# Bachelor of Education (Elementary) &

# Bachelor of Education (Secondary) STEM

# Unit Plan Template

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| **Unit Title:** | Energy | **Number of Lessons** | 11 | **Time**  **(In weeks):** | 2-3 |
| Name: | Stephanie Luca | Subject(s): | Science | Grade(s): | 4 |

Rationale

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| This unit is important because it introduces students to different forms of energy, allowing them to develop an understanding of energy sources around them. Students learn about kinetic and potential energy, light energy, sound energy, thermal energy, and electrical energy. Students also develop an understanding of how energy transfers, as well as the meaning of the input and output of energy. |

Overview:

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| This unit begins with introducing students to energy as a whole. The next 2 lessons focus on the difference between kinetic and potential energy, and help students understand how these 2 forms of energy can transform into one another. Lessons 4 and 5 discuss light energy and help students understand the difference between natural and artificial light sources. Lesson 6 focuses on sound energy and how it works, while lesson 7 discusses thermal energy and the difference between thermal conductors and insulators. The remaining lessons focus on electrical energy and energy input/output. |

CORE COMPETENCIES

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| Communication | Thinking | Personal & Social |
| * Students engage in conversation where they listen, contribute, and develop shared understandings (communicating) * Students combine efforts to achieve a shared goal and develop shared understandings (collaborating) | * Students use critical, metacognitive, and reflective thinking skills to build on their understanding of energy (critical thinking) | * Students develop positive and diverse relations with others (social responsibility) |

BIG IDEAS

(multiple subject areas for integrated unit)

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| Subject Name Science | Subject Name | Subject Name |
| * Energy can be transformed |  |  |

LEARNING STANDARDS

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| Curricular Competencies | Content |
| * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
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Prerequisite Concepts and Skills:

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| * Students need to be able to read at grade level * Students need to be able to write at grade level * Students need to be able to listen actively |

Teacher Preparation Required:

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| Lesson # | Teacher Preparation Required (See Unit Plan Sample) |
| Lesson 1 | * Have vocab words scattered around classroom * Have enough recording sheets photocopied * Have video set up |
| Lesson 2 | * Have enough sheets photocopied |
| Lesson 3 | * Have enough sheets photocopied * Have video set up |
| Lesson 4 | * Have enough sheets photocopied * Have all materials and images set up for demonstrations |
| Lesson 5 | * Have enough sheets photocopied |
| Lesson 6 | * Have PowerPoint set up * Have enough sheets photocopied |
| Lesson 7 | * Have PowerPoint set up * Have enough sheets photocopied |
| Lesson 8 | * Have PowerPoint set up * Have video set up |
| Lesson 9 | * Ensure there are enough whiteboards and markers |
| Lesson 10 |  |

Cross-Curricular Connections:

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| * ELA |

Aboriginal Connections/ First Peoples Principles of Learning:

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| * Learning is holistic, reflexive, reflective, experiential, and relational. * Learning takes patience and time |

Universal Design for Learning (UDL)

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| Multiple means of representation   * Examples with different materials * Visuals * PowerPoint quizzes * Videos * Read and responds * Final project   Multiple means of engagement:   * Examples with different materials * Visuals * PowerPoint quizzes * Videos * Read and responds * Final project   Multiple means of action and expression:   * Final project * Read together * Collaborative quizzes and games |

Differentiated Instruction (DI):

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| * The students who struggle with reading and writing will be assisted * Passages are read out together as a class for students who struggle with reading |

Overview of Lessons:

