Lesson 1.3
Forces All Around
Lesson Overview

Students read to gather more evidence about forces. They are introduced to the first book in the unit, *Forces All Around*, about two friends who are learning what forces are. The class sets a purpose for reading—finding evidence of forces in the book. Students discuss the value of setting a purpose when reading and when investigating. The teacher models looking for evidence in text, and then students read in pairs and note evidence of forces. After reading, the class adds examples of forces to the Class Observation Table and analyzes the data to discover two key concepts. The purpose of this lesson is for students to search for evidence of forces from text and to discover that a force can make an object start or stop moving and that a force acts between two objects.

**Anchor phenomenon:** The floating train rises, floats above the track, then later falls back to the track.  
**Everyday phenomenon:** A variety of common objects, including a skateboard, a notebook, and a stroller start to move or stop moving.

**Students learn:**

- Scientists pay attention to change because understanding how and why something changes can be a way of figuring out how something works.
- Scientists gather information and evidence from books.
- Setting a purpose before reading can help readers focus their attention.
- When an object starts moving or stops moving, that is evidence that a force has acted on it.
- A force acts between two objects.
Setting a Purpose for Reading

The teacher introduces the unit’s first book and the strategy of setting a purpose—both before a science investigation and before reading.

Instructional Guide

1. Review the Chapter and Investigation Questions. Read aloud the Chapter Question: Why does the train rise? Read aloud the Investigation Question: What makes an object start to move?

   We started to figure this out by making observations of force blocks. We’ll gather more evidence to answer these questions today by reading. Reading is another way that scientists gather evidence to answer questions.

2. Introduce the book Forces All Around and describe its genre.

   This book is about students who are learning about forces, just like you are. They go out in their neighborhood and find examples of forces everywhere they look. This book is realistic fiction, meaning that although the two characters in the book are fictional, the examples and information in the book about forces are real.

3. Introduce the reading strategy of setting a purpose. Connect setting a purpose before investigating to setting a purpose before reading.

   In the last lesson, we had a purpose for our investigation—we were trying to figure out what makes an object move. We can use the strategy of setting a purpose when we read, too. In this unit, setting a purpose before we begin will be a strategy that we use when we read and when we conduct investigations.

4. Set a purpose for reading to find more examples of forces.

   Your purpose for reading will be to find more examples of forces. Yesterday we collected observations of what made things start to move, and discovered that forces were involved. Finding more examples of forces can help us discover more about how they work, and can help us figure out what makes the train rise.

5. Point out the Setting a Purpose for Investigating and Reading chart and add the first example in each column.
Teacher Support

Rationale

Providing More Experience: About Daily Written Reflections

Daily Written Reflections are open-ended, optional prompts that you can use with students to jump-start each lesson. You can ask students to write their responses, or you can use the prompts as the basis for a discussion. Daily Written Reflections can also be used at other times in the day or as homework. The prompts encourage students to reflect on what they’ve been learning, activate prior knowledge, make connections, and practice using science vocabulary. Responses can also be a good window into students’ thinking. Let students know that for this kind of writing, it is more important to focus on recording their ideas rather than on perfect spelling or punctuation. Daily Written Reflections are meant to be brief—allow about 5–10 minutes for students to respond.

Instructional Suggestion

Providing More Experience: Today’s Daily Written Reflection

What do you want to know about forces? This prompt (on page 3 in the Investigation Notebook) asks students to think about what they already know about forces and to also consider questions they currently have about forces. Encouraging students to respond to this prompt can help them connect what they did in Lesson 1.2 to any lingering ideas or questions they still have. This can help you learn about students’ prior knowledge of forces. It also serves as an anticipatory activity for reading the Forces All Around book in this lesson.

Background

Literacy Note: Setting a Purpose for Reading

Good readers are active readers; they often have clear goals in mind at the outset of reading. Good readers also evaluate the text as they read to determine whether it is meeting their goals. Setting goals promotes comprehension monitoring and may be particularly useful for reading science texts. In science, reading has the more authentic purpose of informing and/or extending ongoing investigations about a particular topic, so it provides opportunities for setting meaningful reading goals. Instruction on setting goals in this unit begins with the teacher modeling when and how to apply this strategy. Instruction on setting goals continues throughout the unit, including opportunities for students to practice setting goals with increasing independence.
Teacher models searching for evidence of forces by reading aloud the first few pages of the book and showing how to record that evidence.

