Unit: Energy

Content Area: Science **Strand: Physical Science** **Grade: Fourth Grade**

Unit	Weeks	Disciplinary Core Ideas	Science and Engineering Practices	Crosscutting Concepts	Unit Language Goal(s)	Resources
Energy (FOSS – Next Generation)	6 Weeks	**PS3.A:** Definitions of energy **PS3.B:** Conservation of energy and transfer **PS3.C:** Relationship between energy and forces **PS3.D:** Energy in chemical processes and everyday life **PS4.A:** Wave properties **PS4.B:** Electromagnetic radiation **PS4.C:** Informational technologies and instrumentation **ESS3.A:** Natural resources **ETS1.A:** Defining and delimiting an engineering problem **ETS1.B:** Developing possible solutions **ETS1.C:** Optimizing the design solution	• Asking questions and defining problems • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations and designing solutions • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• Patterns • Cause and effect • Systems and system models • Energy and matter	I can… -investigate a question based on observations -identify and use evidence from data, models, and/or information to explain why something occurs -use evidence to show relationships between claims and evidence -present information without personal opinion	FOSS Science Resources Book FOSS Next Generation Investigation Guide

Language for Science (Explain)

Language Expectations: Multilingual learners will…

ELD-SC.4-5.Argue.Interpretive
Interpret scientific arguments by

- Identifying relevant evidence from data, models, and/or information from investigations of phenomena or design solutions
- Comparing reasoning and claims based on evidence
- Distinguishing among facts, reasoned judgment based on research findings, and speculation in an explanation

ELD-SC.4-5.Argue.Expressive
Construct scientific arguments that

- Introduce topic/phenomenon in issues related to the natural and designed world(s)
- Make and define a claim based on evidence, data, and/or model
- Establish a neutral tone or an objective stance
- Signal logical relationships among reasoning, relevant evidence, data, and/or a model when making a claim

Language for Science (Argue)

Language Expectations: Multilingual learners will…

ELD-SC.4-5.Explain.Interpretive
Interpret scientific explanations by

- Defining investigable questions or design problems based on observations, data, and prior knowledge about a phenomenon
- Obtaining and combining evidence and information to help explain how or why a phenomenon occurs
- Identifying evidence that supports particular points in an explanation

ELD-SC.4-5.Explain.Expressive
Construct scientific explanations that

- Describe observations and/or data about a phenomenon
- Establish neutral or objective stance in communicating results
- Develop reasoning to show relationships between evidence and claims
- Summarize and/or compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 1 Lesson 1 What is needed to light a bulb? *Reading Lesson Page 127 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **ETS1: How do engineers solve problems?** ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5. Explain.Interpretive I can investigate a question based on observations and prior knowledge of electricity. ELD-SC.4-5.Explain.Expressive I can describe observations/ evidence about lighting a lightbulb (orally/written).	*Describe observations and/or evidence about a phenomenon through…* **--Abstract nouns to introduce concepts, ideas, and technical terms (system, circuit)** --Cohesion to reference ideas, people across text (pronouns, renaming subject, synonyms) --Relating verbs to state relationships or attributes(be, have, belong to) **--Timeless verbs to state on-going facts about the phenomenon (lights, travels, transfer)**	**Inquiry Chart** – What do I know/want to know about energy **Realia**- Flashlight **Pictorial Input Chart**- light bulb **Comparative Input Chart** – light/doesn't light **Cognitive Content Dictionary** – Energy **Sentence Stem** – "To light a bulb, there needs to be a ____." "I dis/agree because…"
Investigation 1 Lesson 2 What materials transfer electricity? *Reading Lesson Page 145 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **ETS1: How do engineers solve problems?** ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5.Explain.Interpretive I can obtain and combine evidence to explain what materials transfer electricity. ELD-SC.4-5.Explain.Expressive I can be neutral in communicating results.	*Establish neutral or objective stance in communicating results through…* **--Passive voice and declarative Statements (All metals are conductors and transfer electricity)** --Word choices to moderate stance (could/might, sometimes, usually) --Objective language to adjust precision and/or invite shared interest	**Cognitive Content Dictionary** – Circuit **Comparative Input Chart** – Conductor v. Insulator **Sentence Stem** – "The types of materials that conduct electricity are…" "Insulators are used to…" **Realia**- conductors and insulators **ELD Oral Review**- Comparative Input Chart **Closed Picture File Card Sort**- Conductors and Insulators
Investigation 1 Lesson 3 How can you light two bulbs brightly with one D-cell? *Reading Lesson Page 157 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **ETS1: How do engineers solve problems?** ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5.Explain.Interpretive I can identify evidence that supports how to light two bulbs brightly in an explanation ELD-SC.4-5.Explain.Expressive I can develop reasoning to show relationships between evidence and claims.	*Develop reasoning to show relationships between evidence and claims through…* **--Nominalizations to represent abstract concepts (connect/connected; complete/incomplete)** **--Connectors to link clauses and combine ideas into logical relationships (so, because, then) or express causality (when, although, in order to…)** --A variety of ways to describe phenomena (relative clauses, declarative statements) --Given/new patterns to link relationships, add new details, and condense information into abstract nouns	**Comparative Input Chart** – Series v. Parallel Circuits **Cognitive Content Dictionary** – Electrical Current **Pictorial Input Chart** – battery orientation and flow **Sentence Stem**- "To light two bulbs brightly, use ____ circuit because…"

