

CRM 3 Force, Motion and Energy**Pacing**

- 20 days
- Oct. 15-Nov. 9
- Week 8-11

DESIRED RESULTS**Making Meaning**

The study of force, motion, and energy leads students to discovering how objects interact with each other in the real world. Students are very familiar with force, motion, and energy if they play sports, push strollers, pull wagons, and ride bikes or skateboards. These concepts build a foundation for the secondary science in the study of Physics, Astronomy, and Engineering. The following make meaning valuable for learners and are investigated in this unit:

- Energy can cause a variety of effects as it moves from place to place including: motion, light, sound, electricity, magnetic fields, and heat.
- Energy is always conserved within a system and remains constant until it is transferred into or out of the system.
- The faster an object moves the more energy it possesses.
- When objects interact each one exerts a force on the other; these forces can transfer energy between the objects.
- The strengths of forces can be measured and compared.
- What happens when a force is applied to an object depends on the strength of the force itself, and the strength of the other forces acting upon it.
- If an object is at rest the forces acting on it are most likely equivalent.
- Forces that are imbalanced can cause changes in the speed or direction of an object.
- Gravity is a force that acts on matter.

Transfer: Students use critical thinking and problem solving to construct their own scientific understanding of forces and motion and develop their scientific process skills by asking scientific questions, designing and conducting investigations, constructing explanations from their observations, and discussing their explanations with others as they investigate energy, and forces and motion.

Enduring Understandings:

- Energy in its many forms is useful in our everyday lives.
- Energy causes change.
- Forces change an object's position (location) or motion and show work being done.

Essential Questions:

- What is energy, and how do we use it in our everyday life?
- How do forces change an object's position and/or motion?

Essential Vocabulary

- change/transformer
- circuit/circuito
- closed circuit /circuito cerrado
- conductors /conductors
- electrical energy / energía eléctrica
- electric circuit /circuito electric
- electric current /corriente eléctrica
- electromagnet/ electroimán
- energy/energía
- friction / fricción
- insulator /aislante

- light energy/energía luminosa
- opaque/opaco
- open circuit /circuito abierto
- pendulum/péndulo
- potential energy / energía potencial
- reflect/reflejar
- sound energy/energía del sonido
- swing/oscilar
- switch /interruptor
- translucent/translúcido
- transmit/transmitir
- transparent/ transparente

Supporting Vocabulary Link

- [Elementary School Supporting Vocabulary](#)

Student Prerequisite Knowledge

Students should know:

- different forms of energy in everyday life.
- objects can move due to forces and energy.
- forces change the position and motion of an object.
- work is done on an object when a force causes it to move position.
- some forces such as magnetism and gravity act on objects even when they are not touching the object.

Resources: AISD Module Kit, Model Lesson Portfolio, FOSS: *Magnetism and Electricity* Investigations, [STEMscopes](#), eBooks: Envisions Science Leveled Readers, Scott Foresman Text, [Science Notebook Resources](#), [BrainPop Jr](#), [Discovery Education](#), [BBC Online Labs, Quizzes, and Activities](#), [Differentiation Strategies & Resources](#)

ELPS: Mandated by Texas Administrative Code (19 TAC §74.4), click on the link for [English Language Proficiency Standards \(ELPS\)](#) to support English Language Learners.

TEKS Knowledge & Skills	Acquisition	
STAAR: RC = Reporting Category; DC = Dual Coded Skills; Readiness Standard ; Supporting Standard Concepts are addressed in another unit.	Students Will Know	Students Will Be Able To
4.6: Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. The student is expected to:		
4.6A differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal	<ul style="list-style-type: none"> • Energy occurs in many forms. • Energy can be observed in cycles, patterns, and systems. 	<ul style="list-style-type: none"> • Differentiate among forms of energy.
4.6B: differentiate between conductors and insulators.	<ul style="list-style-type: none"> • Conductors easily transmit electricity. • Insulators do not easily transmit electricity. 	<ul style="list-style-type: none"> • Differentiate between conductors and insulators.
4.6C: demonstrate that electricity travels in a closed path, creating an electrical circuit, and explore an electromagnetic field.	<ul style="list-style-type: none"> • Circuits must have a complete path in order for electricity to flow. • An electromagnet is created when electricity flows through a wire therefore producing a magnetic field. 	<ul style="list-style-type: none"> • Create a working electric circuit in cooperative groups. • Explore electromagnetism.
4.6D design an experiment to test the effect of force on an object such as a push or a pull, gravity, friction, or magnetism.	<ul style="list-style-type: none"> • The effect of a force on an object can be tested in an experiment. 	<ul style="list-style-type: none"> • Design an experiment to test the effect of a force on an object.