Lesson 1

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| Name &Time (Minutes Allotted): | What is Energy? (45 minutes) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to recognize and determine the definition of energy, the importance of energy, and different forms of energy |
| Assessment: | * Student participation * Teacher observation * Students complete a practice sheet after learning important facts about energy |
| Teaching Strategies: | * Speak with expression |
| Materials: | * What is energy? Fact sheet: * What is energy? Practice sheet * YouTube video: [(71) Energy Lesson 1: What is energy? for kids - YouTube](https://www.youtube.com/watch?v=hDvEC1cPQbY&list=PLsapvjNzsAykceBtN84cEk0ShJ5iniJOy) * Scissors * Glue sticks |
| y | |
| Introduction/Hook: | * Show students the YouTube video [(71) Energy Lesson 1: What is energy? for kids - YouTube](https://www.youtube.com/watch?v=hDvEC1cPQbY&list=PLsapvjNzsAykceBtN84cEk0ShJ5iniJOy) to introduce them to the topic of energy * Inform students that they will learn all about energy and the different forms of energy mentioned in the video * Remind students that energy is present all around us |
| Body: | * Ask a student volunteer to hand out the “What is Energy?” fact sheet * Regain student attention, and inform them that we will read together * Ask for students to raise hands if they would like to volunteer to read * Choose a student and allow them to read a few sentences. Thank the student and ask for a different volunteer to continue * Repeat until the reading is complete * Ask a student volunteer to hand out the “what is energy?” practice sheet. All answers can be found on the fact sheet. Students are asked to cut out examples and glue them next to their correct forms of energy * Explain to students what is expected of them – and do the first couple together to ensure they are on the right track * Give students time to work. Walk around, observe, and provide assistance where needed * After most students have completed it, regain student attention using classroom windchimes * Inform students that we will go over each question together * Go through the questions, asking students to raise hands to share their answers |
| Closure: | * Thank students for participating and ask them to place their sheets into their science duo-tangs * Inform students that they will continue to learn about energy and the different types of energy in depth over the next few weeks * Transition to next lesson or dismiss for lunch |

Lesson 2

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| Name &Time (Minutes Allotted): | Energy Vocabulary Hunt |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to find and copy energy vocabulary words |
| Assessment: | * Participation |
| Teaching Strategies: | * Encourage students to participate and find as many words as they can |
| Materials: | * Vocabulary hunt recording sheet * Vocabulary hunt terms to scatter around the classroom * Pencils and erasers * PowerPoint presentation (in progress) |
| Lesson Activities: | |
| Introduction/Hook: | * Show students a list of all the different forms of energy * Inform students they will learn about some of these forms of energy in more depth, but that it is important to have a basic understanding of all of them |
| Body: | * Hand out the energy vocabulary hunt sheets, and inform students that they can find their definitions around the room * Ask students to grad a clipboard and begin searching the room for different energy forms. Ask students to get as far as they can, but inform them that it is okay if they cannot find them all * After about 20 minutes, regain student attention and ask them to take their seats * Pull up a PowerPoint presentation that has the definitions of all the forms of energy. Before revealing each, ask students to raise hands to share if they found the definition – ask a student to read it out, then reveal the definition so students can write it down * Repeat with all the different energy forms |
| Closure: | * Thank students for participating and inform them that they will take a closer look at some of these energy forms * Transition to next lesson |

Lesson 3

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| Name &Time (Minutes Allotted): | Energy Transformation |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to recognize the law of conservation of energy |
| Assessment: | * Participation * Teacher observation |
| Teaching Strategies: | * Read together with students |
| Materials: | * [(75) The Law of Conservation of Energy - YouTube](https://www.youtube.com/watch?v=Vx0yAS2u8gI) * Practice sheets * Pencils and erasers |
| Lesson Activities: | |
| Introduction/Hook: | * Show students the YouTube video [(75) The Law of Conservation of Energy - YouTube](https://www.youtube.com/watch?v=Vx0yAS2u8gI) to ensure they have a basic understanding of the concept before diving into it deeper * On a student’s desk where everybody can see, place down a ruler and line up 3 marbles in the middle of the ruler. Place one marble at the end of the ruler * Flick the single marble toward the group of three. If done correctly, only the final marble should move away * Explain to students that the energy is transferred through the first two marbles and into the third |
| Body: | * After the experiment, inform students that we will take a closer look at energy transformation * Hand out the energy transformation fact sheet * Similar to the previous lesson, ask a student volunteer to begin reading. After a few sentences, thank the student and call on a different student to continue reading. Continue until the reading is complete * Remind students that energy input is the energy that goes into something, and energy output is the energy that comes out of something * Ask a student volunteer to hand out the energy transformation practice sheet and go over each question. Remind students that all answers can be found on the fact sheet * Complete the first question of the energy input/output chart with students. Ask them what the energy input and output of a hairdryer is. Ensure they understand that the input is electrical and the output is thermal, sound, and kinetic * Students are asked to provide 2 examples of their own – do one with students together as this may be tricky * If students are unable to think of an example, suggest a lamp. Ask students what the energy input is (electrical) and what the energy output is (light, and sometimes heat) * Give students time to work through the rest of the sheet on their own. Walk around, observe, and provide assistance where needed |
| Closure: | * Regain student attention using classroom windchimes * Go over each fill in the blank question, asking students to raise hands to share what they got for answers * Ask students to raise hands to share what they used as their other example for input/output of energy * Ask students to hand in their sheets in the hand-in bin * Transition to next lesson |

