CCPS Science Unit Plan

Grade	8th	Subject	Science	Unit #	2
Unit Name	Energy		Timeline	5 Weeks	
How to Use the Framework	This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards. Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework.				
Unit Overview	This unit is based on the understanding that energy exists in many forms due to various forces (gravitational, electromagnetic, heat) that affect matter. In this unit, students will understand ways in which energy can be transferred and transformed. Content topics include the conservation of energy, the investigation of different forms and conversions of energy, and how energy is transformed from one form to another. Students will be expected to analyze scientific data throughout this unit by collecting, using, interpreting, and comparing experimental results. Additionally, the students will continue developing their skills in communicating scientific ideas and activities clearly by writing laboratory reports.				
Lesson Plan Guidance Document & Lesson Plan Template	CCPS Lesson Plan Template Day View Lesson Plan Template Week View Department of Science Guidance Document Science SBC Instructional Framework.pdf				

3Dimensional Instruction

GSE	Science and Engineering Practices	Crosscutting Concepts
S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. a. Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object. b. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.). c. Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)]. d. Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to	• Develop and use models • Engage in arguments from evidence • Asking Questions and Defining Problems • Planning and Carrying Out Investigations • Analyzing and Interpreting Data • Using mathematics and Computational Thinking • Constructing Explanations and Designing Solutions	• Systems and system models • Scale, proportion, and quantity • Energy and matter • Patterns

	the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	• Obtaining, Evaluations, and Communicating Information	

NGSS Alignment	NGSS Alignment to Disciplinary Core Ideas • **MS-PS3-1.** Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. • **MS-PS3-2.** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. • **MS-PS3-5.** Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Weekly Lesson Tasks

Week 1

GSE: **S8P2.** Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. **S8P2.A.** Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object**.**	**Focused Concept:** • The focus concept for this element is for students to understand how potential energy is related to an object's height and mass. In contrast, kinetic energy is associated with an object's mass and speed. Students should understand that all objects possess potential and/or kinetic energy based on their position and motion.
SEP: • Obtain, Evaluate, and Communicate Information • Analyzing and Interpreting Data	**CCC:** • Energy and Matter • Cause and Effect
Phenomenon: • What determines how far you can move a ball?	**DQ:** • What factors determine the kinetic energy of an object? • What factors determine the potential energy of an object?

	Day 1	Day 2	Day 3	Day 4	Day 5
Learning Target: **The students will be able to (SWBAT)**	SWBAT define and cite examples of potential energy and kinetic energy. SWBAT analyze and interpret data to create graphical illustrations	SWBAT define and cite examples of potential energy and kinetic energy. SWBAT analyze and interpret data to create graphical illustrations	SWBAT define and cite examples of potential energy and kinetic energy. SWBAT analyze and interpret data to create graphical illustrations	SWBAT define and cite examples of potential energy and kinetic energy. SWBAT analyze and interpret data to create graphical illustrations	SWBAT define and cite examples of potential energy and kinetic energy. SWBAT analyze and interpret data to create graphical illustrations

	relating kinetic energy to an object's mass and speed. SWBAT analyze and interpret data to create graphical illustrations relating potential energy to an object's mass and height.	relating kinetic energy to an object's mass and speed. SWBAT analyze and interpret data to create graphical illustrations relating potential energy to an object's mass and height.	relating kinetic energy to an object's mass and speed. SWBAT analyze and interpret data to create graphical illustrations relating potential energy to an object's mass and height.	relating kinetic energy to an object's mass and speed. SWBAT analyze and interpret data to create graphical illustrations relating potential energy to an object's mass and height.	relating kinetic energy to an object's mass and speed. SWBAT analyze and interpret data to create graphical illustrations relating potential energy to an object's mass and height.
Opening	The teacher will introduce Science Probe: Soccer Ball Inspire Science: Energy and Motion Textbook Pg. 107 Students will complete the Lesson 1 Launch Activity. With a partner or independently.	The teacher will use this science probe to assess students' prior knowledge of the lesson content and identify possible preconceptions. Science Probe: Don't Fall Inspire Science: Energy and Motion Textbook Pg. 125 Students will complete Lesson 2 Launch independently.	The teacher will ask: When you stretch a rubber band, are you increasing or decreasing its potential energy?	The teacher will ask: Can an object have energy when it is not moving?	**Students will engage in a warm up that connects the skate park PHET and the Pendulum Lab to Kinetic and Potential Energy.**
Guided Practice/ Transition	Watch the video Going Going Gone from teacher edition C-E-R: Make a claim about what determines how far an object, such as the ball, will travel Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Mass Speed	Watch the video Increasing Potential from the teacher edition. C-E-R Make a claim about how you could increase the potential energy Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Mass Speed	Finish Gizmo Potential Energy on Shelves Activity A. Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Mass Speed	Students will watch video: Potential and Kinetic questions are embedded throughout the video to ensure engagement. Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Mass Speed	What role does energy play when an object is not moving? Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Mass Speed
Independent Practice	Students will fill out a	Students will play a	Students will show	Introduce Phet Energy	Students will show