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 1 Lesson 4 Which design is better for manufacturing long strings of lights—series or parallel? *Reading Lesson Page 167 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **ETS1: How do engineers solve problems?** ETS1.A: Defining and delimiting engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5.Argue.Interpretive I can identify important evidence from data, models, and/or information from design solutions ELD-SC.4-5.Argue.Expressive I can connect the topic of energy to the real world. ELD-SC.4-5.Explain.Expressive I can compare multiple solutions based on how well they meet the criteria (rules) of the task.	*Introduce topic/phenomenon related to the natural world and designed world(s) through…* **--Generalized nouns to define phenomenon (circuit, design, engineer)** ---Relating verbs (have, belong to, be) to define topic/phenomenon (The circuit design is better because it has…) --Expanded noun phrases to add clarity, classify, or add description *Summarize and/or compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution through…* **--Labeling/describing diagrams to add information about the phenomenon (parallel circuit diagram)** --Ask and answer question to clarify or hypothesize about phenomenon --Conditional Clauses (if…/then…) to generalize phenomenon to additional contexts	**Exploration Report** – Holiday Lights **Pictorial Input Chart** – Thinking Like an Engineer **Sentence Stems** – "The ___ circuit design is better for long strings of lights because…" "I tested this by…" **Cognitive Content Dictionary** – Engineer **Poetry/Chant** – "The Other Day I Made a Light"
Investigation 2 Lesson 1 What materials stick to magnets?	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions	ELD-SC.4-5. Explain.Interpretive I can investigate a question based on observations and prior knowledge of magnetism. ELD-SC.4-5.Explain.Expressive I can describe observations/ evidence about what materials stick to magnets (orally/written).	*Describe observations and/or evidence about a phenomenon through…* --Abstract nouns to introduce concepts, ideas, and technical terms (magnetism, pattern, materials) **--Cohesion to reference ideas, people across text (metal, steel, it)** --Relating verbs to state relationships or attributes (be, have, belong to) --Timeless verbs to state on-going facts about the phenomenon (metal sticks to magnets)	**Cognitive Content Dictionary** – magnetic **Comparative Input Chart** – Things that Stick v. Things that don't stick **ELD Oral Review** – Comparative Input Chart **Poetry/Chant** – "Magnets"
Investigation 2 Lesson 2 What happens when two or more magnets interact? When a piece of iron comes close to or touches a permanent magnet?	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions	ELD-SC.4-5.Explain.Interpretive I can obtain and combine evidence to explain what happens when two or more magnets interact. ELD-SC.4-5.Explain.Expressive	*Develop reasoning to show relationships between evidence and claims through…* --Nominalizations to represent abstract subjects (magnet/magnetic/magmatism) --Connectors to link clauses and combine ideas into logical relationships (so, because, then) or express causality (when, although, in order to…) --A variety of ways to describe phenomena (relative clauses, declarative statements)	**Cognitive Content Dictionary** – compass **Pictorial Input Chart**- Magnetic Poles **ELD Oral Review** – Pictorial Input Chart **Poetry/Chant** – "Did You Ever See a Magnet?" **Sentence Stems**- "a pattern I noticed is ___"