**Instructional Guide**

1. **Demonstrate reading with a purpose and marking the text with a sticky note.** Think aloud as you model how to read with a purpose.

   - Explain what reading with a purpose is.
   - Hold up a copy of the *Forces All Around* book. Model the process of beginning to read by noticing the pictures on the cover. Think-aloud about how you will recognize evidence of a force.

   Now that I’ve set a purpose before reading, I know what I want to focus on and look for as I read this book. As I read, I’m looking for evidence of forces, such as something starting to move. Since there are illustrations in the book, we aren’t going to observe anything actually moving like we did in our investigation, but we can probably tell from the pictures and the words what is moving.

   - Read aloud the first page of the book and model the process of finding out about a force and how it makes something move, and marking the page with a sticky note.

   In the picture, I can see there’s a ball that bounced off the desk and onto the floor. Something made the ball start moving so it bounced off the desk, so there must have been a force.

   - Continue reading aloud the next two pages. Mark one more example of evidence of forces on pages 4–5.

   On page 5, it says, “When the skateboard started moving, that was evidence of a force.” I’m going to mark that example, too.
2. Project and introduce Partner Reading Guidelines. Let students know that they will read the book with a partner. Review the Partner Reading Guidelines with the class. Also point out the chart on the wall and let students know that they can refer to the guidelines as they read.

### Partner Reading Guidelines

1. Sit next to your partner and place the book between you.
2. Take turns reading.
3. Read in a quiet voice.
4. Be respectful and polite to your partner.
5. Ask your partner for help if you need it. Work together to make sure you both understand what you read.

I would like you and your partner to pause briefly every two or three pages to discuss what you saw or read that shows an example of a force. Your examples can come from the text or from the illustrations. You should find at least one example for each few pages you read.

3. Distribute books and sticky notes. Distribute 1 copy of the book and 10 sticky notes to each pair of students. Have pairs begin reading.

4. On-the Fly-Assessment: Reading with a purpose. As you circulate, remind students of the purpose of their reading: to find out more about forces and how they can make objects move. Also remind students to use their sticky notes to mark the book so it will be easier to locate when they share ideas with the class.
Embedded Formative Assessment

On-the-Fly Assessment 1: Reading With a Purpose

Look for: Throughout the unit, the strategy of setting a purpose will be taught and applied as students read and as they engage in firsthand science investigations. Beginning with this lesson, students will have many opportunities to learn about and use the strategy of setting goals to support their reading comprehension. As you circulate, make note of how well students use the purpose that was provided to guide their reading of the text. Are they talking with their partners about examples of forces? Do they connect their reading to the experiences they had with forces in Lesson 1.2?

Now what? If not, provide more reminders of what the purpose is and why setting a purpose is helpful. Point out when you notice students mentioning or focusing on the purpose. Next time they are asked to read with a purpose, help students reflect on whether or not they’ve met the purpose and model what it would look like to read with that purpose. Depending on how many students need this support, you could provide it to students individually, in a small group, or to the whole class. Early in the unit, students are given a purpose to read; later in the unit, they will be selecting their own purposes for reading.

Teacher Support

Background

About the Book: Forces All Around

Forces All Around follows the adventures of two kids looking for evidence of forces. The narrator and her friend learn in school that forces are pushes and pulls. On the way home, they decide to play a game: they challenge each other to find evidence of forces in the world around them. As they walk along, they look for things that are starting to move or stopping moving. It turns out there is evidence of forces everywhere—as a kid passes by on a skateboard, as a parent pushes a stroller, as a car gets towed away—and the kids record each example they see. Forces All Around sets the context for this unit, connecting what students are learning with their everyday lives. Non-touching forces are introduced in some of the illustrations, offering an opportunity to go back through the book looking for evidence of gravity and magnetic force.

