Energy: Every Day, Everywhere
Lesson 1: Launching an Investigation of Energy

Grade: 4	**Length of lesson:** 95 minutes	**Placement of lesson:** 1 of 5 lessons on energy
Anchoring Phenomenon: The distance the rubber band is stretched in a toy car launcher affects the energy of a toy car as evidenced by the speed and distance the car travels.		
Unit Learning Goal: The energy of objects and systems can be transferred and/or transformed. Changes in the energy of objects and systems can be observed and compared.		
Lesson Main Learning Goal: We can detect energy (and changes in energy) when an object is moving (and the motion of an object changes). **Science and Engineering Practices** Asking Questions and Defining Problems • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. Ask questions about what would happen if a variable is changed. **Crosscutting Concepts** Systems and System Models • A system can be described in terms of its components and their interactions. Patterns • Patterns of change can be used to make predictions.		
Unit Central Question: How does the energy of an object or system change?	**Lesson Focus Question:** How do we know if something has energy?	
Science content storyline Observable changes in a rubber band car launcher system can provide evidence of energy changes (where energy comes from and where it goes) in the system. When the pulled-back rubber band is released, the launcher bar moves forward. Motion indicates an object has energy. As the moving launcher bar collides with the stationary car, the car begins moving and the launcher bar stops. Some of the motion energy of the launcher bar is transferred to the stationary car. This causes the car to begin moving as it gains energy and the launcher bar to stop moving as it has less energy after the collision. The farther the rubber band is stretched, the faster the launcher bar moves and the faster and farther the car moves after the collision.		
Ideal student response to the Lesson Focus Question: Something has energy if it is moving. When the launcher bar was released, it had energy when it was moving forward. When the launcher bar hit the car, it gave the car energy and the car started moving. The farther the rubber band was pulled back, the faster and farther the car went. This means the car had more energy after the collision.		

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Preparation

<table>
<tr><th>MATERIALS NEEDED</th><th>AHEAD OF TIME</th></tr>
<tr><td>
Teacher Resources
none
Student Handouts
HO 1.1: Communicating in Scientific Ways (1 per student)
Other Materials

transparent tape or glue stick (1 per group of 3 students)
car launcher system (1 per group of 3 students)
chart paper
painter’s tape
chart markers
sticky notes (1 pad per group of 3 students)
fine-point marker (1 per student)
sticky note arrows

</td><td>

Review the information about energy in the Content Background document.
Review the Using an Anchoring Phenomenon section in the Unit Frontmatter.
Prepare the handout.
Prepare the class Know and Wonder, Focus Question, Notice and Wonder, and Driving Question Board (blank) charts.
Determine where you will post the Communicating in Scientific Ways (CSW) poster as well as other charts. The CSW poster and Driving Question Board will remain posted throughout the unit.
Determine student groups and any safety logistics for the car launcher system activity.

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Lesson 1 General Outline

Time	Phase of lesson	How the science content storyline develops
5 min	**Introduction:** The teacher introduces a new unit and a new way of communicating with one another. The teacher elicits students' prior knowledge and questions by asking, *What do you know or wonder about energy?*	Many things have energy.
5 min	**Focus Question:** The teacher introduces the Lesson Focus Question and gives students a sentence starter to answer the focus question. Students share their initial ideas about the question, *How do we know if something has energy?*	
10 min	**Setup for Activity:** Students are introduced to the Communicating in Scientific Ways (CSW) chart and practice using CSW sentence stems. Students examine the car launcher system and identify and name the parts of the launcher system. They decide if any parts of the system have energy and provide evidence that the parts do or do not have energy.	Scientists think and communicate in specific ways. Moving objects have energy.
30 min	**Activity:** Students explore the car launcher by pulling the rubber band back to different lengths and observing how far and fast the car travels. The class creates a Notice and Wonder chart to note observations and ask questions. Students continue to practice using CSW sentence stems. Students identify where in the launcher system they see evidence of energy.	Energy is present when an object (the car or launcher bar) is moving. There are patterns of observable energy changes. The farther the rubber band is stretched, the faster the launcher bar moves and the faster and farther the car moves after the collision.