Lesson 4

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| Name &Time (Minutes Allotted): | Kinetic and Potential Energy (1 hour) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to recognize and identify the difference between kinetic and potential energy |
| Assessment: | * Teacher observation * Students demonstrate their learning by completing a practice sheet where they identify whether something is kinetic or potential energy |
| Teaching Strategies: | * Speak with expression * Have examples and props ready and set up * Have strategy to regain student attention (windchimes) |
| Materials: | * Whiteboard and marker * A basketball * Smart Board and access to Google images – image of a car and bike, image of a bow and arrow, image of a rollercoaster * Kinetic or potential energy? Practice sheet: |
| Lesson Activities: | |
| Introduction/Hook: | * Write “energy” on a piece of chart paper and ask students to raise hands to share what they have learned about energy so far * Write student responses on the whiteboard * Inform students that today, they will learn about kinetic and potential energy |
| Body: | * Ask students if anyone knows, or has any guesses, about what kinetic energy is while writing kinetic energy on the board * Explain to students that kinetic energy is energy that moves, or in other words, energy in motion * Explain to students that a car has kinetic energy because it moves * Have grabbed a basketball from the gym prior to lesson – and bounce the ball on the ground. Explain to students that this ball has kinetic energy when it is coming down from a throw * Explain to students that the toy cars they play with have kinetic energy when the cars are going down a slope or a ramp * Ask students if they can think of more examples of what might have kinetic energy * Next, explain to students that mass and speed have a lot to do with how much kinetic energy something has * Show students a google image of a car and bicycle. * Ask students which one they think has more mass – ensure students understand that the car has more mass * Explain to students that when it is in motion, the kinetic energy of the bike will be a lot less than the car because it has less mass * Have 2 toy cars that differ in size – one quite a bit smaller than the other. Ask students which one would have more kinetic energy in motion. Ensure students understand that the larger car would have more kinetic energy * Next, ask students if anyone knows, or can guess, what potential energy is * Explain that potential energy is energy that is stored, or energy that has the potential to go into motion – so it is not in motion, but has the potential to go into motion * Explain that when an object moves up above the ground or against gravity, it has potential energy * Show students an image of a bow and arrow [cartoon image of bow and arrow - Bing images](https://www.bing.com/images/search?view=detailV2&ccid=G0Pjd9Wb&id=EA6102299FE53DAC675B16403393340F03DE0B83&thid=OIP.G0Pjd9WbkNDz8Jw0t7XgiQHaHa&mediaurl=https%3a%2f%2fmedia.istockphoto.com%2fvectors%2fbow-and-arrow-archery-icon-image-vector-id867142498%3fk%3d6%26m%3d867142498%26s%3d612x612%26w%3d0%26h%3deIP88zv0DUd2HFnvxaszI_kHM4jvkV9ULbtu_IDd12Q%3d&cdnurl=https%3a%2f%2fth.bing.com%2fth%2fid%2fR.1b43e377d59b90d0f3f09c34b7b5e089%3frik%3dgwveAw80kzNAFg%26pid%3dImgRaw%26r%3d0&exph=612&expw=612&q=cartoon+image+of+bow+and+arrow&simid=608038610838300539&FORM=IRPRST&ck=5BFEBA76933BD4182FDB4CA308FD5011&selectedIndex=8&ajaxhist=0&ajaxserp=0) and explain how it has potential energy when the bow is being pulled back. When the arrow is released, however, it has transformed to kinetic energy * Provide another example – a rubber band that is stretched back before being released * Use the basketball again – throw it up in the air and let it come down. Explain to students that the ball has potential energy when it is in the air before it comes back down. Ask students what it has when it comes back down (kinetic energy) * Show students an image of a rollercoaster with 3 cars on it – one heading towards the top of the slope, one right at the top of the slope, and one heading down the slope. Ask students which car has the most potential energy. Ensure students understand that the car at the top of the slope has the most potential energy. Ask students which car has kinetic energy (the car going down) * Direct student attention to the shelves at the back of the room. Have a book on the higher shelf and a book on the lower shelf. Ask students which book has more potential energy. Explain that the book on the higher shelf has more potential energy because if they were to fall, the book on the higher shelf would fall harder and faster * Explain to students that the more mass an object has, the more potential energy it will have, like kinetic energy * Show students the image of the car and the bike again, and ask students which has more potential energy (the car) * Ask a student volunteer to hand out the “kinetic energy or potential energy?” practice sheet * Inform students that they will get to practice determining if something has kinetic or potential energy, and that students will need to write “K” or “P” for each question * When students have the sheet, read out each question * Go through the first 3 questions together, asking students to raise hands if it is kinetic or potential energy * Give students 10 minutes to complete the remaining questions on their own |
| Closure: | * Regain student attention using windchimes * Read out each question and have students raise hands to answer if they wrote kinetic or potential * Thank students for participating and inform them that they will continue to learn about energy * Ask students to hand in their sheets in the hand-in bin, and transition to next lesson or dismiss for lunch |

