**Content Area:** Science S4.C Physical Sciences – Characteristics of Energy **Grade Level: 4**

**Content Standard:** 3.2.4.B6 Energy-Give examples of how energy can be transformed from one form to another.

**PASA Anchor:**No PASA Anchor

**PASA linked to PSSA Anchor(s):** No link

**Grade Level PSSA Anchor/Eligible Content:** S4.C.2.1 Recognize basic energy types and sources, or describe how energy can be changed from one form to another.

**Eligible Content:** S4.C.2.1.1 Identify energy forms and examples (e.g. light, heat, stored motion, electrical)

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| **Webb’s Depth of Knowledge (Cognitive Demand)** | |
| **1 – Recall**  **2 – Application of Skill/Concept** | **3 – Strategic Thinking**  **4 – Extended Thinking** |

**Big Idea:** Energy has many forms

**Essential Questions:** How does energy change form one form to another as it moves through a system?

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| **Prioritization** |
| Skill is assessed in the general assessment  Skill is assessed in the alternate assessment  Skill is required for future learning in the content area  Needed in next age/appropriate environment  Required for instructional activities in a variety of practice communities  Lesson plan available in SAS Voluntary Model Curriculum |

In this unit, students learn that energy has many forms. Students will:

* Recognize basic energy types and sources.
* Identify energy forms and provide examples.
* Describe how energy can be changed from one form to another.

**Example of General Education Instructional Activity:**

1. **Introductory Activity:**

Start the lesson by having students create a KWL chart in their science journals. If students do not have an ongoing science journal, give all students a copy of the KWL chart ([S-4-5-1\_ KWL Chart.doc](http://websites.pdesas.org/sethtriggs/2010/5/26/44759/file.aspx)). Have students write the following types of energy under the W (What) section of their KWL charts, leaving space after each to allow for note taking throughout the lesson. Have students complete this task before showing them the energy video.

* energy
* radiant energy
* thermal energy
* chemical energy
* electrical energy
* kinetic energy
* potential energy

1. Explain to students that as they watch the video, they will write notes under the appropriate vocabulary terms in their science journals. These notes will be used to generate and answer questions throughout the unit and help them study for the end of unit test on energy.

**2.A**. Students can write these definitions and begin to list examples of each as they watch the video and complete the following activities. Ask students to listen for and write down examples of various forms of energy while you watch the video. Begin the Matter and Energy video lasting approximately 11 minutes at <http://videos.howstuffworks.com/hsw/20431-matter-and-energy-defining-energy-video.htm>.

Teacher Explanation: “Energy has many forms. Some examples include radiant, thermal, electrical, and chemical. Energy can either be kinetic/in motion or potential/stored. Also the Sun, or solar energy, is Earth’s primary energy source (as radiant or light energy, not as heat or thermal energy.) The Earth is too far away from the Sun for thermal energy, but the light radiant energy causes thermal energy on Earth, which we feel as heat. Solar energy provides the Earth with its main source of energy which is transformed into other forms of energy: wind, photosynthesis or chemical energy, friction (rub hands or two sticks to feel heat; this is energy transforming from mechanical energy of motion to thermal energy), chemical (burning of oil, gas, coal, wood), and electrical energy (heat when an electric current flows through thin wires such as the filament in a light bulb or toaster).”

1. When the video is done, divide students into small groups. Each student in the group shares a fact from their journal/KWL chart within their group. Students enter additional information into their journal/chart that they may not have captured during viewing of video. When small group work is finished, call on volunteers from each group to share a fact. Record the facts on chart paper (or SMART Board or overhead transparency). When all groups have shared their facts, read aloud the facts recorded on the chart paper
2. Differentiate between the various forms of energy, citing examples. Explain to students that kinetic energy is energy in motion, like running and swimming. Objects like a moving car, a falling rock, or a strong wind all have kinetic energy