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Time	Phase of lesson	How the science content storyline develops
30 min	**Follow-up to Activity:** Students use the Notice and Wonder chart to revisit and revise their response to the Lesson Focus Question—*How do we know if something has energy?*—and share with the class how their thinking changed. The class creates the Driving Question Board (DQB) with their questions.	Moving objects have energy. There are patterns of energy related to the speed of a moving object. The faster an object is moving, the more energy it has.
10 min	**Summarize and Synthesize:** The teacher introduces the Unit Central Question as the title of the DQB: *How does the energy of an object or system change?* The class considers how the CSW stems helped them think and communicate like scientists.	The energy of an object or system can change as a result of a collision between two objects. As the moving launcher bar collides with the stationary car, the car begins moving and the launcher bar stops. Some of the motion energy of the launcher bar is transferred to the stationary car. This causes the car to begin moving as it gains energy and the launcher bar to stop moving as it has less energy after the collision.
5 min	**Link to Next Lesson:** Teacher links science ideas to the next lesson and the next focus question, highlighting the category that includes collisions as the place to start our investigations in the next lesson.	

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
5 min	**Introduction** Synopsis: The teacher introduces a new unit and a new way of communicating with one another. The teacher elicits students' prior knowledge and questions by asking, *What do you know or wonder about energy?* Main Science Idea Many things have energy.	Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions.	Today we are starting a new unit about energy. Let's start by thinking about what we know and wonder about energy. What are your ideas about energy? Take a minute or two of individual think time. Who would like to share your thoughts? ***NOTE TO TEACHER:*** *As students share, record on the Know and Wonder T-chart. The purpose of this chart is to introduce students to making their thinking public—even ideas about which they are not certain. While other charts will be used in multiple lessons throughout the unit, this chart serves as a formative assessment for the teacher and as an opportunity for students to begin to share their ideas with the class.* *Students' initial ideas may include science terms such as* potential, kinetic, motion energy, *and* position energy. *At this point, include them on the chart. These terms, as well as concepts related to electricity and electric currents, will be introduced when appropriate in the unit. Although these ideas will not be covered in this lesson or unit, they should be included on the chart as they are important energy concepts. As the lesson focus shifts to the car launcher system, student ideas will likely tend more toward the idea of motion (kinetic) energy.*	Mom says I have lots of it! **What does "lots of it" mean? Why does she say that?** Because I'm always playing and running around. **You're saying that running around means you have lots of energy?** Yep. **What do others think?** I like energy drinks. **Why do you think they are called energy drinks?** Because they give you energy? **Are there other things that give you energy? Turn to a neighbor and share an idea.** Food. Water. Candy. Sleep. **So, we've been talking about how you do or don't have energy and**

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				where you get it. Are there other things that have energy—besides you? A flashlight, a battery, a match, sound. **You say these are things that have energy.** • **What makes you think they have energy?** • **What do you wonder about the energy of these objects?**
5 min	**Focus Question** <u>Synopsis:</u> The teacher introduces the Lesson Focus Question and gives students a sentence starter to answer the focus question. Students share their initial ideas about the question, *How do we know if something has energy?*	Set the purpose with a focus question. Ask questions to elicit student ideas and predictions.	The purpose of our lesson today is to figure out the answer to our Lesson Focus Question: **How do we know if something has energy?** Please write the question in your notebook and draw a box around it. ***NOTE TO TEACHER:*** *Write this lesson's focus question on the board. Refer to the focus question often throughout the lesson.* Let's start our answer with the sentence starter: *I know something has energy because it ...* Write this sentence starter in your notebook under the question. Record your current thinking by completing this sentence. Remember, we are just beginning our unit, so be sure to leave plenty of room after it to add to and revise your thinking as we further investigate and learn. Will someone share your thinking with the class?	I know something has energy because it gives off heat and light.

