup straight out of the water. Turn the cup upright, and observe the paper. Record your observations.
4. Use the point of a pencil to punch a small hole in the bottom of the cup. Repeat steps 2 and 3.
5. How do the results show that air has volume? Explain your answer.

**Task: 3**

**Essential Question(s):**

What are three factors that affect how gases behave?

How can a change in pressure affect the volume of gas?

**Resources:**

[Behavior of Gases Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS08/PS08.html)

**Teacher’s Place:**

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4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Properties of Matter: Behavior of Gases p.70

8. Engage students in conversation by asking students the following question: What gas is used in a balloon to make it float in the air? Then, ask the students if they have ever seen a hot-air balloon floating in the sky. Ask them to give an explanation as to why they think the balloon can fly with only air init and not helium. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Behavior of Gases Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS08/PS08.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete [Behavior of Gases Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS08/PS08.html) as

a whole group activity. Students will work in cooperative learning groups to complete the journal activity.

**Task: 4**

**Essential Question(s):**

How is energy involved in changes of state?

What two changes take place when a substance loses or gains energy?

**Resources:**

[**How does thermal energy affect the state of a substance virtual lesson**](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E17/E17.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

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4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. States of Matter: Changes in State p. 74

8. Engage students in conversation by asking students the following question: What must be done to liquid water to change it to ice or to change it to steam? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [**How does thermal energy affect the state of a substance virtual lesson**](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E17/E17.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

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**Activity**

The teacher and students will complete the [**How does thermal energy affect the state of a substance virtual lesson**](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E17/E17.html)as a whole group activity. Students will complete the journal activity independently.

**Motion and Forces**

**Georgia Performance Standards**

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

b. Find the mean, median, and mode and use them to analyze a set of scientific data.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

b. Use appropriate tools and units for measuring objects and/or substances.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

**S8P3. Students will investigate relationship between force, mass, and the motion of objects.**

a. Determine the relationship between velocity and acceleration.

b. Demonstrate the effect of balanced and unbalanced forces on an object in terms of gravity, inertia, and friction.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

**S8CS7. Students will question scientific claims and arguments effectively.**

a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.

b. Identify the flaws of reasoning in arguments that are based on poorly designed research (e.g., facts intermingled with opinion, conclusions based on insufficient evidence).

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8P1. Students will examine the scientific view of the nature of matter.**

c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

**Task: 1**

**Essential Question(s):**

How do you know when you are moving?

What is the relationship between velocity and acceleration?

**Resources:**

<http://footballphysics.utk.edu/equipment.htm>

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

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2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Matter in Motion: Measuring Motion p.118

8. Engage students in conversation by asking students the following questions: What factors affect the speed of falling objects? How can you demonstrate velocity and acceleration using a football field or open area that has been measured off in distance increments? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing <http://footballphysics.utk.edu/equipment.htm>

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activities**

**Activity 1**

The teacher and students will complete start up activity The Domino Derby.

(p. 117 of the text book)

Speed is the distance traveled by an object in a certain amount of time. In this activity, the teacher will instruct students to observe one factor that affects the speed of falling dominoes.

**Procedure**

1. Set up 25 dominoes in a straight line. Try to keep equal spacing between the dominoes.

2. Use a meter stick to measure the total length of the row of dominos, and record the length.

3. Use a stop watch to time how long it takes for the dominoes to fall. Record this measurement.

4. Predict what would happen to that amount of time if you changed the distance between the dominoes. Write your prediction.

5. Repeat steps 2 and 3 a couple of times using different distances between the dominoes that are smaller and larger that the distance used in your first setup. Use the same number of dominoes in each trial.

**Analysis**

1. Calculate the average speed for each trial by dividing the total distance by the time the dominoes take to fall.
2. How did the spacing between dominoes affect the average spee? Is the result what you expected? If not explain.

**Activity 2**

The teacher and students will use this web based activity as a whole group activity to introduce students to the concepts of the standards. While viewing this activity as a class, the teacher may divide students into small groups to allow students to complete the interactive lesson and questions for each segment of the video.

<http://footballphysics.utk.edu/equipment.htm>

You are taking your team to football camp. In order to build a winning team, not only do they need to be in optimum physical condition, but they need to understand the physics of the game, specifically the concepts of velocity, acceleration, and force. You are going to have them view some video tapes and analyze these tapes in order to understand the physics of football, and apply these concepts on the field. Brains as well as brawn are important if you want a winning team, and you plan to take yours all the way to the State Championships!

First, go to the home page and watch the introductory video. We will be attending the training camp, so next, click on *Training Camp*, which is the following link:

[http://footballphysics.utk.edu/more.htm](http://footballphysics.utk.edu/more.htm%20)

**A. Velocity**

1. How would you describe the meaning of the words ‘speed’ and ‘velocity’?

2. Click on the tab *Amateur* for Speed and velocity.

What are typical speeds of players on the field?

How fast are they running?

Click the " <http://footballphysics.utk.edu/speed/speed1.asp>" button to make some measurements.

By clicking on *Clip 1, Clip 2*, and *Clip 3*, you can actually calculate the speed of a player by collecting the time as he travels across the football field using the yard lines as the measurement for the distance. Use the *Step Up* icon to slow down the players so you can see them move in slow motion and to start and stop the time.

Record your data in a table.

3. What is a player's velocity?

Next click the <http://footballphysics.utk.edu/speed/speed1a.asp> button. Work through animations 1, 2 and 3. Measure velocities, and do not forget direction. Make sure you check your answers and ask questions if you are incorrect and do not understand why.