Lesson 5

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| Name &Time (Minutes Allotted): | An Introduction to Light Energy (45 minutes) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to recognize and identify the functions and purposes of light energy |
| Assessment: | * Teacher observation * Students complete a practice sheet to demonstrate their learning of light energy |
| Teaching Strategies: | * Speak with expression * Have strategy to regain student attention (windchimes) * Call on a variety of different volunteers to read |
| Materials: | * YouTube video: [(76) What is Light Energy? - YouTube](https://www.youtube.com/watch?v=wOpZz7NIgFY) * Pencils and erasers * Let there be light facts sheets: * Let there be light practice sheets |
| Lesson Activities: | |
| Introduction/Hook: | * Ask students to raise hands to remind you of how kinetic and potential energy can transfer from one to the other * Remind students using the car accident example from the previous lesson * Inform students that they will now be learning about light energy |
| Body: | * Show students the YouTube video [(76) What is Light Energy? - YouTube](https://www.youtube.com/watch?v=wOpZz7NIgFY) to introduce them to the concept of light energy * After the video, ask students to raise hands to share interesting facts they learned from the video. Call on 3 or 4 students * Ask a student volunteer to hand out the “Let There be Light!” fact sheet * Once students have the sheet, inform them that we will read it together * Ask a student volunteer to begin reading. After a few sentences, thank the student and call on a different volunteer to read. Continue until the reading is complete * Once the reading is complete, ask a student volunteer to hand out the “let there be light” practice sheet (all answers can be found on the fact sheet) * Read each question out loud to students and give them 10-15 minutes to work through it on their own * Walk around, observe, and provide assistance where needed * Regain student attention using classroom windchimes * Read and go over each question with students, asking them to raise hands to share answers |
| Closure: | * Thank students for participating and inform them that they will learn about natural and artificial light tomorrow * Ask students to hand in their sheets in the hand-in bin and transition to next lesson or dismiss for lunch |