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
*Reading Lesson Page 208 in *Energy Investigation Guide*		I can develop reasoning to show relationships between evidence and claims.	**--Given/new patterns to link relationships, add new details, and condense information into abstract nouns (When opposite poles approach each other, they attract. When similar poles approach each other, they repel)**	
Investigation 2 Lesson 3 What is the effect on the force of attraction between two magnets as the distance between them changes? *Reading Lesson Page 221 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions	ELD-SC.4-5.Explain.Interpretive I can identify evidence that supports the effect on the force of attraction between two magnets as the distance between them changes. ELD-SC.4-5.Argue.Interpretive I can find relationships among reasoning, evidence, data, and or a model when making a claim.	*Signal logical relationships among reasoning, relevant evidence, data, and/or a model when making a claim through…* --Connectors to signal time (next, at the same time, causality (therefore, consequently, as a result, because), clarification (for example, this shows how) **--Reference devices (pronouns, synonyms, renaming subject) to create cohesion across text *(The closer the <u>magnets</u> are, the strong the forces between <u>them</u>.)*** ---Modal verbs to describe possible impacts of phenomenon on various situations including human (must, shall, will, should, would, can, could, may, and might) *Magnetic fields **can** pass through objects and iron objects **can** become temporary magnets.*	**Cognitive Content Dictionary** – force **Process Pictorial Input Chart -** Magnetic Poles **Sentence Stems** – "When I put a plastic spacer between the magnets, the force will ____." "I think this will happen because…"
Investigation 3 Lesson 1 How can you turn a steel rivet into a magnet that turns on and off? *Reading Lesson Page 250 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: Waves and their applications in technologies for information transfer** PS4.C: Information technologies and instrumentation **ETS1: How do engineers solve problems?** ETS1.C: Optimizing the design solution	ELD-SC.4-5. Explain.Interpretive I can investigate a question based on observations and prior knowledge of magnets and electricity. ELD-SC.4-5.Explain.Expressive I can describe observations about how a steel rivet can become a magnet that turns on and off. (orally/written).	*Describe observations and/or evidence about a phenomenon through…* --Abstract nouns to introduce concepts, ideas, and technical terms (core, electromagnet, magnetic field, electricity, current) --Cohesion to reference ideas, people across text (wire/it, washers/they) --Relating verbs to state relationships or attributes (be, have, belong to) **--Timeless verbs to state on-going facts about the phenomenon (A temporary magnet is created when electricity <u>flows</u> to it. Metal <u>conducts</u> electricity. Energy <u>transfers</u>.)**	**Cognitive Content Dictionary** – electromagnet **Pictorial Input Chart –** Core, Coil, Magnetic Field, Rivet **Sentence Stems** – "The function of the D-Cell is…" "The function of the wire is…" "The function of the core is…" **Exploration Report** – junkyard magnet

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 3 Lesson 2 How does the number of winds of wire around a core affect the strength of the magnetism? *Reading Lesson Page 259 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: Waves and their applications in technologies for information transfer** PS4.C: Information technologies and instrumentation **ETS1: How do engineers solve problems?** ETS1.C: Optimizing the design solution	ELD-SC.4-5.Explain.Interpretive I can identify evidence that supports how the number of winds of wire around a core affect the strength of the magnetism. ELD-SC.4-5.Argue.Expressive I can make and define a claim based on evidence, **data**, and/or a model	*Make and define claim based on evidence, data, and/or model through…* --Expand noun groups to add precision and details (magnets, poles, magnetic field, temporary magnets, date, evidence) --Connectors to link ideas (as a result, therefore, overtime) **--Diagrams, graphics, data to support claims and evidence (Graph data)**	**Cognitive Content Dictionary** – core **Pictorial Input Chart –** Compass **Sentence Stems** – "As the number of winds around an electromagnet ____, the strength ____."
Investigation 3 Lesson 3 How can you reinvent the telegraph using your knowledge of energy and electromagnetism? *Reading Lesson Page 267 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS2: How can one explain and predict interactions between objects and within systems of objects?** PS2.B: Types of interactions **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: Waves and their applications in technologies for information transfer** PS4.C: Information technologies and instrumentation **ETS1: How do engineers solve problems?** ETS1.C: Optimizing the design solution	ELD-SC.4-5.Argue.Interpretive I can compare similarities and differences among designs and the reasoning presented. ELD-SC.4-5.Argue.Expressive I can connect the topic of energy to the real world.	*Introduce topic/phenomenon related to the natural world and designed world(s) through…* **--Generalized nouns to define phenomenon (telegraph, device, circuits, electromagnet, code, key)** ---Relating verbs (have, belong to, be) to define topic/phenomenon (The message has a code… The) --Expanded noun phrases to add clarity, classify, or add description (communication device, coded message, alphabet pattern)	**Cognitive Content Dictionary** – telegraph **Pictorial Input Chart –** Flow of electricity in the telegraph model **Sentence Stems** – "The best code was _____ because ____." **ELD Oral Review** – Flow of electricity