4. Physics gets interesting when velocities change.

Click the <http://footballphysics.utk.edu/speed/vchange.asp> button to watch 3 video clips and determine if the velocity of a player is changing.

Take the quiz for *Animations 1, 2 and 3*. Notice that there are two questions. The first question is for speed, and the second question is for velocity.

What do we call a changing velocity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**B. Acceleration**

1. Acceleration can be:

a.

b.

c.

2. Why are we interested in acceleration? Under the blue *Practice* button,

click the <http://footballphysics.utk.edu/acceleration/acceleration2.htm>

How do you get a football player to move?

3. Whenever there is acceleration, there must be a \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ involved.

4. If you really enjoy acceleration, you can do the animations and watch the football videos and see the direction of acceleration!

C. Force

1. What is a force?

Click on the Amateur icon for Force.

2. Click on Players and Forces. List some examples of forces being exerted on each other.

3. Can a player exert a force on himself? Why or why not? Explain.

Click on Interactions. What is Newton’s Third Law, and how does it apply to football and forces?

So, why do some players fall over and others do not?

4. If \_\_\_\_\_\_\_\_\_\_\_\_\_\_ forces cause acceleration, what kind of force results in an object staying at rest? Click on F=ma. A larger mass produces a (larger, smaller) acceleration. Can you provide an example?

5. Click on Net Force. In diagram one at the top of the page. Are balanced or unbalanced forces acting on the ball? In the diagram to the bottom left, are balanced or unbalanced forces acting on number 11? In the diagram to the bottom right, player number 11 is standing still. Are balanced or unbalanced forces acting on him?

6. We have come to the conclusion that unbalanced forces produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and balanced forces will result in an object remaining at rest. Which one of these types of force will keep an object moving at a constant velocity?

**Task: 2**

**Essential Question(s):**

What is force?

What affect does force have on objects?

In what ways can unbalanced forces cause change in motion?

**Resources:**

Bikes as Simple Machines Virtual lesson

<http://library.thinkquest.org/J002670/parts.htm>

The Sport of Bicycling Mr. Fizzix Virtual lesson

<http://physicsofbicycling.homestead.com/index.html>

Machines Make Life Easier Virtual lesson

<http://www.schools.utah.gov/curr/science/sciber00/8th/machines/sciber/intro.htm>

**Teacher’s Place:**

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2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Matter in Motion: What is a Force? P.124

8. Engage students in conversation by asking students the following question: How do you determine the net force on an object if all forces act in the same direction? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing

<http://physicsofbicycling.homestead.com/index.html>

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will use this web based activity as a whole group activity to introduce students to the concept of bicycles as simple machines. While viewing this activity as a class, the teacher may divide students into small groups to allow students to complete the activity by answering the questions below.

<http://physicsofbicycling.homestead.com/index.html>

1. Explain the role of gravity when riding a bicycle.

2. Explain how friction is useful to bicyclers in a race.

3. If you were going to buy a bicycle for racing, what type of material would you want your frame to be made of and why?

4. Explain the role of friction in the brakes.

Part II

The teacher and students will use this web based activity as a whole group activity to introduce students to the concept of bicycles as simple machines. While viewing this activity as a class, the teacher may divide students into small groups to allow students to complete the activity by answering the questions below.

<http://library.thinkquest.org/J002670/parts.htm>

1. How can a force produce motion on a bicycle?

2. What do a bike and a gyroscope have in common?

3. What is inertia? Explain the concept.

4. Would you ride your bike on ice? Why or why not? (Explain your answer in terms of friction.)

**Task: 3**

**Essential Question(s):**

How is projectile force motion affected by gravity?

What effect does gravity and air resistance have on falling objects?

**Resources:**

[Amusement Park Physics](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://www.learner.org/exhibits/parkphysics/)

[Kinetic and Potential Energy](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://library.thinkquest.org/2745/data/ke.htm)

[Build a Roller Coaster](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://dsc.discovery.com/games/coasters/interactive.html)

[Forces and Motion Quiz](http://go.hrw.com/activities/frameset.html?main=2404.html)

**Teacher’s Place:**

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4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Forces in Motion: Gravity and Motion p. 150

8. Engage students in conversation by asking students the following question: Suppose you dropped a baseball and a marble at the same time from the top of a tall building. Which do you think would land on the ground first? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10.Guide students into the activity utilizing [Amusement Park Physics](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://www.learner.org/exhibits/parkphysics/) and [Kinetic and Potential Energy](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://library.thinkquest.org/2745/data/ke.htm)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will use this web based activity as a whole group activity to introduce students to the concept of gravity and motion by building a virtual roller coaster ride. While viewing this activity as a class, the teacher may divide students into small groups to allow students to complete a visual model of the class virtual roller coaster.

[Rollercoaster Creator](http://www.playsushi.com/PremiumGame_Rollercoaster_Creator_141) or [Build a Roller Coaster](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://dsc.discovery.com/games/coasters/interactive.html)

As the chief design engineer for a new theme park on your centers campus, you must ensure that all rides and attractions are the biggest, fastest, tallest, safest, and most thrilling in the world. Your latest assignment is to design the world’s fastest roller coaster. The roller coaster must have one loop and two hills. Your first task is to build a model for the roller coaster. If the design is sound, the model will serve as the prototype for a new roller coaster called The Village 411 Express. The park owner and visitors expect The Village 411 Express to be the main attraction at the theme park’s grand opening next year.

**Task: 4**

**Essential Question(s):**

What is Newton’s first law of motion?