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| **General Instructional Format** | **Formative Assessment Options** |
| **Cooperative learning**  **Project based**  **Performance event/task**  **Note-taking**  **Presentation**  **Direct Instruction (I do, We do, You do)**  **Indirect Instruction**  **Other: video** | **Observation with Data Collection**  **Random Reporter**  **Ticket out the door**  **Think Pair Share**  **Student work sample**  **Video tape**  **Multiple choice Item**  **Open response Item**  **Item Other:** |

**Access to the Instructional Activity for Students at Different Communication Levels**

**Symbolic**

In this unit, students learn that energy has many forms. Students will:

* Recognize basic energy types and sources.
* Identify energy forms and provide examples.
* Describe how energy can be changed from one form to another.

**Example of General Education Instructional Activity:**

1. **Introductory Activity:**

Start the lesson by having students create a KWL chart (provide KWL chart with 7 blank spaces) in their science journals. If students do not have an ongoing science journal, give all students a copy of the KWL chart ([S-4-5-1\_ KWL Chart.doc](http://websites.pdesas.org/sethtriggs/2010/5/26/44759/file.aspx)). Have students write (direct students to place paired words & picture cards representing different forms of energy on the chart) the following types of energy under the W (What) section of their KWL charts, leaving space after each to allow for note taking throughout the lesson. Have students complete this task before showing them the energy video (in preparation to view the video demonstrating forms of energy, the teacher will pair enlarged words/pictures to the energy forms discussed in the video).

* energy
* radiant energy
* thermal energy
* chemical energy
* electrical energy
* kinetic energy
* potential energy

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1. Explain to students that as they watch the video, they will write notes under the appropriate vocabulary terms in their science journals. These notes will be used to generate and answer questions throughout the unit and help them study for the end of unit test on energy.

**2.A**. Students can write these definitions and begin to list examples of each as they watch the video and complete the following activities. Ask students to listen for and write down examples of various forms of energy while you watch the video (Note taking: Student will be provided with pre-made sentence strips describing energy forms for placement on KWL chart). Begin the Matter and Energy video lasting approximately 11 minutes at <http://videos.howstuffworks.com/hsw/20431-matter-and-energy-defining-energy-video.htm>.

Teacher Explanation (the teacher will pair enlarged words/pictures/objects to the energy forms): “Energy has many forms. Some examples include radiant, thermal, electrical, and chemical. Energy can either be kinetic/in motion or potential/stored. Also the Sun, or solar energy, is Earth’s primary energy source (as radiant or light energy, not as heat or thermal energy.) The Earth is too far away from the Sun for thermal energy, but the light radiant energy causes thermal energy on Earth, which we feel as heat. Solar energy provides the Earth with its main source of energy which is transformed into other forms of energy: wind, photosynthesis or chemical energy, friction (rub hands or two sticks to feel heat; this is energy transforming from mechanical energy of motion to thermal energy), chemical (burning of oil, gas, coal, wood), and electrical energy (heat when an electric current flows through thin wires such as the filament in a light bulb or toaster).”

1. When the video is done, divide students into small groups. Each student in the group shares a fact from their journal/KWL chart within their group [Student will select fact from their chart either through verbal response or gesture and share fact via their primary mode of communication (verbal or written word, sign, communication device)]. Students enter additional information into their journal/chart that they may not have captured during viewing of video (provide additional pre-made sentence strips describing energy forms for placement on KWL chart). When small group work is finished, call on volunteers from each group to share a fact [share fact via their primary mode of communication (verbal or written word, sign, communication device)]. Record the facts on chart paper (or SMART Board or overhead transparency). When all groups have shared their facts, read aloud the facts recorded on the chart paper
2. In preparation for lecture regarding the explanation of different forms of energy the teacher will pair enlarged words/pictures to the energy forms discussed. Differentiate between the various forms of energy, citing examples (pair enlarged words/pictures to the examples of energy forms). Explain to students that kinetic energy is energy in motion, like running and swimming (provide student with word/picture card representing forms of kinetic energy). Objects like a moving car, a falling rock, or a strong wind all have kinetic energy (provide word/picture card of objects that have kinetic energy).