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 4 Lesson 1 What do we observe that provides evidence that energy is present? *Reading Lesson Page 294 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.C: Relationship between energy and forces PS3.D: Energy in chemical processes and everyday life	ELD-SC.4-5. Explain.Interpretive I can investigate a question based on observations and prior knowledge of electricity. ELD-SC.4-5.Explain.Expressive I can describe observations and or data about the evidence that energy is present. (orally/written).	*Describe observations and/or evidence about a phenomenon through…* --Abstract nouns (heat, light, sound, motion, stored energy) --Cohesion to reference ideas, people (metal > steel, it) --Relating verbs to state relationships or attributes (be, have, belong to) **--Timeless verbs to state on-going facts about the phenomenon (candle wax burns, coal produces heat, plants capture the sun's energy, Animals use energy)**	**Inquiry Chart-** What we know about energy, what we want to know about energy **Cognitive Content Dictionary** – kinetic **GOIC –** Forms of Energy **Comparative Input Chart** – kinetic/potential **Sentence Stems** – "Energy is present when…"; "Evidence of energy transfer is…" **ELD Oral Review** – Forms of Energy
Investigation 4 Lesson 2 How does the starting position affect the speed of a ball rolling down a ramp? *Reading Lesson Page 305 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.C: Relationship between energy and forces PS3.D: Energy in chemical processes and everyday life	ELD-SC.4-5.Explain.Interpretive I can identify evidence that supports how the starting position affects the speed of a ball rolling down a ramp in an explanation. ELD-SC.4-5.Explain.Expressive I can develop reasoning to show relationships between evidence and claims.	*Develop reasoning to show relationships between evidence and claims through…* --Nominalizations to represent abstract concepts (transfer/transform/transformation,) --Connectors to link clauses and combine ideas into logical relationships (when, although, in order to…) --A variety of ways to describe phenomena (energy source, energy transfer, potential energy, stored energy, waiting to happen, kinetic energy, movement energy) **--Given/new patterns to link relationships, and new details, and condense information into abstract nouns (Kinetic energy is moving, potential energy is stored)**	**Cognitive Content Dictionary** – potential **Sentence Stems** – "The speed of the ball is affected by…"; "The starting position of the ball impacts…" **Process Comparative Input Chart** – kinetic/potential **ELD Oral Review** – kinetic v. potential energy

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 4 Lesson 3 What happens when objects collide? *Reading Lesson Page 317 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.A: Definitions of energy PS3.B: Conservation of energy and energy transfer PS3.C: Relationship between energy and forces PS3.D: Energy in chemical processes and everyday life	ELD-SC.4-5.Argue.Interpretive I use patterns and or rules from solutions to create generalizations ELD-SC.4-5.Argue.Expressive I can make and define a claim based on evidence, data, and/or model	*Make and define claim based on evidence, data, and/or model through…* --Expanded noun groups to add precision and details (collision, motion, position, mass,) **--Connectors to link ideas (as a result, therefore, over time)** --diagrams, graphics, data to support claims/evidence (Larger balls have more kinetic energy because they travel farther and faster)	**Cognitive Content Dictionary** – friction **Sentence Stems** – "When the ___ ball was in a ___ starting position, then…"; "When objects collide…" "We think ___ because ___"; "We agree with ___ because ___"; "We disagree with ___ because ___"; "I would like to add that ___"; "Do you have evidence that ___?" **Pictorial Input Chart –** Energy Transfer
Investigation 5 Lesson 1 How are waves involved in energy transfer? *Reading Lesson Page 353 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: How are waves used to transfer energy and information?** PS4.A: Wave properties PS4.B: Electromagnetic radiation **ESS3: How do Earth's surface processes and human activities affect each other?** ESS3.A: Natural resources **ETS1: How do engineers solve problems?** ETS1.A: Defining engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5. Explain.Interpretive I can investigate a question based on observations and prior knowledge of energy. ELD-SC.4-5.Explain.Expressive I can describe observations about how waves are involved in energy transfer (orally/written).	*Describe observations and/or evidence about a phenomenon through…* **--Abstract nouns (waves, generator, patterns, properties, amplitude, wavelength, frequency, peak, trough)** --Cohesion to reference ideas, people across text (waves, they) --Relating verbs to state relationships or attributes (be, have, belong to) --Timeless verbs to state on-going facts about the phenomenon (waves move/travel)	**Inquiry Chart** – What we know about waves, what we want to know about waves **Pictorial Input Chart –** Properties of Waves **Cognitive Content Dictionary** – wave **ELD Oral Review** – properties of waves