How does Newton’s first law of motion relate to objects at rest and objects in motion?

What is Newton’s second law of motion?

**Resources:**

[Newton's Laws of Motion Virtual lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078785337/161752/00035803.html)

[Motion and Forces Interactive Learning Activity](http://www.glencoe.com/sec/science/activities/scivoyxwords/nab3/NAB307.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Forces and Motion: Newton’s Law of Motion p.158

8. Engage students in conversation by asking students to imagine that they are playing baseball. The pitch comes in, and they hit the ball hard! But instead of flying off the bat, the ball just drops to the ground. Is that normal? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Newton's Laws of Motion Virtual lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078785337/161752/00035803.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

Complete Quick Lab p. 160

First-Law of Motion

1. On a table or desk, place a large, empty plastic cup on top of a paper towel.
2. Without touching the cup or tipping it over, remove the paper towel from under the cup. How did you accomplish this? Repeat this step.
3. Fill the cup half full with water, and place the cup on the paper towel.
4. Once again, remove the paper towel from under the cup. Was it easier or harder to do this time?
5. Explain your observations in terms of mass, inertia, and Newton’s first law of motion.

**Work, Machines, and Energy**

**Georgia Performance Standards**

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

a. Understand the importance of—and keep—honest, clear, and accurate records in science.

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

b. Use appropriate tools and units for measuring objects and/or substances.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents.

b. Find the mean, median, and mode and use them to analyze a set of scientific data.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

a. Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines.

**S8P2. Students will be familiar with the forms and transformations of energy.**

a. Explain energy transformation in terms of the Law of Conservation of Energy.

b. Explain the relationship between potential and kinetic energy.

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

d. Describe how heat can be transferred through matter by the collisions of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).

**S8P1. Students will examine the scientific view of the nature of matter.**

c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

**Task: 1**

**Essential Question(s):**

What is the difference between work and power?

How can you calculate the amount of work being done on an object?

How can you determine when work is being done on an object?

**Resources:**

[How Much Work](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E13/E13.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Work and Machines: Work and Power p.210

8. Engage students in conversation by asking students the following question: Is work done every time a force is applied to an object? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How Much Work](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E13/E13.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will use this web based activity as a whole group activity to introduce students to the concept of work and power (W=f x d) by completing the virtual lab

[How Much Work](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E13/E13.html). Students will complete journal activity independently using the class table data. This activity may be printed from [How Much Work](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E13/E13.html).

**Task: 2**

**Essential Question(s):**

What is the relationship between energy and work?

What is the difference between kinetic energy and potential energy?

What are the different forms of energy?

**Resources:**

[How You Can Hear Music Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::295::/sites/dl/free/007877846x/164155/655_Fig_12.swf::How%20You%20Can%20Hear%20Music)

[Energy Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::321::/sites/dl/free/0078785337/164037/628_Fig_8.swf::Energy%20Transformation)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Energy and Energy Resources: What is Energy? P.240

8. Engage students in conversation by asking students to fill in the blank to the following question: Energy is the ability to\_\_\_\_\_\_\_\_? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How You Can Hear Music Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::295::/sites/dl/free/007877846x/164155/655_Fig_12.swf::How%20You%20Can%20Hear%20Music)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

Quick Lab p.245

Hear That Energy

1. Make a simple drum by covering the open end of an empty coffee can (or other type of can) with wax paper. Secure the wax paper with a rubber band.
2. Using the eraser end of a pencil, tap lightly on the wax paper. Describe how the paper responds. What do you hear?
3. Repeat step 2, but tap the paper a bit harder. Compare your results with those of step 2.
4. Cover half of the wax paper with one hand. Now, tap the paper. What happened? How can you describe sound energy as a form of mechanical energy?

**Task: 3**

**Essential Question(s):**

How is energy conserved within a closed system?

How do the laws of conservation and energy work?

Why is thermal energy always the result of energy conversion?

**Resources:**

[Pendulum Virtual Activity](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html)

[Potential Energy Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/160350/00035807.html)

[Energy Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078785337/160350/00076705.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Energy and Energy Resources: Energy Conversion p.248

8. Engage students in conversation by posting a picture of a plant, a Bunsen burner, and a pendulum. Then ask students what they think these objects have in common. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Pendulum Virtual Activity](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Pendulum Virtual Activity](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html) as a whole group activity to introduce students to the relationship between kinetic energy and potential energy. Students will work in cooperative learning groups to complete the journal activity.

**Task: 4**

**Essential Question(s):**

How can you use specific heat capacity to calculate heat?

What are the three methods of heating objects?

What are the differences between temperature, thermal energy, and heat?

**Resources:**

[Thermal Energy Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS06/PS06.html)

[Energy and Energy Resources Quick Check Quiz review](http://glencoe.mcgraw-hill.com/sites/007877846x/student_view0/unit5/chapter13/chapter_review_quiz-english.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Heat and Heat Technology: What is Heat? P.280

8. Engage students in conversation by asking students to imagine the following: You walk into the bathroom in your bare feet. The temperature in there is 23 degrees Celsius. You step onto the tile floor, and it feels very cold. Quickly, you step onto the throw rug in front of the sink, and the rug feels warmer. Now ask students to answer the following questions: Is the floor really colder than the rug? Why do they seem to be at a different temperatures when your bare feet touch them? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Thermal Energy Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS06/PS06.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Thermal Energy Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS06/PS06.html) as a whole group activity to introduce students to the concept of thermal energy. Students will complete the journal activities as an independent activity.