Rationale

Pedagogical Goals: Informational Text

A major goal of our program is to deepen students’ awareness of and experience with the genres of science writing they are likely to encounter in school and in their lives outside of school. Our program is designed to address the Common Core State Standards for English Language Arts (CCSS-ELA) related to reading and writing informational text, with a specific focus on science text. Learning effective strategies and approaches for comprehension of informational text is extremely important for success in school, yet reading and writing these texts can be challenging for many students. The student books and related investigations in this program provide explicit, supportive instruction around how to tackle informational text.
Rationale

**Literacy Note: Partner Reading**
Throughout this unit, we suggest that students read the books with a partner. This allows students time to apply and practice the reading strategies they’re learning, keeps them focused on the task at hand, and provides opportunities for them to assist each other with reading. Of course, you can use any effective reading procedures you’ve already established with your class. Before reading this first book in the unit, you may need to provide instruction on how to read with a partner by using the Partner Reading Guidelines provided or your own guidelines. Establishing procedures takes time at first, but will pay off in terms of student learning and management of the lessons. Over time, students gain practice working together and will need fewer reminders about reading together effectively.
Sharing Observations and Drawing Conclusions

Students share forces they found in the book, which are added to the Class Observation Table, and the class analyzes patterns in the chart in order to agree on two key concepts.

Instructional Guide

1. Read aloud the first paragraph of *Forces All Around* on page 7.

2. Introduce evidence.

   This page, and lots of other pages in the book use the word evidence. Does anyone know what that word means? [Accept all responses.]

   Evidence is information that helps explain something or answer a question. Observing a stroller start moving is evidence that helps us know that a force acted on the stroller. When you observed your block starting to move the other day, that was evidence of a force. You can’t see a force itself, but you can see evidence that helps you know a force acted.

   All scientists use evidence in their work.

3. Review the Class Observation Table. Point out the table that you started in Lesson 1.2. Remind students what goes in each column.

4. Call on volunteers to share examples of forces, and add to the table. Have a few volunteers share examples of forces that they identified in the book. Have the class help you fill out a row on the table for each example.

5. Ask pairs to discuss ideas and questions about patterns in the table. Remind students that scientists collect many observations in order to look for patterns. Have pairs examine the chart and discuss any patterns they notice, or ideas or questions they have based on the chart. Call on a few volunteers to share and accept all ideas.

6. Ask about the number of objects involved with each force.
7. Read aloud and post the first key concept. Hold up the first key concept and read it aloud: A force acts between two objects. Post the key concept to the wall under the Key Concepts header, then point out the two objects involved in several forces on the chart.

8. Point out an example of a force stopping a moving object. If the chart already includes an example of a force causing a moving object to stop, point out this example. If one is not already on the chart, read aloud page 8 of the book.

Kai was moving, and then she stopped when she hit the fence. When she stopped moving, that was evidence of a force.

Then add “Friend stopped moving when she bumped into the fence” to the table.

9. Read aloud and post the second key concept. Hold up the second key concept and read it aloud: When an object starts moving or stops moving, that is evidence that a force has acted on it. Post the key concept.

10. Highlight how forces can cause changes in an object’s speed and direction.

We’ve looked at examples where we knew a force caused an object to start or stop moving. Actually, any change in an object’s movement is evidence of a force. Can you think of an example of an object changing speed or direction?

[A bike speeding up or slowing down. A car turning. A ball bouncing off a wall.]

Any time something slows down, speeds up, or changes direction, that is also evidence that a force acted on that object.

Teacher Support

Background

Science Notes: Forces Act Between Two Objects

The idea that forces always act between two objects is an important concept in physics and one about which this unit hopes to build awareness. It sets up students to understand more sophisticated concepts about forces in middle school—for example, when Object A pulls (or pushes) on Object B, Object B always pulls (or pushes) on Object A with exactly the same amount of force, but in the opposite direction. That important understanding is built on the idea that forces always act between two objects. Students will build more awareness of this basic idea in Chapters 2 and 3 of this unit, as they apply it to magnetic force and the force of gravity.
Background

Science Notes: Misconceptions About Forces
Typically, students think of a force only as something that makes things happen or creates a change. They believe forces only cause motion but do not stop it, and they often think there is no force acting on something if it is not moving. Younger students also tend to associate the word force with living things. Another common misconception is that whenever something is moving, this is evidence that a force is acting on it. While this may seem true in our everyday experience, an object’s motion is not evidence of a force at work.