	vocabulary scaffold Energy Note Chart … Which includes definitions, examples, and pictures using their textbook (Beginning Pg. 112)	vocabulary review game to continue to get familiar with terms. Introduce Gizmo: Potential Energy on Shelves. Prior Knowledge Questions and Gizmo warmup. gizmos with a guided worksheet.	understanding by completing the following activity sheet: Potential vs. Kinetic energy	Skate Park Simulation and the worksheet with guided questions.	understanding by completing the kinetic vs potential energy graphical worksheet
Assessment Summary	Complete the graphic organizer to describe the relationships of the variables that result in Kinetic Energy Textbook pg. 122	Review Lesson 2 Textbook Pg. 138-139 Questions 1-3	TOTD: What is the difference between kinetic and potential energy?	TOTD: How does energy change from PE to KE and back?	TOTD: Where is the highest KE/PE located on a graph?
Small Group Tasks (TBA)					

Week 2					
GSE: **S8P2.** Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. **S8P2.B.** Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.).		**Focused Concept:** • This element focuses on students investigating how potential and kinetic energy transform when objects are part of a system. Students will plan and carry out an investigation to determine how the total energy of a system is maintained even though energy is transforming.			
SEP: • Obtain, evaluate, and communicate information • Plan and carry out investigations • Construct explanations			**CCC:** • Energy and Matter • Systems and System Models		
Phenomenon: • How does changing the position of a ball affect its energy? • How can you make an action figure jump higher?			**DQ:** • How do potential and kinetic energy transform within a system?		
	Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**

Learning Target: **The students will be able to (SWBAT)**	SWBAT plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system.	SWBAT plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system.	SWBAT plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system.	SWBAT plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system.	SWBAT plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system.
Opening	The teacher will introduce ADI lab by playing the video: Teeterboard Act Teeterboard Act fro… Students will complete a see-think-wonder see_think_wonder_t…	Watch Video: What is The Difference Between Evidence and Justification	Review/Clarify the difference between evidence and justification	Complete Argument Session. *Groups may need to revise the initial argument.	Complete the Lab Report
Guided Practice/Transition	ADI Lab #14 Annotate Lab Sheet Marking The Lab Text Review Lab Safety and Gather Materials Vocabulary: Energy Kinetic Energy Potential Energy Law of Conservation of Energy Elastic Potential Energy Gravitational Potential Energy Energy Transformation	Once your group has finished collecting and analyzing your data, your group will need to develop an initial argument.	Allow students to complete a whiteboard presentation.	Introduce Lab Report and discuss rubric.	Reflect on Lab: What worked? What didn't work? What can we do differently next time?
Independent Practice	While conducting the lab, Questions to Ask: -How did you collect your data? -Why did you use that method? -Why did you collect that data? To answer the guiding question:	C-E-R: Argument Presentation On Whiteboard. Your group will create your initial argument on a whiteboard.	Argument Session: One member of each group will stay at the lab station to share that group's argument while the other members of the group go to the other lab stations to listen to and critique the arguments developed by their classmates.	Lab Report: ADI Lab Report (w…	Mini Assessment on S8P2a/b