Lesson 6

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| Name &Time (Minutes Allotted): | Natural and Artificial Light (45 minutes) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to recognize the difference between natural and artificial light sources, and will be able to identify whether an object is a natural or artificial light source |
| Assessment: | * Teacher observation * Students complete a practice sheet where they identify natural and artificial light sources |
| Teaching Strategies: | * Speak with expression * Give clear and concise directions * Have strategy to regain student attention (windchimes) * Ensure PowerPoint presentation is engaging and eye-catching |
| Materials: | * Chart paper and marker * PowerPoint presentation: [Natural vs. Artificial Light - Google Slides](https://docs.google.com/presentation/d/1gAWvtfOux1U91NNi0kr1pvwpcuPYilk0zK-jvIru6xs/edit#slide=id.g35f391192_065) * Natural vs. artificial light practice sheet * Scissors * Glue sticks * Another practice sheet for early finishers * Pencils |
| Lesson Activities: | |
| Introduction/Hook: | * Have “light energy” written on chart paper and ask students to raise hands to remind you of what they have learned about light energy so far. Write responses on the chart paper * Remind students that they will learn about the difference between natural light and artificial light |
| Body: | * Go through a PowerPoint presentation that discusses light energy, natural light sources, and artificial light sources: [Natural vs. Artificial Light - Google Slides](https://docs.google.com/presentation/d/1gAWvtfOux1U91NNi0kr1pvwpcuPYilk0zK-jvIru6xs/edit#slide=id.g35f391192_00) * After going through the presentation and discussing the difference between natural and artificial light, ask students the 2 questions at the end of the presentation * Ask “what is the difference between natural and artificial light?” Choose students who raise hands to share * Ask “what would life be like for you if we didn’t have artificial light?” Choose students who raise hands to share * Ask a student volunteer to hand out a practice sheet * When students have the sheet, go over instructions. Inform students that they will cut out the pictures of objects and glue them under either the “natural” or “artificial” column * Go over the first 2 together, asking students if they objects are natural or artificial light sources, asking them to explain why * Show students where they can find another sheet to work through if they finish early, where they are asked to circle whether the object is natural or artificial * Give students time to work. Walk around, observe, and provide assistance where needed |
| Closure: | * Regain student attention using windchimes * Go through the objects and ask students if they glued them to the natural or artificial columns * Thank students for participating and ask them to hand in their sheets in the hand-in bin * Transition to next lesson or dismiss for lunch |

Lesson 7

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| Name &Time (Minutes Allotted): | An Introduction to Sound Energy (1 hour) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content |  |
| Instructional Objectives | * Students will be able to develop an understanding of sound vibrations and recognize the difference of how sound energy travels through solids, liquids, and gases |
| Assessment: | * Teacher observation * Student participation * Students collaborate to answer questions to demonstrate their learning |
| Teaching Strategies: | * Speak with expression * Give clear and concise directions * Have strategy to regain student attention (windchimes) * Call on a variety of different student volunteers |
| Materials: | * Paper, basketball, and pencil (for hook activity) * Sound is energy fact sheet * Sound energy PowerPoint: [Sound Energy - Google Slides](https://docs.google.com/presentation/d/1J0yWO3xHloBOyCZLY__ryBglVYlqpPTyLoBqT3zaob4/edit#slide=id.p) * Sound energy practice sheet |
|  | * Pencils |
| Lesson Activities: | |
| Introduction/Hook: | * Inform students that we are going to do an experiment to begin our learning of sound energy * Explain to students that in a moment, you will have them close their eyes. You will make a noise while their eyes are closed, then ask them to open their eyes. When they open their eyes, they will raise hands to guess what the noise was * Ask students to close eyes, and crumple up a piece of paper. Ask students to open their eyes and raise hands to guess * If students don’t guess correctly, explain what it was * Repeat the process with different examples: bouncing a ball on the ground, tapping a pencil on a desk * After the activity, ask students if they found this challenging or easy |
| Body: | * Remind students that sound is a form of energy just like light is * Ask a student volunteer to hand out the “sound is energy” fact sheet * Once students have the sheet, ask a student volunteer to begin reading. After a few sentences, thank the student and ask another student to continue. Repeat until the reading is complete * Once the reading is complete, ask students to raise hands to share why sound can’t travel in a vacuum (found on fact sheet). Ensure students understand that it is because there are no atoms to transmit or send the sound waves * Ask students how we create more energy when we are yelling, rather than talking at a normal volume. Ensure students understand that the extra energy our vocal cords use when we yell transfer into larger vibrations and sound waves * Next, go through a fun PowerPoint presentation that discusses how sound travels through matter, and how it travels differently through solids, liquids, and gases [Sound Energy - Google Slides](https://docs.google.com/presentation/d/1J0yWO3xHloBOyCZLY__ryBglVYlqpPTyLoBqT3zaob4/edit#slide=id.p) * Afterwards, ask a student volunteer to hand out the “sound travels through matter” practice sheet * Go through the questions together. Read out the first question “why does sound travel faster through solid than gas?” and ask students to raise hands to share. If they don’t remember, go back to the slide on sound travelling through solids. Give students a moment to write their responses * Read out the second question “when we hear someone talk, how are the sound waves travelling to our ears?” Ask students to raise hands to share. Ensure they understand that we are hearing sounds from vocal cords that create sound waves that travel through the air and into our ears. Give students a few minutes to write responses * Ask students to skip question 3 as it asks students to summarize a reading, but the material was taught through a presentation instead * Lastly, go through all 5 of the true or false questions with students, asking them to raise hands to share if the answers are true or false |
| Closure: | * Thank students for participating and ask them to place their sheets into their science duo-tangs * Ask students to raise hands to share what they found interesting about what they learned today about sound energy * Transition to next lesson or dismiss for lunch |