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
				Like the Sun. The Sun gives plants energy to grow. **Thank you. Does anyone have another idea to share?** I know something has energy if it gives energy to other things, like the outlets give energy when you plug things in.
10 min	**Setup for Activity** Synopsis: Students are introduced to the Communicating in Scientific Ways (CSW) strategies and practice using CSW sentence stems. Students examine the car launcher system and identify and name the parts of the launcher system. They decide if any parts of the system have energy and provide evidence that the parts do or do not have energy. Main science ideas Scientists think and communicate in specific ways. Moving objects have energy.	Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions. Engage students in communicating in scientific ways.	Thank you for sharing some of your current thinking. Now, let's use this car launcher system to think more about energy. This system contains three main parts. It is important for all of us to identify our system and use the same name for each part so that we can communicate clearly like scientists do as we learn and share our thinking. Look up here as I name them for you. The blue part at the bottom is called the base. The yellow part here is called the launcher bar. And then, we have the car. ***NOTE TO TEACHER:*** *The purpose of establishing common names is to enable clear communication of science ideas in the context of the car launcher system.* Throughout this unit, we will talk about our ideas and questions in the same way that scientists do. To help us learn and practice, we have a chart that will help us communicate like scientists. ***NOTE TO TEACHER:*** *Show students the Communicating in Scientific Ways (CSW) poster that you have on the wall and distribute a copy of the CSW chart to each student to put in their notebook (HO 1.1,* Communicating in Scientific Ways*).*	

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		Highlight key science ideas and focus question throughout. Make explicit links between science ideas and activities.	*Have students attach it in the front of their science notebook using tape or glue stick.* OK, now I would like each of you to quietly observe the parts of our system—the stationary launcher and the car—to consider this question: **Do any parts of the launcher system have energy?** Let's share our thinking by using the sentence stems from rows 2 and 7 in our CSW chart that are marked with arrows. ***NOTE TO TEACHER:*** *To encourage students to respond to the elicit question using CSW sentence stems from rows 2 and 7, add a sticky note arrow to these rows of the CSW chart so students have a visual reminder of which sentence stems to focus on and use. As students respond to the elicit question, follow with probe questions such as those shown in the next column. Point to sentence stems from row 6 of the CSW chart to highlight that you are using these sentence stems to make sure you and the class understand each other's thinking.*	I don't think any of the parts have energy. **What makes you say that none of the parts have energy?** The reason I think that is because nothing is moving. **Do others agree or disagree?** I agree with ___ because it has energy if it's moving. **You think that if something is moving, it has energy, right? What do others think?** I think there could be energy in the launcher if we pulled the rubber band back and let it go. **You're saying there is energy in the launcher when the rubber band is stretched?** Yes, when you let it go. **Is there energy in the launcher now when the rubber band is not stretched?** I don't think so, but I'm not sure.

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
30 min	**Activity** Synopsis: Students explore the car launcher by pulling the rubber band back to different lengths and observing how far and fast the car travels. The class creates a Notice and Wonder chart to note observations and ask questions. Students continue to practice using CSW sentence stems. Students identify where in the launcher system they see evidence of energy. Main science ideas: Energy is present when an object (the car or launcher bar) is moving. There are patterns of observable energy changes. The farther the rubber band is stretched, the faster the launcher bar moves and the faster and farther the car moves after the collision.	Highlight key science ideas and focus question throughout. Engage students in communicating in scientific ways.	Good job thinking about our launcher system, now let's use it to think more about our Lesson Focus Question, "How do we know if something has energy?". Take a minute to draw in your science notebook a Notice and Wonder chart like I have here. Make sure you draw it so you have room to record your observations and questions in the columns. ***NOTE TO TEACHER:*** *Distribute a launcher and car to each group of 3. Provide any safety precautions for your classroom setting at this time. For example, you may have students use the launcher on the floor rather than on desktops or tables and not launch the car toward other groups. You might designate a member of each group to stop the car or have the car run into a stationary object after it has traveled a certain distance.* Each team will launch your car three to four times. After each launch, work together to add your observations to the "Notice" column of your chart. Then, as a group, identify one question you want to investigate and/or a question about energy. Record that question in the "Wonder" column. Repeat that process for each launch, recording your thinking in the appropriate column. Notice I am moving the arrows to mark rows 1 and 2 on the CSW poster. Use CSW stems from row 2 to identify noticings or observations and from row 1 to identify wonderings and questions. ***NOTE TO TEACHER:*** *While students may find it easy to identify noticings, they may have more difficulty identifying questions to investigate. They may state what they want to investigate as a prediction rather than a question (e.g., If we pull the launcher back*	