**The Atom**

**Georgia Performance Standards**

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS8. Students will be familiar with the characteristics of scientific knowledge and**

**how it is achieved.**

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8P1. Students will examine the scientific view of the nature of matter.**

f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

**S8P1. Students will examine the scientific view of the nature of matter.**

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

**S8P2. Students will be familiar with the forms and transformations of energy.**

d. Describe how heat can be transferred through matter by the collisions of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).

**Task: 1**

**Essential Question(s):**

How has the atomic theory changed over decades?

**Resources:**

[The Atomic Model Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/164155/00044672.html)

[Atoms,Elements, and the Periodic Table Activity](http://www.glencoe.com/sec/science/activities/lep2002xw/ch635.php?iRef=690&iChapter=3)

[CRCT Practice](http://glencoe.mcgraw-hill.com/sites/0078778468/student_view0/unit2/chapter3/crct_practice.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Introduction to Atoms: Development of the Atomic Theory p.312

8. Engage students in conversation by asking students what they think the following statements means: Color exist by convention, sweet by convention, bitter by convention; in reality nothing exists but atoms and the void. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [The Atomic Model Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/164155/00044672.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

After viewing [The Atomic Model Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/164155/00044672.html) , students will make comparisons by comparing the location of electron in Bohr’s theory with the location of electrons in the current atomic theory. Students will then draw and illustrate both models.

**Task: 2**

**Essential Question(s):**

What are the parts of an atom?

What is known about the particles inside the atom?

How is the relationship between numbers of protons and neutrons and atomic number?

**Resources:**

[All about Atoms Video Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E18/E18.html)

[Building an Atom Virtual Activity](http://www.pbs.org/wgbh/aso/tryit/atom/builder.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Introduction to Atoms: Atoms p. 318

8. Engage students in conversation by telling students that an atom is the smallest particle into which an element can divide and still be that element. Then state now that scientist have learned that an atom is made up of even smaller particles, do you think that this definition is still accurate? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Building an Atom Virtual Activity](http://www.pbs.org/wgbh/aso/tryit/atom/builder.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activities**

**Activity 1**

The teacher and students will complete the [Building an Atom Virtual Activity](http://www.pbs.org/wgbh/aso/tryit/atom/builder.html) as a whole group activity to introduce students to the carbon atom.

The goal of the activity is to build a carbon atom out of elementary particles (up quarks, down quarks, and electrons). On the left side of the activity's window sits the particle dispenser. Dragging two up quarks and one down quark from the dispenser to the Nucleon Assembly area, which sits near the center of the window, forms a proton. Dragging one up quark and two down quarks to the Assembly area forms a neutron. From the Assembly area, a neutron or proton is dragged to the atom's nucleus at the center of the atom building area. Electrons are dragged from the dispenser directly to the building area, to one of two rings that surround the atom's nucleus.

As protons, neutrons, and electrons are added to the atom, the atom changes from one element to another. From hydrogen the atom changes into helium, then lithium, and on up through the Periodic table until it finally becomes carbon. If, while being built, the balance between protons, neutrons, and electrons is not sufficiently maintained, the atom will either become radioactive and decay, or become so ionized that it will attach itself to a molecule outside the building area. In either case, the user must start over. The activity is over when the atom changes into carbon.

Activity 2

The teacher and students will complete the [All about Atoms Video Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E18/E18.html) as a whole group activity to introduce students to the concept of radioactive atoms. Students will complete the journal activity independently.

**Task: 3**

**Essential Question(s):**

How did Mendeleev arrange the elements in the first periodic table?

What is the difference between a period and a group?

**Resources:**

Interactive Periodic Table: <http://www.webelements.com/>

[The Atom and the Periodic Table](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E19/E19.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Periodic Table: Arranging the Elements p.336

8. Engage students in conversation by asking students to think of all the ways a deck of cards could be laid out so that the cards form some sort of identifiable pattern. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [The Atom and the Periodic Table](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E19/E19.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [The Atom and the Periodic Table](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E19/E19.html) as a whole group activity to help students understand how the structure of an atom’s relates to its position on the periodic table. Students will complete the journal activity in cooperative learning groups.

**Task: 4**

**Essential Question(s):**

How are elements arranged in the modern periodic table?

**Resources:**

[Learning the Periodic Table Virtual lesson](http://www.glencoe.com/sec/science/activities/lep2002conc/647.php?iRef=647&iChapter=4)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Review the following:

a. The Periodic Table: Arranging the Elements p.336

8. Engage students in conversation by revisiting the following: ask students to think of all the ways a deck of cards could be laid out so that the cards form some sort of identifiable pattern. However, this time have students to write down as many patterns as they can. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Learning the Periodic Table Virtual lesson](http://www.glencoe.com/sec/science/activities/lep2002conc/647.php?iRef=647&iChapter=4)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

Students will divide a sheet of paper into four columns. Look at the elements whose atomic numbers are 1 to 20 on the periodic table. With a partner, find patterns that describe the relationship between the chemical symbols and names of elements. In each column, write all of the chemical symbols and names that follow a single pattern. At the top of each column, write a sentence describing the pattern.

Interactive Periodic Table: <http://www.webelements.com/>

**Unit: Interactions of Matter**

**Georgia Performance Standards**

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

a. Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines.

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

**S8P1. Students will examine the scientific view of the nature of matter.**

a. Distinguish between atoms and molecules.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

g. Identify and demonstrate the Law of Conservation of Matter.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

**S8P2. Students will be familiar with the forms and transformations of energy.**

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

b. Use appropriate tools and units for measuring objects and/or substances.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

1. Understand the importance of and keep honest, clear, and accurate records in

science.

