

**FAMILY FOUNDATIONS
ACADEMY CHARTER SCHOOL
CURRICULUM SCIENCE LESSON
WITH ASSESSMENT**

Nicole Aizaga, 8th Grade Science, Transfer of Energy Unit

K-U-Ds

Key Learning and Unit Essential Question(s)
Key Learning(s): Energy exists and can be transferred and transformed in systems. Energy is neither created nor destroyed, it only changes forms.
Unit Essential Question(s): How does energy transfer or transform into or out of a system?
Common Core State Standards/GLEs

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Standard 3.1.A Energy from the Sun takes the form of electromagnetic waves such as infrared, visible, and ultraviolet electromagnetic waves. The radiation from the sun consists of a range of energies in the electromagnetic spectrum.

(Essential)

Standard 3.1.B Mechanical energy comes from the motion and position of objects. Gravitational potential energy and elastic potential energy are important forms of potential energy that contribute to the mechanical energy of objects.

(Essential)

Standard 3.2.A When the forces acting on an object are balanced, its motion will not change. Unbalanced forces will cause the object's motion to change. Changes in motion depend upon the size and direction of the total unbalanced force exerted on the object.

(Essential)

Standard 3.2.C Forces can be used to transfer energy from one object to another. Simple machines are used to transfer energy in order to simplify difficult tasks.

(Essential)

Standard 3.2.D When energy from the sun is transferred to objects and substances, it can be transformed into a variety of energy forms.

(Essential)

Standard 3.3.A Energy can be transformed from one form into another. Energy transformations often take place while energy is being transferred to another object or substance. Energy transformations and energy transfers can be used to explain how energy flows through a physical system

(Essential)

Standard 3.3.B When a substance absorbs heat energy, or when a different form of energy is absorbed by the substance and is transformed into heat energy, the substance usually expands. The particles within the substance do not expand but the space between the particles increases.

(Essential)

Standard 1.1.C Construct tables, diagrams and graphs, showing relationships between two variables, to display and facilitate analysis of data. Compare and question results with and from other students.

(Essential)

Standard 1.1.D Form explanations based on accurate and logical analysis of evidence. Revise the explanation using alternative descriptions, predictions, models and knowledge from other sources as well as results of further investigation. **(Essential)**

KNOW	UNDERSTAND	DO
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<p>Energy comes in different forms, and can change from one form to another.</p> <p>Energy can be transferred from one object to another.</p> <p>Energy cannot be created or destroyed.</p> <p>The particles that make up materials are in constant but random motion. The combined random kinetic energy of particles is called heat energy.</p> <p>Temperature is the measure of the average motion energy of the particles in a material or substance.</p> <p>Heat energy transfers by conduction, convection and radiation.</p> <p>Heat energy transfers from warmer substances to cooler substances until it reaches same temperature (equilibrium).</p> <p>When particles absorb energy they increase the amount of space between the particles but do not change in size.</p> <p>Energy can raise the temperature of matter or change its state.</p> <p>Vocabulary: Transfer Transform Kinetic Energy Potential Energy Law of Conservation of Energy Energy chain Conduction Radiation Convection Heat Energy Particle Model</p>	<p>Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy) and types of energy associated with the position of mass (potential energy).</p> <p>Energy may transfer into or out of a system and it may change forms (transform) but the total energy cannot change.</p> <p>The particle model is a representation of the arrangement and motion of particles in different states of matter.</p> <p>Heat energy transfers by conduction, radiation, or convection and from areas of higher temperature (energy) to areas of lower temperature (energy).</p>	<p>Explain that kinetic energy is the energy an object has because of its motion and identify that kinetic energy depends upon the object's speed and mass.</p> <p>Design and carry out investigations to determine how changing the mass of an object or changing its speed changes its kinetic energy.</p> <p>Explain that gravitational potential energy (GPE) is the energy of position (above the Earth's surface) and that it depends on the object's mass and height above the ground. Relate that lifted objects have GPE and that the size of an object's GPE depends on its mass and the vertical distance it was lifted.</p> <p>Explain that the mechanical energy of an object is the sum of its kinetic energy and its potential energy at any point in time.</p> <p>Accurately construct, interpret, and analyze tables, diagrams and graphs, showing relationships between two variables relating to energy.</p> <p>Use the particle model to explain heat energy as the combined random kinetic energy of particles that make up an object and while the heat energy and temperature of an object are related, they are different quantities.</p> <p>Describe how the motion of water particles in a glass of cold water is different from the motion of water particles in a glass of hot water.</p> <p>Explain how the addition or removal of heat energy can change an object's temperature and or its physical state.</p> <p>Conduct simple investigations involving changes of physical state and temperature. Relate that there is no change in</p>
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Equilibrium

temperature when the substance

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Key Learning: Energy exists and can be transferred and transformed in systems. Energy is neither created nor destroyed, it only changes form.

