Timeline ->	*Quarter Three & Four (12 lessons)*
Guiding Questions	***Science:*** What are the steps of the scientific method? ENERGY What is kinetic and potential energy? Can we give examples of these two forms of energy? How is energy transferred? What are the characteristics of an energy wave? How is heat energy described? How are temperature and energy transfer related? FORCES & MOTION What are forces? What affects forces? (friction, surfaces, angle of incline) and how can we measure them? ***Language Arts:*** What can we learn about the characteristics of energy and other forces by reading? How can we use a variety of reading strategies to understand science vocabulary? How can we write to show the steps we have used in the scientific method? How can we use adjectives to help our written science descriptions and formative assessments? ***Math:*** How can we determine which tool to measure specific items with and use it correctly? How can we measure the strength of various forces? How does a table help organize and provide data? What conclusions can we draw from the data collected? What patterns can we see? **Social Studies:** How can we use information about ancient civilizations to understand how they applied science and technology to solve problems? ***Art:*** How can we draw/illustrate and label sketches for a scientific notebook/portfolio?

General Learner Outcomes	***GLO#1: Self-Directed Learner:*** Students will be able to complete a series of experiments that helps them explore the characteristics of different forms of energy and other forces. Students will use the textbook and other resources to complete individual class and homework reading assignments (both science and social studies). ***GLO#2: Community Contributor:*** Students will work together in groups or pairs to complete experiments. ***GLO#3: Complex Thinker:*** Students will use their problem solving, math and writing skills to investigate the properties of forces. ***GLO#4: Quality Producer:*** Students will create math products (graphs, data tables, charts) that enhance their lab/experiment reports. ***GLO#5: Effective Communicator:*** Students will listen, discuss and record information from their different lessons through oral, written and math pieces that illustrate concepts they have learned about forces. ***GLO#5: Effective and Ethical User of Technology:*** Students will use a variety of scientific equipment and tools to safely collect data from their experiments.
Assessments	Formative = textbook/reading assignments Summative = lab experiment reports completed, Reading Support & Homework worksheets

Standards & Benchmarks

Big Idea(s) / Major Understanding(s): *Students will understand that...*

Matter and energy transfer through and between organisms and their physical environment.

There are different kinds of waves.

The energy of vibrations produces waves that travel away.

There are different forms of energy.

Energy can be transformed and transferred.

Energy can be conserved.

Electricity can produce magnetism, and magnetism can create electricity.

Forces affect objects.

Forces are all around us.

Forces affect objects in several ways, even when objects are stationary.

Forces affect an object's movement.

- 6.6.2 **Energy and its Transformation**
  Describe the different types of energy transformations
- 6.6.3 **Energy and its Transformation**
  Explain how energy can change forms and is conserved
- 6.6.4 **Energy and its Transformation**
  Describe and give examples of different types of energy waves
- 6.1.1 **Scientific Inquiry**
  Formulate a testable hypothesis that can be answered through a controlled experiment
- 6.1.2 **Scientific Inquiry**
  Use appropriate tools, equipment, and techniques safely to collect, display, and analyze data
- 6.2.1 **Science, Technology, and Society**
  Explain how technology has an impact on society and science
- 6.2.2 **Science, Technology, and Society**
  Explain how the needs of society have influenced the development and use of technologies
- 6.7.1 **Force and Motion**
  Describe examples of how forces affect an object's motion
- 6.6.1 **Energy and its Transformation**
  Compare how heat energy can be transferred through conduction, convection, and radiation
- 6.6.2 **Energy and its Transformation**

Sample Performance Rubrics

Topic	Force and Motion		
Benchmark SC.6.7.1	Describe examples of how forces affect an object's motion		
Sample Performance Assessment (SPA)	The student: Uses Newton's Laws of Motion to describe how forces affect an object's motion (e.g., constant speed in a straight line unless a force is acting upon it).		
Rubric			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Explain, with supporting evidence and Newton's Laws, how forces affect an object's motion	Describe examples of how forces affect an object's motion	Identify the forces that affect an object's motion	Identify examples of forces

Topic	Forces of the Universe		
Benchmark SC.6.7.2	Explain that electric currents can produce magnetic effects and that magnets can cause electric currents		
Sample Performance Assessment (SPA)	The student: Demonstrates and explains that magnets can produce electric currents and that electric currents produce a magnetic field.		
Rubric			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Explain, and provide real world applications, that electric currents can produce magnetic effects and that magnets can cause electric currents	Explain that electric currents can produce magnetic effects, and that magnets can cause electric currents	Describe that electric currents can produce magnetic effects, or that magnets can cause electric currents	Recognize electric currents and magnetic effects
Topic	Energy and its Transformation		
Benchmark SC.6.6.1	Compare how heat energy can be transferred through conduction, convection, and radiation		
Sample Performance Assessment (SPA)	The student: Compares how heat energy is transferred and makes comparisons between conduction, convection, and radiation.		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Describe and compare how heat energy can be transferred through conduction, convection, and radiation and make a connection to real world situations	Compare how heat energy can be transferred through conduction, convection, and radiation	Describe how heat energy can be transferred through conduction, convection, and radiation	Recognize that heat energy can be transferred
Benchmark SC.6.6.2	Describe the different types of energy transformations		
Sample Performance Assessment (SPA)	The student: Describes a variety of energy transformations (e.g., heat energy into mechanical energy; chemical energy into light energy; electrical energy into		

	magnetic energy).		
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Explain the different types of energy transformations and give examples of their application	Describe the different types of energy transformations	Identify, with assistance, different types of energy transformations	Recognize that energy can be transformed
Topic	Energy and its Transformation		
Benchmark SC.6.6.3	Explain how energy can change forms and is conserved		
Sample Performance Assessment (SPA)	The student: Explains the conservation of energy by comparing the input and output of energy of a specific device or process (e.g., throwing a ball against a wall).		
Rubric			
Advanced	**Proficient**	**Partially Proficient**	**Novice**
Provide a detailed explanation of the conservation of energy with supporting evidence	Explain how energy can change forms and is conserved	Describe, with assistance, how energy can change forms and is conserved	Recognize that energy is conserved