1. Understand that hypotheses can be valuable even if they turn out not to be

completely accurate.

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

f. Use ratios and proportions, including constant rates, in appropriate problems.

**S8CS8. Students will be familiar with the characteristics of scientific knowledge and how it is achieved.**

a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change.

**Task: 1**

**Essential Question(s):**

What is chemical bonding?

What role does the electron play in the formation of chemical bonds?

**Resources:**

[How can molecular models be built virtual lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E02/E02.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Chemical Bonding: Electron and Chemical Bonding p.364

8. Engage students in conversation by displaying the following chemical formulas but not their identities: C6H12O6 (glucose, a sugar) C2H5OH (ethyl alcohol) C6H8O6 (vitamin C) C6H8O7 (citric acid) asking students to write a sentence for each of the following terms: heredity, genotype, and phenotype. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How can molecular models be built virtual lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E02/E02.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [How can molecular models be built virtual lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E02/E02.html) as a whole group activity. Students will complete the journal activity independently.

**Task: 2**

**Essential Question(s):**

How do chemical reactions produce new substances that have different chemical and physical properties?

What are four signs that may indicate that a chemical reaction may be taking place?

**Resources:**

[Chemical Reaction Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E03/E03.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Chemical Reaction: Forming New Substances p.388

8. Engage students in conversation by asking students the following question: What do baking bread, launching the space shuttle, and digesting food have in common? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Chemical Reaction Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E03/E03.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Chemical Reaction Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E03/E03.html) as a whole group activity. Students will complete the journal activity in pairs of two.

**Task: 3**

**Essential Question(s):**

What are the properties of ionic and covalent compounds?

**Resources:**

[Which Elements form Chemical Bonds Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E20/E20.html)

[How Ions Form](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::354::356::/sites/dl/free/007877846x/164155/648_Fig_12.swf::How%20Ions%20Form)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Chemical Compounds: Ionic and Covalent Compounds p.418

8. Engage students in conversation by giving every student an object to represent a foam ball. Organize the class into two groups, and organize each group into pairs. Tell partners to stand and face each other. In Group 1, have one student from each pair give his or her ball to the other students. In Group 2, tell both students to hold both foam balls, as in a tug of war. Explain that the students in Group 1 represent a compound formed by ionic bonding and that those in Group 2 represent a compound formed by covalent bonding. Ask students what do they think are the differences between the two types of bonding. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Which Elements form Chemical Bonds Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E20/E20.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Which Elements form Chemical Bonds Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E20/E20.html) as a whole group activity. Students will complete the journal activity independently.

**Task: 4**

**Essential Question(s):**

What is nuclear fission?

What are the advantages and disadvantages of fission?

What is nuclear fission?

What are the advantages and disadvantages of nuclear fission?

**Resources:**

[**Nuclear Fission**](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::470::305::/sites/dl/free/0078600510/164037/624_16.swf::Nuclear%20Fission)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Atomic Energy: Energy from the Nucleus p.456

8. Engage students in conversation by writing the words fission and fusion on the board. Next ask students what they think each term means. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [**Nuclear Fission**](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::470::305::/sites/dl/free/0078600510/164037/624_16.swf::Nuclear%20Fission)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

Quick Lab p.459

Students will complete the Gone Fission Lab.

Procedures:

1. Make two paper balls from a sheet of paper.
2. Stand in a group with your classmates. Make sure you are an arm’s length from your other classmates.
3. Your teacher will gently toss a paper ball at the group. If you are touched by a ball, gently toss your paper balls at the group.
4. Explain how this activity is a model of a chain reaction. Be sure to explain what the students and the paper balls represent.

**Unit: Electricity**

**Georgia Performance Standards**

**S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations.**

a. Follow correct procedures for use of scientific apparatus.

b. Demonstrate appropriate techniques in all laboratory situations.

c. Follow correct protocol for identifying and reporting safety problems and violations.

**S8CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.

b. Use appropriate tools and units for measuring objects and/or substances.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

d. Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

**S8P1. Students will examine the scientific view of the nature of matter.**

a. Distinguish between atoms and molecules.

b. Describe the difference between pure substances (elements and compounds) and mixtures.

c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

e. Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

g. Identify and demonstrate the Law of Conservation of Matter.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

c. Investigate and explain that electric currents and magnets can exert force on each other.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

f. Use ratios and proportions, including constant rates, in appropriate problems.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8P2. Students will be familiar with the forms and transformations of energy.**

a. Explain energy transformation in terms of the Law of Conservation of Energy.

b. Explain the relationship between potential and kinetic energy.

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

d. Describe how heat can be transferred through matter by the collisions of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).

**Task: 1**

**Essential Question(s):**

How do charged objects interact by using the law of electric charges?

What are three ways an object can become charged?

What are two examples of static electricity and electric discharge?

**Resources:**

[Static Charge Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::205::/sites/dl/free/007877846x/164155/644_Fig_8.swf::Static%20Charge)

[CRCT Practice](http://glencoe.mcgraw-hill.com/sites/0078778468/student_view0/unit7/chapter20/crct_practice.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Introduction to Electricity: Electric Charge and Static Electricity p.474

8. Engage students in conversation by writing the term electric charge on the board. Ask students to define the word in their own words. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Static Charge Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::205::/sites/dl/free/007877846x/164155/644_Fig_8.swf::Static%20Charge)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

Students will complete the start-up activity

Stick together p.473

**Procedure**

1. Takes two strips of cellophane tape. Each strip should be 20 cm long. Fold over a small part of the end of each strip to form a tab.
2. Hold each piece of tape by its tab. Bring the two pieces of tape close together, but do not let them touch. Record your observations.
3. Tape one of the strips to your table or desk. Tape the second strip on top of the first strip.
4. Pull the strips of tape off the table or desk together.
5. Quickly pull the strips apart. Bring the two pieces of tape close together, but do not let them touch. Record your observations.