Background

Science Practices: Analyzing and Interpreting Data
In order to make sense of the evidence they gather in investigations, scientists analyze and interpret data. This can include organizing data into tables and charts, making comparisons, and identifying patterns. Analyzing data can lead to proposed explanations, use of the data as evidence in an argument, or to posing new questions. In this activity, students see the observations they made organized into a table and they have the opportunity to identify patterns and ask questions based on what they notice. Don’t worry if students aren’t yet very sophisticated in the patterns and questions they come up with. This is intended as an open-ended, initial experience with this important science practice.

Background

Science Note: About Patterns in Data
Finding patterns in data is an important part of analyzing data. This may mean finding a correlation (e.g., when forces are unbalanced, the object starts moving; as the strength of the force increases, so does the distance the ball moves), finding a value range (e.g., most of the time, the ball moved between 1 and 5 meters), or noticing what varies and what does not vary (e.g., sometimes there are two forces on an object and sometimes only one). Students may find the term pattern confusing at first. They may think of a pattern only as a repeating sequence (e.g., AABBAB). You can encourage students to discuss whatever they notice about the data; during the class discussion, you can highlight instances of patterns that students describe.

Instructional Suggestion

Supporting Discussions: Debriefing Evidence and Conclusions
As you guide discussions throughout the unit, work to find a balance between allowing students enough freedom to come to their own conclusions and providing enough guidance to keep the discussion on topic. Avoid confirming or denying students’ ideas. Rather, ask questions such as “Can you explain what you observed?”, “What is your evidence for that?”, “Does anyone else have a different idea?”, or “Does anyone else have other evidence?”.
The teacher introduces the unit’s first book and the strategy of setting a purpose—both before a science investigation and before reading.

Instructional Guide

1. **Review the Chapter and Investigation Questions.** Read aloud the Chapter Question: Why does the train rise? Read aloud the Investigation Question: What makes an object start to move?

   Comenzamos a averiguar esto haciendo observaciones de bloques. Hoy reuniremos más evidencia para responder estas preguntas por medio de la lectura. Leer es otra manera en la que los científicos reúnen evidencia para responder preguntas.

2. **Introduce the book Forces All Around and describe its genre.**

   Este libro trata de estudiantes que están aprendiendo acerca de las fuerzas, igual que ustedes. Ellos salen a su vecindario y encuentran ejemplos de fuerzas por dondequiera que miran. Este libro es una ficción realista, lo que significa que aunque los dos personajes en el libro son ficticios, los ejemplos y la información sobre las fuerzas en el libro son reales.

3. **Introduce the reading strategy of setting a purpose.** Connect setting a purpose before investigating to setting a purpose before reading.

   En la lección anterior, teníamos un propósito para nuestra investigación: estábamos intentando averiguar qué hace que un objeto se mueva. También podemos usar la estrategia de definir un propósito cuando leemos. En esta unidad, definir un propósito antes de que comenzemos será una estrategia que usaremos cuando leamos y cuando realicemos investigaciones.

4. **Set a purpose for reading to find more examples of forces.**

   Su propósito para leer será encontrar más ejemplos de fuerzas. Ayer recolectamos observaciones sobre qué hizo que las cosas comenzaran a moverse, y descubrimos que las fuerzas tenían algo que ver con ese movimiento. Encontrar más ejemplos de fuerzas puede ayudarnos a descubrir más sobre cómo funcionan, y puede ayudarnos a averiguar qué hace que el tren se eleve.
5. Point out the Setting a Purpose for Investigating and Reading chart and add the first example in each column.