Student Learning Map

Unit Essential Question: How does energy transfer or transform into or out of a system?

Concept: Forms of Energy	Concept: Transfer and Transformation of energy	Concept: Heat Energy
Lesson Essential Questions: What factors influence energy? What are different forms of energy?	Lesson Essential Questions: How can energy be passed from one object to another or change forms? How does energy transfer without changing the amount of energy?	Lesson Essential Questions: How is the arrangement of particles related to temperature? What ways is HE transferred? How does HE reach a balance?

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<p><u>Vocabulary:</u></p> <p>GPE, energy, variable, mass, height, KE</p>	<p><u>Vocabulary:</u></p> <p>Energy chain, transfer, transform, conservation of energy, heat energy</p>	<p><u>Vocabulary:</u></p> <p>Convection, conduction, radiation, friction, particle model, temperature, absorb</p>
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Acquisition Lesson Plan: The factors that influence energy

<p>Lesson Essential Question: What factors influence energy?</p> <p>Assessment Prompt #1: speed, mass, matter, and height are all important to understanding energy</p> <p>Assessment Prompt #2: mass, speed, and height all influence the amount of energy an object has</p>	
<p>Activating Strategy: (<i>Learners Mentally Active</i>)</p> <p>Students will watch a video clip of a roller coaster and identify where and what the energy is in the clip in their notebook.</p>	<p>Acceleration/Previewing: (<i>Key Vocabulary / Words needed to answer the EQ</i>)</p> <ul style="list-style-type: none"> speed mass matter height
<p>Teaching Strategies: <i>Graphic organizers, collaborative pairs</i></p>	

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Learning Plan:

After viewing the video, there will be a class discussion about the energy found in the video. The teacher will introduce the new vocabulary words to the students with just a simple definition. The teacher will model for students how to use a graphic organizer for the new vocabulary words. Students will work in pairs to fill out an organizer for each of the words and the groups will share out.

Assessment Prompt #1: Successful completion of the graphic organizers

The teacher will go through a power point called would you rather. There are three scenarios, for example would you rather get hit by a 5 pound baseball or a 5 pound wrecking ball. Students will answer the questions and during class discussion students will identify to the teacher that mass, speed, and height all affect the amount of energy in an object.

Assessment Prompt #2: What are the three factors that influence the amount of energy an object has and how does it influence the energy? Quick write

Assignments and Assessments:

Lab #1: get the ball rolling. Students will see the effect of release height of a golf ball on speed.

Summarizing Strategies: *(Learners Summarize & Answer Essential Question)*

Answer the EQ in journals and go over it together as a class

Acquisition Lesson Plan: Different forms of Energy

Lesson Essential Question: What are the different forms of energy?

Assessment Prompt #1: GPE and KE are two major forms of energy

Assessment Prompt #2: speed and mass change as potential and KE change

Assessment Prompt #3: there are other forms of energy in addition to potential and kinetic energy

Activating Strategy: *(Learners Mentally Active)*

Students will watch a video of bowling balls falling down an alley. They will list what and where the energy can be found.

Acceleration/Previewing: *(Key Vocabulary / Words needed to answer the*

EQ)

| GPE

| KE

| HE

| SE

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Teaching Strategies: *sorting, collaborative pairs*

Learning Plan:

Students will be given a ziploc bag of different images. They will be asked to sort the images into categories with a partner. After some time with the categories, the teacher will ask what kinds categories the students came up with. The teacher will elect students to say that there are things moving and things not moving. The students will then resort their cards into those two categories and list them on a piece of paper. The teacher will then provide the students the formal definition of potential and kinetic energy and the class will provide examples.