**Analysis**

1. Compare how the pieces of tape behaved when you first brought them together with how they behaved after you pulled the pieces of apart.
2. As you pulled the pieces of tape apart, electrons from one piece of tape moved onto the other piece of tape. Describe the charge on each piece of tape after you pulled the two pieces apart.

**Task: 2**

**Essential Question(s):**

What is electric current?

What is the relationship between resistance and electric charge?

How can a cell generate electrical energy?

**Resources:**

[Electric Current and Electrical Energy](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E14/E14.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Introduction to Electricity: Electric Current and Electrical Energy p.482

8. Engage students in conversation by writing the following question on the board: What is the difference between something that is direct and something that is alternating? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Electric Current and Electrical Energy](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E14/E14.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Electric Current and Electrical Energy](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E14/E14.html) as a whole group activity to introduce students to the relationship between current, voltage, and resistance. Students will work in cooperative learning groups to complete the journal activity.

**Task: 3**

**Essential Question(s):**

What are the properties of magnets?

Why are some materials magnetic?

What makes the earth a giant magnet?

**Resources:**

[How Does a Transformer Work Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E15/E15.html)

[Simple Electric Circuit Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::402::356::/sites/dl/free/007877846x/164155/644_Fig_11.swf::Simple%20Electric%20Circuit)

[Using Electromagnets](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::148::356::/sites/dl/free/007877846x/164155/645_Fig_10.swf::Using%20Electromagnets)

[How Electric Gets to Your House](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::356::/sites/dl/free/007877846x/164155/645_Fig_19.swf::How%20Electric%20Gets%20to%20Your%20House)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Electromagnetism: Magnetism from Electricity p.518

8. Engage students in conversation by giving students the following instructions: Have you ever discovered something by accident? Maybe you looked in a dictionary for the definition of an unknown word but found the definition of another word you didn’t know. Then invite students to discuss how they found something by accident with the class. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How Does a Transformer Work Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E15/E15.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [How Does a Transformer Work Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E15/E15.html) as a whole group activity. Students will complete the journal activity independently.

**Task: 4**

**Essential Question(s):**

What are the basic functions of a computer?

How can information be stored on CD-Rs and CD-RWs?

What is a computer network?

**Resources:**

[Decision Trees and Binary Virtual Lesson](%20http:/www.glencoe.com/sites/common_assets/science/virtual_labs/PS23/PS23.html)

[**CRCT Practice**](http://glencoe.mcgraw-hill.com/sites/0078778468/student_view0/unit7/chapter22/crct_practice.html)

**Teacher’s Place:**

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3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Electronic Technology: Computers p.554

8. Engage students in conversation by asking students the following question: What are the basic functions of a computer? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Decision Trees and Binary Virtual Lesson](%20http:/www.glencoe.com/sites/common_assets/science/virtual_labs/PS23/PS23.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Decision Trees and Binary Virtual Lesson](%20http:/www.glencoe.com/sites/common_assets/science/virtual_labs/PS23/PS23.html)

as a whole group activity. Students will complete the journal activity independently.

**Waves, Sounds, and Lights**

**Georgia Performance Standards**

**S8P4. Students will explore the wave nature of sound and electromagnetic radiation.**

a. Identify the characteristics of electromagnetic and mechanical waves.

b. Describe how the behavior of light waves is manipulated causing reflection, refraction diffraction, and absorption.

d. Describe how the behavior of waves is affected by medium (such as air, water, solids).

e. Relate the properties of sound to everyday experiences.

f. Diagram the parts of the wave and explain how the parts are affected by changes in amplitude and pitch.

**S8CS1. Students will explore the importance of curiosity, honesty, openness, an**

**skepticism in science and will exhibit these traits in their own efforts to**

**understand how the world works.**

b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.

**S8CS9. Students will understand the features of the process of scientific inquiry.**

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.

c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.

d. Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.

f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

**S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations.**

c. Follow correct protocol for identifying and reporting safety problems and violations.

**S8CS6. Students will communicate scientific ideas and activities clearly.**

a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.

b. Write for scientific purposes incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols.

c. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal.

**S8CS7. Students will question scientific claims and arguments effectively.**

a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.

b. Identify the flaws of reasoning in arguments that are based on poorly designed research (e.g., facts intermingled with opinion, conclusions based on insufficient evidence).

**S8CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.**

f. Use ratios and proportions, including constant rates, in appropriate problems.

**S8P5. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature.**

a. Recognize that every object exerts gravitational force on every other object and that the force exerted depends on how much mass the objects have and how far apart they are.

b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

c. Investigate and explain that electric currents and magnets can exert force on each other.

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring**

**scientific and technological matters.**

a. Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines.

b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**Task: 1**

**Essential Question(s):**

What are wave properties?

How is frequency and wavelength related to the speed of a wave?

