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 fore 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:	**Essential Questions:**
• Energy in its many forms is useful in our everyday lives. • Energy causes change. • Location and motion can be observed and described.	• What is energy, and how do we use it in our everyday life? • How can location and motion be observed and described?

Essential Vocabulary

- amount/cantidad
- attract/atraer
- axle/ eje
- bright/brilliante
- compass/brújula
- darkness/oscuridad
- decrease/ disminuir
- dim/ tenue
- disk/ disco
- effects/efectos
- energy/energía
- force/fuerza
- gravity/ gravedad
- increase/ aumentar
- iron/hierro
- light/luz
- loop/bucle
- magnet/imán
- melt/derretir
- movement/ movimiento
- pattern/patrón
- physical change/cambio físico
- pole/polo
- position/ posición
- ramp/ rampa
- repel/repelar
- roll/rodar
- rotate/girar
- runaway/pista
- slide/deslizar
- slope/pendiente
- solid/sólido
- source/fuente
- sphere/esfera
- spin/girar
- spiral/espiral
- top/trompo
- twist/retorcer
- vibration/vibración
- volume / volumen

Supporting Vocabulary Link

- Elementary School Supporting Vocabulary

Student Prerequisite Knowledge

Students should know:

- energy comes in many forms.
- sound, light and heat energy are important to everyday life.
- that forces change or move objects.
- that magnets have a force that can push or pull an object
- objects can change location.
- objects can move due to forces and energy.

Resources: AISD Module Kit, Model Lesson Portfolio, FOSS: Balance and Motion Investigations, STEMscopes, eBooks: Envisions Science Leveled Readers, Scott Foresman Text, Science Notebook Resources, BrainPop Jr., Discovery Education, 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**
2.6 Force, motion, and energy. The student knows that forces cause change and energy exists in many forms.		
2.6A: Investigate the effects on an object by increasing or decreasing the amounts of light, heat, and sound energy such as how the color of an object appears different in dimmer light or how heat melts butter.	• Objects appear differently under different levels of light. • Substances are affected by different amounts of heat. • Sound can be changed by increasing and decreasing volume.	• Internalize initial vocabulary by identifying examples of light, heat, and sound energy using the . • Recognize heat as a form of energy. • Explore how different levels of heat melt a substance. • Compare the time it takes for different substances to melt under high heat. • Demonstrate that objects appear differently under different amounts of light. • Explain with increasing specificity that objects cannot be seen in complete darkness. • Recognize sound as a form of energy. • Create vibrations with different objects to produce sound. • Amplify sound by using larger surfaces to vibrate more air.
2.6B: Observe and identify how magnets are used in everyday life.	• Magnets are used in everyday life. • Magnets are useful when they repel and attract.	• Explore and communicate about the properties of magnets that make them useful in everyday life. • Use prior knowledge to identify how they have used magnets in everyday life.

2.6C: Trace the changes in the position of an object over time such as a cup rolling on the floor and a car rolling down a ramp.	• An object's change in position depends on its shape, size and the surface over which it rolls.	• Compare results of rolling different-sized objects down ramps. • Observe and compare rolling systems with different-sized wheels. • Observe and compare rolling systems with weight attached to the wheels. • Discover that marbles roll faster and longer when rolled from high to low places.
2.6D: Compare patterns of movement of objects such as sliding, rolling, and spinning.	• Objects slide, roll, and spin in patterns.	• Observe the motion of spinning by creating and observing tops, zoomers, and twirlers. • Use content vocabulary to assist in identifying the forces that act on objects that spin. • Explore different ways of creating rotational motion in cooperative groups. • Explore and describe the variables that affect the speed and behavior of spinning objects.

The study of science is taught through the lens of Scientific Processes (TEKS 2.1-2.4); 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 2nd grade, districts are encouraged to facilitate laboratory and field investigations for at least 60% of instructional time.

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.)
• Melting Butter Investigation • Which substance melts fastest? Investigation Students create a graph using the data collected to compare the time it takes for different substances to melt under high heat. • Can You See in the Dark? Investigation Students explain with increasing specificity that objects cannot be seen in complete darkness using the sentence stem ___ cannot be seen in darkness because___ • Increasing Sound Investigation • **Suggested Dual Language Activity 1** FOSS: Investigation 2: Part 1: Tops Students use a word bank with academic vocabulary to assist in identifying the forces that act on objects that spin. • **Suggested Dual Language Activity 2** Students explore	• Teacher Observations and Questioning • Interactive Notebook Entries • Think-Pair-Share • What Type of Energy is It? Card activity • Can You See in the Dark? question prompt/4 corners • Does it Make Sound? cards • Magnets – True or False? card activity • How do Some Things Move? card activity FOSS: Balance and Motion: Student Pages • Additional Suggestions for Assessment • Teacher observations: Use of safety rules and equipment • Teacher observations: management and use of tools • Tools foldable/web in Interactive Notebook • Students' use of evidence to support explanations and claim.

and describe the variables that affect the speed and behavior of spinning objects using the sentence stem I think that the ___changed position because of its shape/size/or surface it was on. • FOSS: Investigation 2: Part 2: Zoomers • **Suggested Dual Language Activity 1** FOSS: Investigation 2: Part 3: Twirlers Students explore different ways of creating rotational motion in think pair share situations. • **Suggested Dual Language Activity 2** FOSS: Investigation 3: Part 1: Rolling Wheels Students use a table to compare results of rolling different-sized objects down ramps. Students observe and compare rolling systems with weight attached to the wheels by drawing, labeling, and describing their observations. • FOSS: Investigation 3: Part 2: Rolling Cups • FOSS: Investigation 3: Part 3: Rolling Spheres	

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- *Investigating Energy* • Investigating Heat Energy • Investigating Light Energy • Investigating Sound Energy Suggested Pacing: (6 days) TEKS:2.6A
Model Lesson- *Investigating Magnets* • Investigating Magnets Suggested Pacing: (2 days) TEKS: 2.6B
Model Lesson- *Effect of Force* • FOSS: Balance and Motion – Investigation 2: Spinners Suggested Pacing (5 days) TEKS: 2.6C, 2.6D
Model Lesson- *Balance and Motion* • FOSS: Balance and Motion – Investigation 3: Rollers Suggested Pacing: (7 days) TEKS: 2.6C, 2.6D