**Emerging Symbolic**

In this unit, students learn that energy has many forms. Students will:

* Recognize basic energy types and sources.
* Identify energy forms and provide examples.
* Describe how energy can be changed from one form to another.

**Example of General Education Instructional Activity:**

1. **Introductory Activity:**

Start the lesson by having students create a KWL chart [Provide KWL chart with 7 blank spaces - Enlarge chart to account for placement of objects if utilized] in their science journals. If students do not have an ongoing science journal, give all students a copy of the KWL chart ([S-4-5-1\_ KWL Chart.doc](http://websites.pdesas.org/sethtriggs/2010/5/26/44759/file.aspx)). Have students write the following types of energy under the W (What) section of their KWL charts [Direct students to place paired picture (including word)/object representing different forms of energy on the chart], leaving space after each to allow for note taking throughout the lesson. Have students complete this task before showing them the energy video (In preparation to view the video demonstrating forms of energy, the teacher will pair enlarged words/pictures/objects to the energy forms discussed in the video).

* energy
* radiant energy
* thermal energy
* chemical energy
* electrical energy
* kinetic energy
* potential energy

1. Explain to students that as they watch the video, they will write notes under the appropriate vocabulary terms in their science journals (enlarged chart to account for placement of objects if utilized). These notes will be used to generate and answer questions throughout the unit and help them study for the end of unit test on energy.

**2.A**. Students can write these definitions and begin to list examples of each as they watch the video and complete the following activities. Ask students to listen for and write down examples of various forms of energy while you watch the video (Note taking: Student will be provided with pre-made pictures &/or objects depicting energy forms for placement on KWL chart). Begin the Matter and Energy video lasting approximately 11 minutes at <http://videos.howstuffworks.com/hsw/20431-matter-and-energy-defining-energy-video.htm>.

Teacher Explanation (the teacher will pair enlarged words/pictures/objects to the energy forms): “Energy has many forms. Some examples include radiant, thermal, electrical, and chemical. Energy can either be kinetic/in motion or potential/stored. Also the Sun, or solar energy, is Earth’s primary energy source (as radiant or light energy, not as heat or thermal energy.) The Earth is too far away from the Sun for thermal energy, but the light radiant energy causes thermal energy on Earth, which we feel as heat. Solar energy provides the Earth with its main source of energy which is transformed into other forms of energy: wind, photosynthesis or chemical energy, friction (rub hands or two sticks to feel heat; this is energy transforming from mechanical energy of motion to thermal energy), chemical (burning of oil, gas, coal, wood), and electrical energy (heat when an electric current flows through thin wires such as the filament in a light bulb or toaster).”

1. When the video is done, divide students into small groups. Each student in the group shares a fact from their journal/KWL chart within their group [Student will select fact from their chart either through vocalization, gesture, picture and share fact via their primary mode of communication (gesture, picture, object, pointing, communication device)]. Students enter additional information into their journal/chart that they may not have captured during viewing of video (provide additional pre-made pictures &/or objects depicting energy forms for placement on KWL chart). When small group work is finished, call on volunteers from each group to share a fact [share fact via their primary mode of communication (gesture, picture, object, pointing, communication device)]. Record the facts on chart paper (or SMART Board or overhead transparency). When all groups have shared their facts, read aloud the facts recorded on the chart paper
2. In preparation for lecture regarding the explanation and provision of examples of different forms of energy the teacher will pair enlarged words/pictures/objects to the energy forms discussed. Differentiate between the various forms of energy, citing examples (pair enlarged words/pictures/objects to the examples of energy forms). Explain to students that kinetic energy is energy in motion, like running and swimming [provide student with word/picture card and object representing specific forms of kinetic energy (running and swimming)]. Objects like a moving car, a falling rock, or a strong wind all have kinetic energy [provide word/picture card and object representing specific objects(moving car, falling rock and strong wind) that have kinetic energy].