**Resources:**

[Characteristics of Waves](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E05/E05.html)

[CRCT Practice](http://glencoe.mcgraw-hill.com/sites/0078778468/student_view0/unit6/chapter16/crct_practice.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

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3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Energy of Waves: Properties of Waves p.580

8. Engage students in conversation by drawing a longitudinal wave and a transverse wave on the board. Then have student to volunteer to come up to the board and label the parts of each one. Discuss the drawings as a class.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Characteristics of Waves](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E05/E05.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [Characteristics of Waves](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E05/E05.html) as a whole group

activity. Students will work in learning circles to complete the journal activity.

.

**Task: 2**

**Essential Question(s):**

How does vibration cause sound?

How is sound transmitted through a medium?

**Resources:**

[How to use a Oscilloscope to tune an Instrument Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html)

[**CRCT Practice**](http://glencoe.mcgraw-hill.com/sites/0078778468/student_view0/unit6/chapter17/crct_practice.html)

**Teacher’s Place:**

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4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Nature of Sound: What is Sound? P.600

8. Engage students in conversation by telling students if they’ve ever been near a large fireworks display, they may have felt the sound of explosions. Ask students to think of other times they might feel sound and invite them to discuss their answers with class. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How to use a Oscilloscope to tune](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html)

[An Instrument Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [How to use a Oscilloscope to tune](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html)

[An Instrument Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html) as a whole group activity. Students will work in peer to peer groups to complete the journal activity independently.

**Task: 3**

**Essential Question(s):**

How does the speed of sound work in different media?

How are frequency and pitch related?

How are amplitude and loudness related?

**Resources:**

[Sound of Music](http://www.exploritorium.com/music/index.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

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3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. The Nature of Sound: Properties of Sound p.606

8. Engage students in conversation by asking students the following question: What is the speed of sound? Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [Sound of Music](http://www.exploritorium.com/music/index.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The bid store at your center has added mp3 players to the list of items that may be purchased from the bid store. Once purchased student will be allowed to create/mix their own beats. You are very excited and ready to get your beat making swagger on. However, you must first learn about sound. During science class your teacher will allow the class to view the following website: [Sound of Music](http://www.exploritorium.com/music/index.html)

.

Before you visit the site you will need to complete the following activities on the graphic organizer provided by your teacher.

1. Define the following terms:

Amplitude

Frequency

Wavelength

Trough

Crest

Rarefaction

Compression

Intensity

Decibel

Echo

Medium

2. Draw and label a sound wave.

3. Explain how sound travels

4. Draw a sound wave with high and low pitch. Label the diagrams.

5. Draw a sound wave with soft strike (low amplitude) and a hard strike (high amplitude).

Label the diagram.

6. How does the energy you put into producing a sound affect the wave produced?

**Get your Music Swagger On**

**Graphic Organizer**

|  |  |
| --- | --- |
| Define the following terms | Draw and label a sound wave |
| Amplitude: |  |
| Frequency: |
| Wavelength: |
| Trough: | Explain how sound travels |
| Crest: |  |
|  |
| Rarefaction: |  |
|  |
| Compression: |  |
|  |
| Intensity: | Draw a sound wave with high and low pitch. Label the diagrams |
| Decibel: |  |
| Echo: |
| Medium: |
| Draw a sound wave with soft strike (low amplitude) and a hard strike (high amplitude). Label the diagram. |
| How does the energy you put into producing a sound affect the wave produced? |
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**Task: 4**

**Essential Question(s):**

What are the parts of the human eye?

What are three common vision problems?

What is surgical eye correction?

**Resources:**

[How are Lenses used to Correct Vision Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html)

[All about the Eye](http://glencoe.mcgraw-hill.com/sites/dl/free/0078617049/161752/00053402.html)

**Teacher’s Place:**

Prior to beginning the performance activity, the teacher should implement the following steps using teaching techniques you have found to be effective for your students.

1. Explain the activity (activity requirements)

2. Display the Georgia Performance Standard(s) (project on blackboard via units of instruction located at <http://thevillage411.weebly.com/units-of-instruction2.html> units of instruction page, or print on blackboard)

3. Read the Georgia Performance Standard(s) aloud and explain it to your students. You can rephrase the Georgia Performance Standard to make sure your students understand it.

4. Display the Essential Question(s) (project on blackboard via units of instruction, or print on blackboard)

5. Read the Essential Question (s) aloud and explain it to your students. You can rephrase the Essential Question (s) to make sure your students understand it.

6. Review unit vocabulary with students.

7. Introduce the following:

a. Light and Our World: Light and Sight p.674

8. Engage students in conversation by asking students the following question: What do you think a person who has colorblindness sees? If you have colorblindness describe what you think you might see. Write answers on the blackboard.

9. Discuss answers with the students using the following questioning techniques as applicable:

**Questioning Techniques:**

**Memory Questions**

Signal words: who, what, when, where?

Cognitive operations: naming, defining, identifying, designating

**Convergent Thinking Questions**

Signal words: who, what, when, where?

Cognitive operations: explaining, stating relationships, comparing and

contrasting

**Divergent Thinking Questions**

Signal words: imagine, suppose, predict, if/then

Cognitive operations: predicting, hypothesizing, inferring, reconstructing

**Evaluative Thinking Questions**

Signal words: defend, judge, justify (what do you think)?

10. Guide students into the activity utilizing [How are Lenses used to Correct Vision](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html)

[Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html)

11. Complete the activity with the students (some tasks may require students to work independently, peer to peer, learning circles [2-3 students] or as a whole group [the entire class]. Therefore the teacher may serve as activity leader and or facilitator. When an activity calls for students to work in learning circles you should assign roles to students individually i.e. recorder, discussion leader or presenter)

12. At the end of the **\*whole group learning session**, students will transition into independent CAP assignments.

**\*The phrase, “whole group learning session” is utilized “rather than, the end of the activity” because all of the activities may not be completed in one day.**

**Activity**

The teacher and students will complete the [How are Lenses used to Correct Vision](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html)

[Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html) as a whole group activity. Students will complete the journal activity independently.