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			farther, the car will go farther). To support students in SEP1: Asking Questions and Defining Problems, you may choose to draw the class's attention together after the first launch and invite groups to share their noticings and questions to investigate. Help groups ask questions about the launcher system that they could investigate by considering what would happen if a variable was changed. As students share questions to investigate, encourage them to also ask questions about what is happening to energy in the launcher system. Some questions you might ask groups include the following: • What observable changes are taking place in the launcher system? • Where do you see evidence of energy (or not)? • Where does the energy come from? • Where does the energy go? *Encourage students to use CSW sentence stems as they add to their Notice and Wonder chart after each launch of the car.* ***NOTE TO TEACHER:*** *This portion of the activity is Element 1 (Explore the Anchoring Phenomenon), described in the Using an Anchoring Phenomenon section of the* Unit Frontmatter.	
		Ask questions to elicit student ideas and predictions.	Now, let's come together as a class to share our Notice and Wonder recordings. I will list your ideas on our class Notice and Wonder chart. Let's begin with our observations or noticings, and remember to use CSW sentence stems. Let's share some of your noticings.	

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
		Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	**What did you notice or observe about the launcher system and the parts? Did any of the parts have energy? How do you know the parts have energy?** ***NOTE TO TEACHER:*** *Students may use ideas about force and energy interchangeably. Students may have prior knowledge of forces (NGSS PS2: Motion and Stability: Forces and Interactions). They may know that when two objects interact (e.g., through a collision), one exerts a force (a push or pull) on the other. The force exerted on an object can change its speed or direction and can start or stop its motion. As students begin to understand energy as a scientific idea, they should begin to recognize that interactions between two objects can also be explained and predicted using concepts of energy transfer (NGSS PS3: Energy). They begin to identify the relationship between forces and energy as they recognize that forces between two objects can transfer energy between the objects. For example, contact forces in a collision transfer energy from one object to another, resulting in observable changes in motion.* *In this unit, our focus will be on describing the energy changes that are occurring, using evidence from observable changes in the system. If students use "force" to explain the observable changes in the system, encourage them to begin to connect their ideas about force with their emerging ideas about energy. You might ask questions such as these:* *Who can tell us what a force is?* *Does the rolling car have energy? Is there a force acting on it?*	When we release the rubber band, the launcher moves forward and hits the car. Then the car starts moving. **That's a great noticing! Does that give you any ideas about what parts of the launcher system have energy?** The car definitely has energy when it's moving. **Where does the energy of the moving car come from?** It comes from the launcher when it hits the car. The launcher has energy when it's moving, too. **You said the energy that the moving car has comes from the launcher when it hits the car. Is that right?** Yes, and the launcher has energy too because it's moving. Oh, and I think the launcher gets its energy from the stretched rubber band! **Are there other ideas about evidence of energy?** Well, I heard a sound when the rubber band hit the car and I heard someone say sound is energy.