Assessment Prompt #1: Quick write: GPE and KE are the same because.....but different because...

Students will then complete lab #2 knock 'em down where they will see how the height and mass of a golf ball will effect how many index cards are knocked over. After the lab the teacher will do a mini lesson on graphing to discuss expectations of graphing in this class. The teacher will model how to do the graph for this lab and then students will graph their own results. They will do questions to summarize what they learned in the lab.

Assessment Prompt #2: What happened to the amount of energy as the golf ball's speed increased?

Students will complete a reading assignment on different forms of energy. The teacher will model for students how to take cornell notes and students will practice cornell notes for this reading. Students will compare cornell notes and revise. After the reading students will complete questions about what other types of energy exist in systems.

Assessment Prompt #3: Reading comprehension questions

Assignments and Assessments:

Lab # 2 knock em down

Summarizing Strategies: Answer the EQ in journals and go over it together as a class

Acquisition Lesson Plan: Transfer and Transformation of Energy

Lesson Essential Question: How can energy be passed from one object to another or change forms?

Assessment Prompt #1: Energy transfers pass energy and transformations change energy

Assessment Prompt #2: Energy can be passed from one object to another

Assessment prompt #3: Friction is a force that creates heat energy

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Activating Strategy: (*Learners Mentally Active*)
Students will watch an energy bar commercial and answer the journal question: Where do you see energy being passed?

Acceleration/Previewing: (*Key Vocabulary / Words needed to answer the EQ*)
| transfer
| transformation
| Heat Energy
| Friction

Teaching Strategies: *Collaborative Pairs; Graphic Organizers*

Learning Plan:

1. The teacher will preview the vocal words energy transfer and transformation for the students. The students will copy definitions and the class will come up with examples of energy transfers and transformations. Students will complete a reading with cornell notes in their notebooks on energy transfers and transformations with teacher support.

Assessment Prompt #1: Students will provide their own examples of energy transfers and transformations. Students will complete lab 3 “passing energy along” in this lab a golf ball is rolled down a ramp and hits a cup. The cup will slide as the KE from the ball is transferred to the cup. Students will identify how the energy changes.

Assessment Prompt #2: Describe what happens to the energy that you gave the ball when you lifted it to the top of the ramp. Trace what became of this energy as the ball was placed on the ramp, released, and finally rolled to rest.

In 6th grade students should have learned about friction. To remind students of this concept students will watch a clip of bill nye about forces and fill out a graphic organizer on forces.

Assessment Prompt #3: Identify 3 different types of forces. What does friction cause?

Assignments and Assessments: Lab questions

Summarizing Strategies: Answer the EQ in journals and go over it together as a class

Acquisition Lesson Plan: Law of conservation of energy

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Lesson Essential Question: How does energy transfer without changing the amount of energy?

Assessment Prompt #1: Use the particle model and the concept of energy transfer to describe how air particles interfere with the motion of objects

Assessment Prompt #2: Construct an energy chain that describes energy flow in everyday phenomena

Activating Strategy: (*Learners Mentally Active*)
The teacher will hold a water bottle suspended from the ceiling. The teacher will ask the students if she lets it go if it will hit her

Acceleration/Previewing: (*Key Vocabulary / Words needed to answer the EQ*)

law of conservation
energy chain

Teaching Strategies: *Demos, pairs, graphic organizers*

Learning Plan:

1. The teacher will use a hanging water bottle to demonstrate a pendulum. As students watch the pendulum go back and forth the teacher will prompt students to answer questions and draw diagrams on a graphic organizer. The students will come to the conclusion that the pendulum stops moving because there is friction between the water bottle and the air particles causing it to come to rest.

Assessment Prompt #1: Summary of activity: Why does the pendulum come to rest?

The teacher will demonstrate to students how to do an energy chain after they watch a video of a skateboarder going down a half pipe. The students and teachers will show where the energy is coming from and where it is going to show conservation of energy. All of the energy comes from somewhere and goes somewhere it does not disappear. The students will do a sample energy chain for practice and then a graded project

Assessment Prompt #2: Practice energy chain

Assignments and Assessments:

Energy chain project Quiz on transfer and transformation of energy

Summarizing Strategies: (*Learners Summarize & Answer Essential Question*)

Summarizing Strategies: Answer the EQ in journals and go over it together as a class

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