Task Websites

<http://thevillage411.weebly.com/units-of-instruction2.html>

Unit 1

[How is a controlled experiment performed Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E16/E16.html)

[Scientific Explanations Concept Lesson](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::248::/sites/dl/free/007877846x/164155/634_Fig_2.swf::Scientific%20Explanations)

[Measuring Matter Virtual Video Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078617049/161752/00076709.html)

[Behavior of Gases Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS08/PS08.html)

[**How does thermal energy affect the state of a substance virtual lesson**](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E17/E17.html)

Unit 2

<http://footballphysics.utk.edu/equipment.htm>

<http://footballphysics.utk.edu/speed/vchange.asp>

<http://footballphysics.utk.edu/acceleration/acceleration2.htm>

Bikes as Simple Machines Virtual lesson

<http://library.thinkquest.org/J002670/parts.htm>

The Sport of Bicycling Mr. Fizzix Virtual lesson

<http://physicsofbicycling.homestead.com/index.html>

Machines Make Life Easier Virtual lesson

<http://www.schools.utah.gov/curr/science/sciber00/8th/machines/sciber/intro.htm>

<http://physicsofbicycling.homestead.com/index.html>

<http://library.thinkquest.org/J002670/parts.htm>

[Amusement Park Physics](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://www.learner.org/exhibits/parkphysics/)

[Kinetic and Potential Energy](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://library.thinkquest.org/2745/data/ke.htm)

[Rollercoaster Creator](http://www.playsushi.com/PremiumGame_Rollercoaster_Creator_141)

[Build a Roller Coaster](http://www.glencoe.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://dsc.discovery.com/games/coasters/interactive.html)

[Forces and Motion Quiz](http://go.hrw.com/activities/frameset.html?main=2404.html)

[Newton's Laws of Motion Virtual lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078785337/161752/00035803.html)

[Motion and Forces Interactive Learning Activity](http://www.glencoe.com/sec/science/activities/scivoyxwords/nab3/NAB307.html)

Unit 3

[How Much Work](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E13/E13.html)

[How You Can Hear Music Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::295::/sites/dl/free/007877846x/164155/655_Fig_12.swf::How%20You%20Can%20Hear%20Music)

[Energy Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::321::/sites/dl/free/0078785337/164037/628_Fig_8.swf::Energy%20Transformation)

[Energy Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/0078785337/160350/00076705.html)

[Pendulum Virtual Activity](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS05/PS05.html)

[Potential Energy Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/160350/00035807.html)

[Thermal Energy Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS06/PS06.html)

[Energy and Energy Resources Quick Check Quiz review](http://glencoe.mcgraw-hill.com/sites/007877846x/student_view0/unit5/chapter13/chapter_review_quiz-english.html)

Unit 4

[The Atomic Model Virtual Lesson](http://glencoe.mcgraw-hill.com/sites/dl/free/007877846x/164155/00044672.html)

[Atoms,Elements, and the Periodic Table Activity](http://www.glencoe.com/sec/science/activities/lep2002xw/ch635.php?iRef=690&iChapter=3)

[Building an Atom Virtual Activity](http://www.pbs.org/wgbh/aso/tryit/atom/builder.html)

[All about Atoms Video Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E18/E18.html)

Interactive Periodic Table: <http://www.webelements.com/>

[The Atom and the Periodic Table](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E19/E19.html)

[Learning the Periodic Table Virtual lesson](http://www.glencoe.com/sec/science/activities/lep2002conc/647.php?iRef=647&iChapter=4)

Unit 5

[How can molecular models be built virtual lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E02/E02.html)

[Chemical Reaction Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E03/E03.html)

[Which Elements form Chemical Bonds Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E20/E20.html)

[How Ions Form](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::354::356::/sites/dl/free/007877846x/164155/648_Fig_12.swf::How%20Ions%20Form)

[**Nuclear Fission**](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::470::305::/sites/dl/free/0078600510/164037/624_16.swf::Nuclear%20Fission)

Unit 6

[Static Charge Virtual Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::205::/sites/dl/free/007877846x/164155/644_Fig_8.swf::Static%20Charge)

[Electric Current and Electrical Energy](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E14/E14.html)

[Simple Electric Circuit Concept](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::402::356::/sites/dl/free/007877846x/164155/644_Fig_11.swf::Simple%20Electric%20Circuit)

[How Does a Transformer Work Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E15/E15.html)

[Using Electromagnets](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::148::356::/sites/dl/free/007877846x/164155/645_Fig_10.swf::Using%20Electromagnets)

[How Electric Gets to Your House](http://glencoe.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::573::356::/sites/dl/free/007877846x/164155/645_Fig_19.swf::How%20Electric%20Gets%20to%20Your%20House)

[Decision Trees and Binary Virtual Lesson](%20http:/www.glencoe.com/sites/common_assets/science/virtual_labs/PS23/PS23.html)

Unit 7

[Characteristics of Waves](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E05/E05.html)

[How to use a Oscilloscope to tune an Instrument Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/PS18/PS18.html)

[Sound of Music](http://www.exploritorium.com/music/index.html)

[How are Lenses used to Correct Vision Virtual Lesson](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E11/E11.html)

[All about the Eye](http://glencoe.mcgraw-hill.com/sites/dl/free/0078617049/161752/00053402.html)