Lesson Plan Summary

(yellow highlighted lessons needed for exemplars and unit assessment)

Title	Basic goals of lesson – Students will be able to…
Chapter 14 Energy – Pre Test	
What are Some Forms of Energy? Lesson #1	Read potential and kinetic energy pp. 528-529 (don't do the beginning of the chapter demo)
	Energy Transformation – (look in TG at the transparencies) Law of Conservation of Energy – Graphic Organizer p. 533 "Reading Review" RS 112-113 Reading Support
What Are Waves? Lesson #2	Making Waves experiment (see the lab manual) pp. 535-537 Some ideas could be jump rope (one kid at each end) ask them to model the picture of the wave on p. 537 Energy in waves is not a physical thing – but it is a force that causes physical things to move. Waves and structure of the wave (height, length, crest, trough) Light Energy from the Sun pp. 542 RS114-115
AIMS	History of Light booklet (4 pages)
AIMS Light Waves	Model of parts of the light wave Materials: index cards, tape, ruler and student page Move through the Connected Learning questions at the end.
AIMS Roy G Biv	Model of light waves with color integrated (spectrum) Uses the same materials as the Light Waves experiment

Chapter 14 Energy – Post Test	
Chapter 15 Information only – (heat) no pre/post test	
How is Thermal Energy transferred? Lesson 1 (2 days)	Formative Assessment probe – The Mitten ½ sheet in notebook – do before other work. RS 119-120 - do Now I've learned – write in their notebook next to their "The Mitten" pre-assessment, what they now know
Chapter 16	**Pre-Test**
FORCES – GETTING SOMETHING TO MOVE FASTER, SLOW DOWN OR STOP MOVING (PUSH/PULL, FRICTION) WHAT STARTS THINGS MOVING? A FORCE…	
Harcourt text Chapter 14	Refer back to Chapter 14 – lesson on kinetic and potential energy because motion is related to kinetic energy
AIMS	Rubber Band Shoot – potential and kinetic energy
AIMS	Magnetic Potential – potential and kinetic energy model
AIMS optional	Frog Legs – conversion of potential to kinetic energy
LESSON 1 How Do Forces Affect Us?	Defines what is a force, velocity and inertia (not moving) Do Lesson Quick Study wkst
Lesson 2 How Do Forces Interact?	Defines balanced/unbalanced forces and friction Do Lesson Quick Study wkst
AIMS	Tug Teams – experiment with balanced and unbalanced forces
AIMS	Air Glider – Key vocabulary is covered on the student pages (force & friction) and then extension to hover craft 2-3 periods to prepare and then do the experiment
Lesson 3 What is Gravitation Force?	Defines weight/mass, gravity Do Lesson Quick Study wkst
Chapter 16	**Post-Test**
Chapter 17 – Simple Machines (not pre/post test) Use the simple machines rubber band booklets to discuss the different simple machines. The AIMS experiments are dealing only with the inclined plane Lesson #2 "What are Inclined Planes?" Check out lesson resources (transparencies, etc)	
AIMS Slip & Slide PGS 21-26	Use Question and Learning Goals – have students copy into their science notebooks – at the end of the lesson, have students answer the "Connected Learning" questions
AIMS The Plane Truth	Use Question and Learning Goals – have students copy into their science notebooks – at the end of the lesson, have students answer the "Connected

PGS 197-205	Learning" questions
AIMS How heavy How far? PGS 37-43	Use Question and Learning Goals – have students copy into their science notebooks – at the end of the lesson, have students answer the "Connected Learning" questions

Materials & Supplies (AIMS lessons)

Rubber Band Shoot	safety goggles – groups of 3-4 rubber bands (rubber band ball – all the same size), metric rulers/measuring tapes, calculator & activity pages
Frog Legs	2 sheets of transparency film for copy machine (frog filler – guts) cardstock and regular paper (one frog pattern per child) student activity sheet, meter stick or tape measure
Tug Teams	thread, paper clips (10 per group), masking tape, student activity page with "tug team strips"
Air Glider	For each group:1 2 oz plastic water bottle, pushpin, scissors, clay OPTIONAL materials instead of above: glue a wooden spool (Ben Franklin crafts) onto the CD, glue a bottom to cover the hole on the top of the spool, 7-9" balloons, recycled cd's, meter stick, vocabulary student sheet
Slip & Slide	For each group: Scissors, glue, tape, flat 30cm ruler, 35mm film canister, 10 pennies, vegetable oil, 2.5 x 10 cm strips of paper, transparency, aluminum foil, fine sandpaper, hand lens (optional) For each student: pg 24-25
How Heavy, How Far?	For each group: small car with non-friction wheels (hotwheels, toy cars), meter tape, lots of space (4 meters of space), scissors, glue, tape, balance with weights, speed wheels track copied on cardstock (3 pgs of tracks), set of textbooks to make the same height (13 cm), student activity/data p. 39
The Plane Truth OPTIONAL	For each group: 2 wooden meter sticks, ½ pound margarine tub, string, ruler, books (stacked 20 cm high), rubber bands 6-8cm long, 2 large paper clips, colored pencils and 300-500 g masses Centers: 5 x 100 cm strip of tagboard, 2 sheets of sandpaper, 1 balance, wax paper, cooking spray, plastic coated playing cards, 1 mini car and rubber bands For each student: pg 200-204