Part (Lesson) & Guiding/Focus Questions	Content Standards (NGSS)	Language Expectations (Sample Language Objectives)	Language Functions and Features (bolded are the focus for instruction)	Multilingual Learner Strategies
Investigation 5 Lesson 2 How does light travel? *Reading Lesson Page 368 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: How are waves used to transfer energy and information?** PS4.A: Wave properties PS4.B: Electromagnetic radiation **ESS3: How do Earth's surface processes and human activities affect each other?** ESS3.A: Natural resources **ETS1: How do engineers solve problems?** ETS1.A: Defining engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5.Explain.Interpretive I can identify evidence that supports how light travels (reflection and refraction). ELD-SC.4-5.Explain.Expressive I can develop reasoning to show relationships between evidence and claims.	*Develop reasoning to show relationships between evidence and claims through…* --Nominalizations to represent abstract concepts (reflect/reflection, refract/refraction, compress/compression, transmit/transmission) --Connectors to link clauses and combine ideas into logical relationships(so, because, and then), or express causality (when, although, in order to…) **--A variety of ways to describe phenomena (Light travels in waves from a luminous source, Light can be absorbed by matter, Light can be transmitted through matter)** --Given/new patterns to link relationships, add new details, and condense information (Light can reflect or bounce off matter, Light can refract or change direction when it passes from one transparent medium into another)	**Process Pictorial Input Chart –** Properties of Waves **Cognitive Content Dictionary** – rays **Pictorial Input Chart –** Rearview Mirror **ELD Oral Review** – Rearview Mirror
Investigation 5 Lesson 3 How can you make a motor run faster using solar cells? *Reading Lesson Page 382 in *Energy Investigation Guide*	**Disciplinary Core Ideas** **PS3: How is energy transferred and conserved?** PS3.B: Conservation of energy and energy transfer PS3.D: Energy in chemical processes and everyday life **PS4: How are waves used to transfer energy and information?** PS4.A: Wave properties PS4.B: Electromagnetic radiation **ESS3: How do Earth's surface processes and human activities affect each other?** ESS3.A: Natural resources **ETS1: How do engineers solve problems?** ETS1.A: Defining engineering problems ETS1.B: Developing possible solutions ETS1.C: Optimizing the design solution	ELD-SC.4-5.Argue.Interpretive I can compare designs, reasoning and claims based on evidence ELD-SC.4-5.Argue.Expressive I can see the relationships among reasoning, relevant evidence, data, and/or a model when making a claim.	Singal logical relationships among reasoning, relevant evidence, data, and/or a model when making a claim through… **--Connectors to signal time (next, at the same time), causality (therefore, consequently, as a result, because), clarification (for example, this shows how)** --Reference devices (energy, power, it) --Modal verbs to describe possible impacts of phenomenon on various situation, including human (Solar power could be an alternative source used to produce electricity, People can conserve energy by turning the lights and appliances off when they are not at home.)	**Cognitive Content Dictionary** – rays **Process Pictorial Input Chart –** Rearview Mirror **Pictorial Input Chart –** Solar Cells in Series **ELD Oral Review** – solar cells in series

Unit: Energy

Standards	Formative Assessments	Summative Assessment
Disciplinary Core Ideas **PS3.A:** Definitions of energy **PS3.B:** Conservation of energy and transfer **PS3.C:** Relationship between energy and forces **PS3.D:** Energy in chemical processes and everyday life **PS4.A:** Wave properties **PS4.B:** Electromagnetic radiation **PS4.C:** Informational technologies and instrumentation **ESS3.A:** Natural resources **ETS1.A:** Defining and delimiting an engineering problem **ETS1.B:** Developing possible solutions **ETS1.C:** Optimizing the design solution	• Survey (Pre-Assessment) • Science Notebook Entries • Performance Assessments	• I-Checks (End of each investigation) • Posttest (End of Unit) • Portfolios
Science and Engineering Practices • Asking questions and defining problems • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations and designing solutions • Engaging in argument from evidence • Obtaining, evaluating, and communicating information	• Science Notebook Entries • Performance Assessments	• Posttest (End of Unit) • Portfolios
Language Expectations • ELD-SC.4-5.Explain.Interpretive • ELD-SC.4-5.Explain.Expressive • ELD-SC.4-5.Argue.Interpretive • ELD-SC.4-5.Argue.Expressive	• Science Notebook Entries • Performance Assessments	• I-Checks (End of each investigation) • Posttest (End of Unit) • Portfolios