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			If I push on this wall, have I applied a force? Does the wall have energy? *So, are force and energy the same thing?* *Share with students that forces can be used to provide one explanation for the observable changes in the system. However, in this unit energy will be used to provide explanations for observable changes in the system.* Those were great noticings. Now let's move to our next column. **What are some of your wonderings?** ***NOTE TO TEACHER:*** *This portion of the activity is Element 2 (Attempt to Make Sense), described in the Using an Anchoring Phenomenon section of the Unit Frontmatter.* *The questions that students ask in the "Wonder" column of the chart can serve as the basis for developing questions for the Driving Question Board.* ***NOTE TO TEACHER:*** *If you cannot complete this lesson in a single class period, this is a good stopping point.*	We wonder if we pull the rubber band back farther, will the car go faster? **Can you restate your idea as a question that you'd like to investigate?** Um. What about: Will the car go faster if we pull the rubber band back farther? **That sounds like a great question to investigate! After you try it, add the changes you observe to your Notice and Wonder chart.** **What wonderings do we have about energy?** Our group wonders where the energy goes when the car stops moving. **Can I write that wondering on our chart as, "Where does the energy go when the car stops moving?"**

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
30 min	**Follow-up to Activity** <u>Synopsis</u>: Students use the Notice and Wonder chart to revisit and revise their response to the Lesson Focus Question—*How do we know if something has energy?*—and share with the class how their thinking changed. The class creates the Driving Question Board (DQB). <u>Main science ideas</u> Moving objects have energy. There are patterns of energy related to the speed of a moving object. The faster an object is moving, the more energy it has.	Highlight key science ideas and focus question throughout. Engage students in communicating in scientific ways. Ask questions to elicit student ideas and predictions. Ask questions to probe student ideas and predictions. Ask questions to challenge student thinking.	Notice the diversity of ideas that you have shared in the Know and Wonder chart from the lesson introduction and our class Notice and Wonder chart we just completed! Great thinking, class! It is time to revisit our Lesson Focus Question and revise our original thinking about it. Please review your initial response, then draw a single line through ideas that have changed and add new ideas and/or revisions in a different color. I would like us to share how our thinking has changed using a CSW stem from row 11. I will put a sticky note arrow to highlight row 11 of the CSW chart. We aren't concerned about which ideas are right or wrong at this time. We are just getting all our ideas out right now. We will gather more evidence in our next lessons to support or challenge our ideas. **Can someone share how their ideas about the focus question changed during our lesson?** ***NOTE TO TEACHER:*** *The purpose of sharing how student thinking has changed over the course of the lesson is to develop a classroom culture of making thinking visible and revising ideas as we figure out new science ideas.*	My first ideas were that something has energy when it's plugged into an outlet. If I plug something into the outlet and it works, it has energy. Now I think there are other kinds of energy, too, like when something is moving. **That's a great addition to your original thinking! How did others' ideas change?** I had light and sound, but now I added the idea that moving objects have energy, too.

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
			Now that you have revised your initial thinking, please read over our Notice and Wonder chart and then revisit the Know and Wonder chart that we created in the lesson introduction to think about the questions you still have. Write one question in a complete sentence per sticky note. Use the markers I've given you to write your questions so we can all read them easily. ***NOTE TO TEACHER****: Have students write their questions on sticky notes—one question per sticky note. They should write their questions so that they are big and bold—so everyone can see the questions clearly. Give students several minutes to populate their sticky notes with questions.* *Fine-point Sharpie markers work well to make the questions bold enough to be viewed easily on the Driving Question Board.* *Next, begin the process of developing a shared Driving Question Board (DQB). Review the Using an Anchoring Phenomenon section in your STeLLA PD Binder for additional guidance.* We will use your questions to develop a shared Driving Question Board, a DQB. Each of you has great questions, and we want to hear every one of them. We also might find that we have questions similar to some of our classmates' questions. We are going to use our DQB to guide our investigations into what is going on with energy. ***NOTE TO TEACHER****: Explain to students how you will create the DQB. Instruct students to share their questions, one by one, with the whole group. Select a student who may not have as many sticky notes as*	