Lesson 8

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| Name &Time (Minutes Allotted): | Heat and Thermal Energy (1 hour) |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to develop an understanding of thermal energy and recognize and identify thermal conductors and insulators |
| Assessment: | * Student participation * Teacher observation * Students write whether certain objects are conductors or insulators to demonstrate their learning |
| Teaching Strategies: | * Speak with expression * Have strategy to regain student attention (windchimes) * Remind students of video watching expectations * Have plenty of examples to help students with their learning |
| Materials: | * YouTube video: [(79) Lighthouse Lab - Thermal Energy - YouTube](https://www.youtube.com/watch?v=9rmKtqpAt5I) * Chart paper and marker(s) * Ceramic coffee cup * Conductor or insulator? PowerPoint [Thermal Conductors and Insulators - Google Slides](https://docs.google.com/presentation/d/1Hsh2CZ9iuDpNpzZE06SjwnqomM2s7OMEp0y2wI4e32k/edit#slide=id.g1c337047cca_0_50) * Lined paper * Pencils |
| Lesson Activities: | |
| Introduction/Hook: | * Inform students that they will continue to learn about energy, and that today they will learn about thermal energy * Show students the YouTube video [(79) Lighthouse Lab - Thermal Energy - YouTube](https://www.youtube.com/watch?v=9rmKtqpAt5I) to help them develop an understanding of thermal energy. When the narrator asks for predictions, pause the video and ask students to raise hands to share and justify answers |
| Body: | * Have a chart paper that has a column for “insulators” and a column for “conductors” * Explain to students that conductors are material that allows thermal energy to flow easily through it. Write this underneath conductors * Inform students that insulators are material that slows down the flow of thermal energy transfer through it. Write this underneath insulators * Explain to students that metal materials are good conductors, and are often used as materials for cooking dishes. Pots, pans, and kettles are made out of metal because they are good conductors * Explain that while cooking with metal material, the particles in the metal move easily to collide with and pass along kinetic energy to neighboring particles, allowing the metal to heat up quickly * Ask students “what do you think would happen if you use a metal spoon to stir your food and you accidentally leave it in there?” Call on a couple students to share predictions * Explain to students that the spoon will quickly transfer the thermal energy from the hot food to your hand and will most likely burn your skin * Explain to students that conductors heat up quickly, but also cool down quickly * Explain to students that coffee or tea that is placed into a metal cup will cool down faster than if it were in a ceramic glass because the thermal energy of the coffee will quickly transfer through the metal cup to the outside air * Move onto insulators – explain that paper, wood, and Styrofoam are good insulators and are commonly used to keep our food hot or cold, and are used as cooking utensils * Explain the coolers and coffee containers are made from materials that are good insulators to ensure the food and/or liquid stays warm or cool. Show students your ceramic coffee cup, and have students pass it around to feel the material. Explain that this is an insulator because it is made to keep hot beverages warm all day * Ask students “what do you think would happen if you used a wooden spoon to stir your food and accidentally left it in there?” Call on a couple students to share predictions * Explain that the thermal energy from the food would transfer through the wooden spoon to your hand, but at a slower rate than the metal spoon. It may feel hot but will not burn your skin like the metal spoon * Inform students that they have been selected to design and build a new slide for a playground. Explain to students that the old slide was too hot in the summertime, and some people would get burned while going down. * Ask students if they should build their slide out of metal or plastic. Students may call out answers, but ask students to raise hands to justify their responses. Call on 2 or 3 students * Ensure students understand that it would be better to build the slide out of plastic because we learned that metal is a good conductor but a poor insulator. The metal slide will get too hot in the summer and too cold in the winter * Hand out a piece of lined paper to each student and ask them to out their names on the top and number from 1-10 * Inform students that you will show them 10 images, and they will write either a C or an I to state whether they are conductors or insulators. Ask students to write their answers quietly and not call them out * Go through each image on the PowerPoint [Thermal Conductors and Insulators - Google Slides](https://docs.google.com/presentation/d/1Hsh2CZ9iuDpNpzZE06SjwnqomM2s7OMEp0y2wI4e32k/edit#slide=id.g1c337047cca_0_50), giving students a few seconds to think and write responses for each (images are a frying pan, mittens, a drink cooler, a clothes iron, a jacket, a wooden spoon, a tea kettle, plastic containers, a metal spoon, and a clothes hamper) |
| Closure: | * After students have seen and answered all 10, go back to the beginning and ask students what they wrote for each. Ask students to justify their answers * Thank students for participating and collect sheets * Transition to next lesson or dismiss for lunch |