3.6: Force, motion, and energy. The student knows that forces cause change and that energy exists in many forms. The student is expected to:		
3.6B: demonstrate and observe how position and motion can be changed by pushing and pulling objects to show work being done such as swings, balls, pulleys, and wagons.	<ul style="list-style-type: none"> Forces change the position and motion of an object. Work is done on an object when a force causes it to move position. 	<ul style="list-style-type: none"> Observe how position and motion can be changed by a push or a pull. Demonstrate how position and motion can be changed by a push or pull by following oral directions.
3.6C: observe forces such as magnetism and gravity acting on objects.	<ul style="list-style-type: none"> Some forces such as magnetism and gravity act on objects even when they are not touching the object. 	<ul style="list-style-type: none"> Observe magnetism and gravity acting on objects.
<p>The study of science is taught through the lens of Scientific Processes (TEKS 4.1-4.4); therefore, these TEKS should be taught in conjunction with content throughout the year. Suggestions for TEKS to embed in each unit are provided in the Yearly Itinerary; however, the TEKS that can be addressed within a unit depends greatly on the learning activities in which students are engaged. Therefore, teachers must be deliberate in their choice of learning activities to ensure that all Scientific Processes TEKS are appropriately embedded within the course. In 4th grade, districts are encouraged to facilitate laboratory and field investigations for at least 60% of instructional time.</p>		
ASSESSMENT EVIDENCE		
Student Work Products/Assessment Evidence		
Performance Tasks	Other Evidence (i.e. unit tests, open ended exams, quiz, essay, student work samples, observations, etc.)	
<ul style="list-style-type: none"> Students identify the types of energy found in their world and explain the energy forms. Students investigate material to determine conductors and insulators. After the investigation, the students will classify realia or picture vocabulary cards in a T-chart. Students create an electric circuit by collaborating with peers in cooperative groups. Students explore electromagnetism. Students design and conduct an experiment to determine the effect of force on an object. They will use their science notebook to describe and explain their experimental design. 	<p>Short Cycle Assessment</p> <ul style="list-style-type: none"> <i>SCA Testing Window: November 9-16, 2012</i> <i>Tested TEKS: 4.6A, 4.6B, 4.6C, 4.6D</i> <p>Additional Suggestions for Assessment</p> <ul style="list-style-type: none"> Graphic organizers Teacher observations: Use of safety, tools, and interactive notebook. Teacher observations: Critical thinking, use of inquiry, questioning, and independent thinking/scientific discovery. Students' use of evidence to support explanations and claims. 	

LESSON PLANNING TOOLS

In the course of lesson planning, it is the expectation that teachers will include whole child considerations when planning such as differentiation, special education, English language learning, dual language, gifted and talented, social emotional learning, physical activity, and wellness.

Model Lesson- [Energy](#)

- Observing Energy
- Mechanical Energy
- Sound
- Light
- Heat/ Thermal Energy
- Electrical Energy
- Distinguishing between types of Energy

Suggested Pacing: (7 days)

TEKS: 4.6A

Model Lesson- [Electrical Energy](#)

- Conductors vs. Insulators
- Exploring Conductors
- Electric Circuits
- Electromagnetism

Suggested Pacing: (8 days)

TEKS: 4.6B, 4.6C

Model Lesson- [Effects of Force](#)

- Types of Forces Review
- Forces Full Inquiry

Suggested Pacing (5 days)

TEKS: 4.6D, 3.6B