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			others to read their question aloud to the class, then post it on the DQB. Students should raise their hand if they have a question that relates to the question that was just read aloud. The first student selects the next student whose hand is raised. The second student reads his or her question, says why or how it relates, and posts it near the question it most relates to on the DQB. That student selects the next student. *Once there are no more related questions, ask if anyone has a question about a different topic. The student should place their question in a new location on the DQB to start a new group of related questions. Continue this until all science questions are grouped on the board. If anyone thinks of a related question as you're putting together the board, they can capture that question on a sticky note and add it.* ***NOTE TO TEACHER:*** *The focus question for the next lesson is: What happens to motion energy when objects collide? If the next lesson's focus question does not appear on the DQB, say something like, "You have mentioned that moving objects have energy. How did the car start to move even though it wasn't moving at first?* *Once all students have at least one question on the board, guide students in naming the groups of questions and elicit or suggest titles for the groups, such as "collisions", "stored energy", or "motion energy". Add the titles to the DQB near the appropriate clusters.* ***NOTE TO TEACHER:*** *This portion of the activity is Element 3 (Pose Questions to Resolve and Discuss Next Steps), described in the Using an Anchoring Phenomenon section of the Unit Frontmatter.*	

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10 min	**Summarize and Synthesize** Synopsis: The teacher introduces the Unit Central Question as the title of the DQB: *How does the energy of an object or system change?* The class considers how the CSW stems helped them think and communicate like scientists. Main Science Ideas The energy of an object or system can change as a result of a collision between two objects. As the moving launcher bar collides with the stationary car, the car begins moving and the launcher bar stops. Some of the motion energy of the launcher bar is transferred to the stationary car. This causes the car to begin moving as it gains energy and the launcher bar to stop moving as it has less energy after the collision.	Engage students in making connections by synthesizing and summarizing key science ideas. Summarize key science ideas.	You've done a great job thinking of so many questions about energy, which we now have organized into categories. Now let's title our Driving Question Board. How about our Unit Central Question as a title, which is, **How does the energy of an object or system change?** ***NOTE TO TEACHER:*** *This portion of the activity is Element 4 (Introduce the Unit Central Question as an Overarching Question from Their DQB), described in the Using an Anchoring Phenomenon section of the Unit Frontmatter.* ***NOTE TO TEACHER***: *Communicate with students that we will try to answer most of their questions in the next several lessons. Tell them that we will revisit the DQB several times, and they are free to add new questions at any time. Also, encourage them to watch for questions they may have answered through the activities that they do. When they answer a question, we can place a big check mark by the question.* Throughout this lesson, we used sentence stems to help us communicate like scientists. Please take a minute to reflect on this question and be prepared to share: **How did using the CSW sentence stems help you think and communicate like a scientist today?** Let's share our thinking.	Talking like a scientist helped me come up with more ideas. **How did talking like a scientist help you come up with more ideas?** If someone said something you hadn't thought of, you could turn their idea into a question.

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Time	Phase of lesson and how the science content storyline develops	STeLLA strategy	Teacher talk and questions	Possible student and teacher dialogue
			These are great thoughts! We will use the CSW sentence stems as we continue to figure out ideas about energy throughout the unit. We also described the launcher and the car as a system. **How did focusing on the system help you make and think about observable changes?**	**Excellent! Who else wants to share what they found?** I thought the wonder questions are really helpful because I can just let out my ideas and it didn't matter how silly they were—they were just my ideas and I could share them. It helped me observe each part separately instead of trying to look at all of it at once. I think I saw, or observed, more with this focus.
5 min	**Link to Next Lesson** <u>Synopsis</u>: Teacher links science ideas to the next lesson and the next focus question, highlighting the category that includes collisions as the place to start our investigations in the next lesson.	Link science ideas to other science ideas (next lesson).	We've used our DQB to organize our wonderings about energy. We will be investigating several of our wonderings throughout this unit—we have questions about light, sound, and heat. However, we need to focus on one group of questions at a time. We began our unit using the launcher system, and I noticed as you shared your revised ideas about our focus question, the idea that moving objects have energy—we will call it motion (kinetic) energy—was mentioned several times. So, let's begin by focusing on this group of questions about collisions. Next time, we will narrow our focus to consider what happens to motion energy during a collision.	