	-Design and conduct an investigation that explores changing the Potential energy of an action figure. -To accomplish this task, you must determine: -What type of data you need to collect -How you will collect the data -How you will analyze the data. Collect Data				
Assessment/Summary	Explain the relationship/transformation between potential and kinetic	TOTD: What factors determine Kinetic Energy? What factors determine Potential Energy?	Exit Ticket: Can you give examples of some of the ways you were able to track energy during this investigation?	What rules should we make to ensure our investigation is scientific?	What were some strengths of how you planned or carried out your investigation? What are some weaknesses in how you planned or carried out your investigation?
Small Group Tasks (TBA)					

Week 3	
GSE: **S8P2.** Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. **S8P2.C.** Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].	**Focused Concept:** ● This lesson focuses on helping students understand how energy transforms within a system. They should be able to construct an argument supporting the claim that energy changes form within a system: electrical to light to heat, chemical to electrical to light, etc.
SEP: ● Obtain, evaluate, and communicate information ● Construct an argument	**CCC:** ● Energy and Matter ● Systems and System Models
Phenomenon: ● What happens to energy as the weight swings?	**DQ:** ● How is energy transformed in a system?

	Day 11	Day 12	Day 13	Day 14	Day 15
Learning Target: **The students will be able to (SWBAT)**	SWBAT identify energy transformations within a system SWBAT construct an argument to support a claim about the type of energy transformations within a system.	SWBAT identify energy transformations within a system SWBAT construct an argument to support a claim about the type of energy transformations within a system.	SWBAT identify energy transformations within a system SWBAT construct an argument to support a claim about the type of energy transformations within a system.	SWBAT identify energy transformations within a system SWBAT construct an argument to support a claim about the type of energy transformations within a system.	SWBAT identify energy transformations within a system SWBAT construct an argument to support a claim about the type of energy transformations within a system.
Opening	Teacher and Students will Watch the video Pendulum Demo from the teacher edition Students will see-think-wonder see_think_wonder_t…	Students will answer: What is the Law of Conservation of Energy? Give an example of	Teachers will: Introduce Energy Transformations Project and discuss rubric.	Students will continue their build using the rubric to show knowledge and understanding of energy transformations	Students will continue their build using the rubric to show knowledge and understanding of energy transformations
Guided Practice/Transition	C-E-R: Make a claim about the energy an object has as it changes position.	Practice Energy Transformations Practice_Energy Tra…	Energy Transformations Project Draft In their groups, students will create a draft of their model and label the materials that they will need to construct their build. Students must show and explain their draft to the teacher to get approval to begin their build of the model.	Students will continue their build using the rubric to show knowledge and understanding of energy transformations	Students will continue their build using the rubric to show knowledge and understanding of energy transformations
Independent Practice	Students will complete a rainbow read to enhance their reading comprehension skills and increase their understanding of types of energy. While reading, they will highlight vocabulary words and associate them with	Energy Transformations Scavenger Hunt. Place Pictures around the class and give students the record sheet. The students will walk around the room to find the picture that correlates to the energy transformation on their record sheet.	Students will begin their build using the rubric to show knowledge and understanding of energy transformations. Energy Transformations Project Expectations and rubric	Students will continue their build using the rubric to show knowledge and understanding of energy transformations. Energy Transformations Project Expectations and rubric	Students will present their projects and paragraphs arguing how the energy is being transformed through your system.

	their meanings. RR_Types of Energ… Digital Example: Exemplar RR_Types… Printout and utilize highlighters: can replace red with pink.	EnergyTransformati…			
Assessment/Summary	Identify each of the 6 energy types and examples of each type of energy	How is energy conserved?	Students must show progress to the teacher to ensure they are working at a steady pace.	Students must show progress to the teacher to ensure they are working at a steady pace.	Peer review/Gallery walk of grows and glows
Small Group Tasks (TBA)					