Lesson 9

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| Name &Time (Minutes Allotted): | Review and Introduction to Final Project |
| Learning Standards: Curricular Competencies | * CC3: Identify questions about familiar objects and events that can be investigated scientifically * CC4: Make predictions based on prior knowledge * CC15: Make simple inferences based on their results and prior knowledge * CC21: Transfer and apply learning to new situations |
| Learning Standards: Content | * C5: Energy – has various forms, can be conserved * C6: Devices that transform energy |
| Instructional Objectives | * Students will be able to demonstrate what they have learned about energy |
| Assessment: | * Teacher observation of student answers to review quiz |
| Teaching Strategies: |  |
| Materials: |
| Lesson Activities: | |
| Introduction/Hook: | * Ask students to grab a whiteboard and a marker * Inform students that we are going to play an energy review game |
| Body: | * Have a list of all possible answers written on chart paper prior to the lesson (energy, kinetic energy, potential energy, light energy, sound energy, thermal energy, elastic energy, nuclear energy, chemical energy, magnetic energy, gravitational energy, electrical energy, energy input, energy output, law of conservation of energy, insulator, conductor, natural, and artificial) * Read out questions, asking students to hold up white boards to share their answers before moving onto the next question * Questions: the energy that flows when an electrical charge is flowing is called \_\_\_\_\_\_\_\_\_ energy (electrical) * When you turn on a light in your home, the energy input is \_\_\_\_\_\_\_ and the energy output is \_\_\_\_\_\_\_ (electrical and light) * \_\_\_\_\_\_\_\_\_\_\_\_ states that energy cannot be changed (the law of conservation of energy) * A ball that is up in the air about to come down has \_\_\_\_\_\_\_\_ energy (potential) * A moving rollercoaster has \_\_\_\_\_\_\_\_\_\_ energy (kinetic) * When talking about thermal energy, is a frying pan a conductor or an insulator? (conductor) * A magnet attracting a metal nail is an example of \_\_\_\_\_\_\_\_\_ energy (magnetic) * The energy that results when an atom’s nucleus is altered is called \_\_\_\_\_\_\_\_ energy (nuclear) * Is a jacket an insulator or a conductor? (insulator) * A firefly is an example of a \_\_\_\_\_\_\_\_ light energy source (natural) * \_\_\_\_\_\_\_\_\_\_ energy allows a book to sit on a shelf, rather than float in the air (gravitational) * A candle is an example of a \_\_\_\_\_\_\_\_\_\_ light source (artificial) * Thank students for participating and ask them to clean off and put away their whiteboards |
| Closure: | * Introduce students to final project * Explain how they will create something at home to bring to school to show a type of energy transformation * Explain how parents will receive a letter so they can help with the project * Show students and explain some possible examples * Give students the date they will present * Transition to next lesson |

Resources:

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| * *What is Energy Unit* from Teachers Pay Teachers (provided by TM) * [(79) Lighthouse Lab - Thermal Energy - YouTube](https://www.youtube.com/watch?v=9rmKtqpAt5I) * [(71) Energy Lesson 1: What is energy? for kids - YouTube](https://www.youtube.com/watch?v=hDvEC1cPQbY&list=PLsapvjNzsAykceBtN84cEk0ShJ5iniJOy) * [(75) The Law of Conservation of Energy - YouTube](https://www.youtube.com/watch?v=Vx0yAS2u8gI) * Google images |

Extensions to Unit:

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| Energy will be revisited and students will be asked about the input/output of different energy forms. |

Reflections and Revisions

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| N/A |