**Pre-Symbolic**

In this unit, students learn that energy has many forms. Students will:

* Recognize basic energy types and sources.
* Identify energy forms and provide examples.
* Describe how energy can be changed from one form to another.

**Example of General Education Instructional Activity:**

1. **Introductory Activity:**

Start the lesson by having students create a KWL chart [Provide KWL chart with 7 blank spaces - Enlarge chart to account for placement of object representations] in their science journals. If students do not have an ongoing science journal, give all students a copy of the KWL chart ([S-4-5-1\_ KWL Chart.doc](http://websites.pdesas.org/sethtriggs/2010/5/26/44759/file.aspx)). Have students write the following types of energy under the W (What) section of their KWL charts, leaving space after each to allow for note taking throughout the lesson [Direct students to place paired picture/object representing different forms of energy on the chart (with physical assistance as necessary) - as appropriate provide verbal description, physical exploration of objects, and sensory input paired with representation]. Have students complete this task before showing them the energy video (In preparation of the video demonstrating forms of energy, the teacher will pair enlarged pictures/objects representations to the energy forms discussed in the video).

* energy
* radiant energy
* thermal energy
* chemical energy
* electrical energy
* kinetic energy
* potential energy

1. Explain to students that as they watch the video, they will write notes under the appropriate vocabulary terms in their science journals (enlarged chart to account for placement of objects representations). These notes will be used to generate and answer questions throughout the unit and help them study for the end of unit test on energy.

**2.A**. Students can write these definitions and begin to list examples of each as they watch the video and complete the following activities. Ask students to listen for and write down examples of various forms of energy while you the video (Note taking: Student will be provided with objects representations depicting energy forms for placement on KWL chart - as appropriate, pair verbal description, physical exploration of objects, and sensory input with each object representation). Begin the Matter and Energy video lasting approximately 11 minutes at <http://videos.howstuffworks.com/hsw/20431-matter-and-energy-defining-energy-video.htm>.

Teacher Explanation (the teacher will pair enlarged pictures/objects to the energy forms): “Energy has many forms. Some examples include radiant, thermal, electrical, and chemical. Energy can either be kinetic/in motion or potential/stored. Also the Sun, or solar energy, is Earth’s primary energy source (as radiant or light energy, not as heat or thermal energy.) The Earth is too far away from the Sun for thermal energy, but the light radiant energy causes thermal energy on Earth, which we feel as heat. Solar energy provides the Earth with its main source of energy which is transformed into other forms of energy: wind, photosynthesis or chemical energy, friction (rub hands or two sticks to feel heat; this is energy transforming from mechanical energy of motion to thermal energy), chemical (burning of oil, gas, coal, wood), and electrical energy (heat when an electric current flows through thin wires such as the filament in a light bulb or toaster).”

1. When the video is done, divide students into small groups. Each student in the group shares a fact from their journal/KWL chart within their group [Student will select fact from a limited array of choices from their chart either through eye gaze, vocalization gesture or physical manipulation of the object representation and share fact via their primary mode of communication (eye gaze, gesture, object manipulation, pointing, etc.)]. Students enter additional information into their journal/chart that they may not have captured during viewing of video (provide additional objects depicting energy forms for placement on KWL chart). When small group work is finished, call on volunteers from each group to share a fact [share fact via their primary mode of communication (eye gaze, gesture, object manipulation, pointing, etc.)]. Record the facts on chart paper (or SMART Board or overhead transparency). When all groups have shared their facts, read aloud the facts recorded on the chart paper
2. In preparation for lecture regarding the explanation and provision of examples of different forms of energy the teacher will pair enlarged object representations to the energy forms discussed. Differentiate between the various forms of energy, citing examples (tactile or object representations to the examples of energy forms). Explain to students that kinetic energy is energy in motion, like running and swimming [provide student with object representing specific forms of kinetic energy (running and swimming)]. Objects like a moving car, a falling rock, or a strong wind all have kinetic energy [provide tactile or object representation of specific objects(moving car, falling rock and strong wind) that have kinetic energy].