Week 4					
GSE: **S8P2.** Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system. **S8P2.D.** Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction) or through space (radiation) or in currents in a liquid or a gas (convection).	**Focused Concept:** ● This lesson focuses on helping students understand how heat transfers via conduction, convection, and radiation. Students will plan and carry out an investigation to determine how molecular motion changes when heat is transferred.				
SEP: ● Obtain, evaluate, and communicate information ● Plan and carry out investigations			**CCC:** ● Energy and Matter ● Cause and Effect ● Systems and System Models		
Phenomenon: ● What makes popcorn kernels pop?			**DQ:** ● What happens to matter when heat is transferred?		
	Day 16	**Day 17**	**Day 18**	**Day 19**	**Day 20**
Learning Target: **The students will be**	SWBAT define and cite examples of conduction, convection, and radiation.	SWBAT define and cite examples of conduction, convection, and radiation.	SWBAT define and cite examples of conduction, convection, and radiation.	SWBAT define and cite examples of conduction, convection, and radiation.	SWBAT define and cite examples of conduction, convection, and radiation.

able to (SWBAT)	SWBAT plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	SWBAT plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	SWBAT plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	SWBAT plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).	SWBAT plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).
Opening	Teacher and Student will: Watch Video: Popcorn Popping Ask: Do you know of other ways to pop popcorn?	Teacher and students will: -Review Conduction, Convection, and Radiation	Teacher and students will: Review Conduction, Convection, and Radiation	Students will: Clarify how molecules/particles move in each heat transfer	Review Energy Transformation and Heat Transfer
Guided Practice/Transition	Heat Probe: Objects and Temperature to Introduce Heat Transfer. Construct an argument using the C-E-R framework. Make a claim about the answer you agree with. -What is your evidence? -What is your reasoning? Heat Probes.pptx 5 Heat Probes to Choose From (select one).	Watch Video: FROZEN | "In Sum… Have students identify the types of heat transfer and explain their selection throughout the video.	R.A.F.T -Change the lyrics to a song to teach conduction, convection, and radiation, or Create an infomercial introducing the best way to pop popcorn. Draw and explain how your method works on a display poster or create a video on Flipgrid.	Discuss and answer the following questions in a group of 3-4. 1. Can you explain why you feel warm when standing near a campfire? 2. Why does a carpeted floor feel warmer to bare feet than tile or wood, even though all surfaces are the same temperature?	Formal Assessment on S8P2c/d using illuminate
Independent Practice	Guided Notes on Heat Transfer using the PBIS website. https://gpb.pbslearningmedia.org/resource/lsps07-sci-phys-thermalenergy/thermal-energy-transfer/#.WgoGGGhSxPY Heat Transfer Notes.…	R.A.F.T -Change the lyrics to a song to teach conduction, convection, and radiation or Create an infomercial introducing the best way to pop popcorn. Draw and explain how your method works on a display poster or create a video on Flipgrid. Heat Transfer RAFT	Students present their song or infomercial. Peer review/Gallery walk of grows and glows	Identify the method of heat transfer that takes place in each illustration Practice_Heat Trans…	Formal Assessment on S8P2c/d using illuminate

Assessment/Summary	Exit Ticket: What is the relationship between heat and temperature?	What is the molecular movement in conduction, convection, and radiation?	Compare and Contrast conduction, convection, and radiation	Identify energies in their everyday life	Analyze Data
Small Group Tasks (TBA)					

Week 5

GSE:
S8P2. Obtain, evaluate, and communicate information about the law of conservation of energy to develop arguments that energy can transform from one form to another within a system.
S8P2.A. Analyze and interpret data to create graphical displays that illustrate the relationships of kinetic energy to mass and speed, and potential energy to mass and height of an object**.**
S8P2.B. Plan and carry out an investigation to explain the transformation between kinetic and potential energy within a system (e.g., roller coasters, pendulums, rubber bands, etc.).
S8P2.C. Construct an argument to support a claim about the type of energy transformations within a system [e.g., lighting a match (light to heat), turning on a light (electrical to light)].
S8P2.D. Plan and carry out investigations on the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction) or through space (radiation) or in currents in a liquid or a gas (convection).