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BSCS SCIENCE LEARNING
Transforming Science Education Through Research-Driven Innovation

Energy: Every Day, Everywhere Lesson 1

Launching an Investigation of Energy

1

What do we know and wonder about energy?

Know	Wonder

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2

Lesson 1: Focus Question

How do we know if something has energy?

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3

Car Launcher System

Identify the parts of the car launcher system.

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4

Communicating in Scientific Ways

What a scientist does	Symbol	What a scientist says
1. Ask why and how questions.	How? Why?	How come … ? I wonder how … ? I wonder why … ? How do they know that … ?
2. Observe.		I see … . I noticed … . I measured … .
3. Organize data and observations; look for patterns.		I see a pattern … . I think we could make a graph … . I see a relationship between … . Our data tell us … because … .
4. Think of an idea that explains your data and observations.		My idea is … . I predict _____ will happen because … . I think what causes this is … . I could draw a picture/diagram to show … .
5. Give evidence for your idea or claim.		My evidence is … . The reason I think that is … . I think it's true because … .
6. Listen to others' ideas and ask clarifying questions.		Are you saying that … ? What do you mean when you say … ? What is your evidence ? Can you say more about … ?
7. Agree or disagree with others' ideas; add onto someone else's ideas.	Yes No	I agree/disagree with _____ because … . I want to piggyback on _____'s idea. I want to add to what _____ said.
8. Search for new ideas from other sources.		We could get some new ideas from … . Is that a reliable source? How do we know? This information is like (or not like) other ideas we've found because … .
9. Consider if new ideas make sense.		That idea makes sense to me because … . That idea doesn't make sense because … . That idea matches what we saw because … .
10. Design an investigation to get more evidence.		What if we … ? We could get better evidence if we … . We could test our ideas by … .
11. Let your ideas change and grow.	AHH HA!	I'm changing my idea, now I think … . I want to add to my idea … . I am going to write down _____ in my notebook.

5

Car Launcher System

Do any of the parts of the car launcher system have energy?

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Explore the Car Launcher System

- Launch the car one time.
- Add observations to the "Notice" column.
- Add a question to the "Wonder" column.
  - Something to investigate
  - Question about energy
- Continue this process 3-4 times, adding noticings and wonderings.

NOTICE	WONDER

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7

Class Notice and Wonder Chart

NOTICE	WONDER

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8

Lesson Focus Question

How do we know if something has energy?

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9

Generate Questions

- Write your questions on sticky notes.
  - Write one question per sticky note.
  - Write in complete sentences.
  - Write big and bold so your questions are easy to read.

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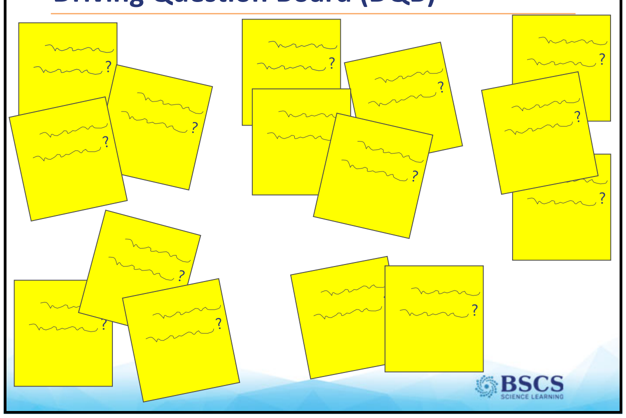
Driving Question Board (DQB)



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Unit Central Question

How does the energy of an object or system change?