Focus Concept:
- The focus of this lesson is to review for the energy unit test.

SEP:
- Obtain, evaluate, and communicate information
- Analyze and interpret data
- Plan and carry out investigations
- Construct an argument from evidence
- Plan and carry out investigations

CCC:
- Energy and Matter
- Systems and System Modules
- Cause and Effect

Phenomenon:
- Reference weekly phenomenon

DQ:
- How can I prepare for my unit assessment?

	Day 21	**Day 22**	**Day 23**	**Day 24**	**Day 25**
Learning Target	SWBAT complete review activities to prepare for my unit assessment.	SWBAT complete review activities to prepare for my unit assessment.	SWBAT complete review activities to prepare for my unit assessment.	SWBAT complete review activities to prepare for my unit assessment.	SWBAT complete review activities to prepare for my unit assessment.
Opening	Go over study guide and clarify misconceptions.	Go over study guide and clarify misconceptions.	Go over study guide and clarify misconceptions.	Allow students to study and ask last-minute clarifying	Review test data from Illuminate

				questions.	
Guided Practice/Transition	Review Kinetic and Potential Energy and its relationship.	Review Types and Forms of Energy, Law of Conservation of Energy, and Energy Transformations	Review Heat Transfer and molecular movement.	Unit 2 Summative Assessment on S8P2	Students will reflect and input scores in data tracker.
Independent Practice	Play a Kahoot, Blooket, etc., to review unit concepts.	Play a Kahoot, Blooket, etc., to review unit concepts.	Play a Kahoot, Blooket, etc., to review unit concepts.	Unit 2 Summative Assessment on S8P2	Test Corrections
Assessment/Summary	How can you prepare for your unit assessment?	How can you prepare for your unit assessment?	How can you prepare for your unit assessment?	How did your preparation compare to your unit test results?	Goals for next Assessment
Small Group Tasks (TBA)					

Assessment Prep

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

- Unit 2 Assessment Prep_Energy.pdf
- Unit 2_Teacher Edition.pdf

Provide the following guidance:

Ask the students to use what they know about the tasks completed to answer the provided assessment prep question.

- What is the question asking you?
- What do you know about the vocabulary or concept in the question?
- Is this question similar to any investigations or tasks we've completed?
- How can what you've done help you answer this question?
- Just view the assessment question: What is the question asking you?

Guide students to think about how their experience connects to the question.

Using the answer choices provided, ask the students the following:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review it the next day. Do not rush to the next question; instructional time is the only time they have to prepare for the end-of-year assessment.

Following the Unit Test:

- Have students correct any missed test items using one of the test correction templates: Template Option 1 Template Option 2
- Have students create goals for review and remediation of material
- Have students set goals for the next unit

Labs / Investigations

Mandatory Labs	Explore Learning Gizmo	Pivot Interactives/Phet
ADI: Physical Science Lab 14. Potential Energy: How Can You Make an Action Figure Jump Higher? pg. 250 **These ADIs are available in the Learning Hub:** Thermal Energy and Matter Energy Transformations	Air Track Energy Conversion in a System Energy of a Pendulum Inclined Plane-Sliding Objects Potential Energy on Shelves Sled Wars Roller Coaster and Physics Conduction and Convection Heat Absorption Heat Transfer by Conduction Radiation	**Energy Skate Park:** **https://phet.colorado.edu/en/simulations/energy-skate-park** **Energy Skate Park: Basics** **https://phet.colorado.edu/en/simulations/energy-skate-park-basics** **Energy Forms and Changes:** **https://phet.colorado.edu/en/simulations/energy-forms-and-changes** **Pendulum Lab:** **https://phet.colorado.edu/en/simulations/pendulum-lab**

Additional Resources/Tasks

Supplemental Resources	Types of Energy Graphic Organizer Energy Guided Notes.docx Types of Energy DES/ELL Types of Energy ELL/DES.docx Thermal Energy Transfer gpb.pbslearningmedia.org/resource/lsps07-sci-phys-thermalenergy/thermal-energy-transfer/?student=true Energy Transformations Project Energy Transformations Project Rubric