SLO

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Communicating in Scientific Ways

How did using the CSW sentence stems help you think like a scientist?

What a scientist does	Symbol	What a scientist says
1. Ask why and how questions.		How come … ? I wonder how … ? I wonder why … ? How do they know that … ?
2. Observe.		I see … . I noticed … . I measured … .
3. Organize data and observations; look for patterns.		I see a pattern … . I think we could make a graph … . I see a relationship between … . Our data tell us … because … .
4. Think of an idea that explains your data and observations.		My idea is … . I predict _____ will happen because … . I think what causes this is … . I could draw a picture/diagram to show … .
5. Give evidence for your idea or claim.		My evidence is … . The reason I think that is … . I think it's true because … .
6. Listen to others' ideas and ask clarifying questions.		Are you saying that … ? What do you mean when you say … ? What is your evidence ? Can you say more about … ?
7. Agree or disagree with others' ideas; add onto someone else's ideas.		I agree/disagree with _____ because … . I want to piggyback on _____'s idea. I want to add to what _____ said.
8. Search for new ideas from other sources.		We could get some new ideas from … . Is that a reliable source? How do we know? This information is like (or not like) other ideas we've found because … .
9. Consider if new ideas make sense.		That idea makes sense to me because … . That idea doesn't make sense because … . That idea matches what we saw because … .
10. Design an investigation to get more evidence.		What if we … ? We could get better evidence if we … . We could test our ideas by … .
11. Let your ideas change and grow.		I'm changing my idea, now I think … . I want to add to my idea … . I am going to write down _____ in my notebook.

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Next Steps

Next class, we will investigate …SL0

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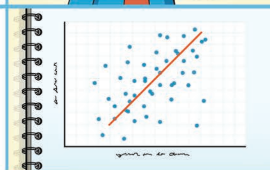
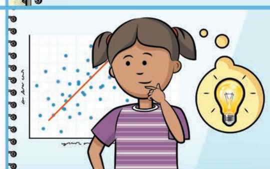
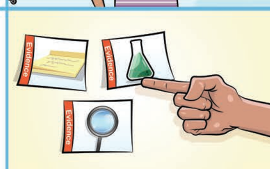
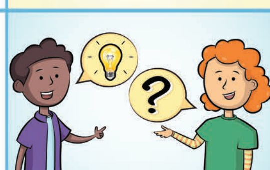
Communicating in Scientific Ways

What a scientist does	Symbol	What a scientist says
1. Ask why and how questions.		How come … ? I wonder how … ? I wonder why … ? How do they know that … ?
2. Observe.		I see … . I noticed … . I measured … .
3. Organize data and observations; look for patterns.		I see a pattern … . I think we could make a graph … . I see a relationship between … . Our data tell us … because … .
4. Think of an idea that explains your data and observations.		My idea is … . I predict _____ will happen because … . I think what causes this is … . I could draw a picture/diagram to show … .
5. Give evidence for your idea or claim.		My evidence is … . The reason I think that is … . I think it's true because … .
6. Listen to others' ideas and ask clarifying questions.		Are you saying that … ? What do you mean when you say … ? What is your evidence? Can you say more about … ?
7. Agree or disagree with others' ideas; add onto someone else's ideas.		I agree/disagree with _____ because … . I want to piggyback on _____'s idea. I want to add to what _____ said.
8. Search for new ideas from other sources.		We could get some new ideas from … . Is that a reliable source? How do we know? This information is like (or not like) other ideas we've found because … .
9. Consider if new ideas make sense.		That idea makes sense to me because … . That idea doesn't make sense because … . That idea matches what we saw because … .
10. Plan an investigation to get more evidence.		What if we … ? We could get better evidence if we … . We could test our ideas by … .
11. Let your ideas change and grow.		I'm changing my idea, now I think … . I want to add to my idea … . I am going to write down _____ in my notebook.

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