- In the “Investigating” column, add the example from the previous lesson. Write “Find out what makes an object start to move.”
- In the “Reading” column, write “Find more examples of forces.”

Teacher Support

Rationale

Providing More Experience: About Daily Written Reflections
Daily Written Reflections are open-ended, optional prompts that you can use with students to jump-start each lesson. You can ask students to write their responses, or you can use the prompts as the basis for a discussion. Daily Written Reflections can also be used at other times in the day or as homework. The prompts encourage students to reflect on what they’ve been learning, activate prior knowledge, make connections, and practice using science vocabulary. Responses can also be a good window into students’ thinking. Let students know that for this kind of writing, it is more important to focus on recording their ideas rather than on perfect spelling or punctuation. Daily Written Reflections are meant to be brief—allow about 5–10 minutes for students to respond.

Instructional Suggestion

Providing More Experience: Today’s Daily Written Reflection
What do you want to know about forces? This prompt (on page 3 in the Investigation Notebook) asks students to think about what they already know about forces and to also consider questions they currently have about forces. Encouraging students to respond to this prompt can help them connect what they did in Lesson 1.2 to any lingering ideas or questions they still have. This can help you learn about students’ prior knowledge of forces. It also serves as an anticipatory activity for reading the Forces All Around book in this lesson.

Background

Literacy Note: Setting a Purpose for Reading
Good readers are active readers; they often have clear goals in mind at the outset of reading. Good readers also evaluate the text as they read to determine whether it is meeting their goals. Setting goals promotes comprehension monitoring and may be particularly useful for reading science texts. In science, reading has the more authentic purpose of informing and/or extending ongoing investigations about a particular topic, so it provides opportunities for setting meaningful reading goals. Instruction on setting goals in this unit begins with the teacher modeling when and how to apply this strategy. Instruction on setting goals continues throughout the unit, including opportunities for students to practice setting goals with increasing independence.
Teacher models searching for evidence of forces by reading aloud the first few pages of the book and showing how to record that evidence.

Instructional Guide

1. Demonstrate reading with a purpose and marking the text with a sticky note. Think aloud as you model how to read with a purpose.

   • Explain what reading with a purpose is.

   Leer con un propósito significa tener una idea en mente sobre la cual quieren averiguar al leer.

   • Hold up a copy of the *Forces All Around* book. Model the process of beginning to read by noticing the pictures on the cover. Think-aloud about how you will recognize evidence of a force.

   Ahora que he definido un propósito antes de leer, sé en qué quiero enfocarme y qué quiero buscar mientras leo este libro. Mientras leo, busco evidencia de las fuerzas, como algo que comienza a moverse. Como hay ilustraciones en el libro, no vamos a observar nada que realmente se esté moviendo como hicimos en nuestra investigación, sino que con los dibujos y las palabras probablemente podamos deducir qué se está moviendo.

   • Read aloud the first page of the book and model the process of finding out about a force and how it makes something move, and marking the page with a sticky note.

   En el dibujo, veo que hay una pelota que rebotó del escritorio y cayó al piso. Algo hizo que la pelota comenzara a moverse para que rebotara del escritorio, así que debe haber sido una fuerza.

   • Continue reading aloud the next two pages. Mark one more example of evidence of forces on pages 4–5.

   En la página 5 dice: "Cuando la patineta comenzó a moverse, eso fue una evidencia de una fuerza". Voy a marcar ese ejemplo también.
2. **Project and introduce Partner Reading Guidelines.** Let students know that they will read the book with a partner. Review the Partner Reading Guidelines with the class. Also point out the chart on the wall and let students know that they can refer to the guidelines as they read.

Reglas para la lectura con un/a compañero/a

1. Siéntate al lado de tu compañero/a y pon el libro entre tú y él o ella.
2. Tomen turnos al leer.
3. Lean en voz baja.
4. Trata a tu compañero/a con respeto y cortesía.
5. Si te hace falta, pídele ayuda a tu compañero/a. Trabajen juntos para asegurar que ambos entienden lo que leen.

Me gustaría que hicieran una pausa breve cada dos o tres páginas para discutir en parejas lo que vieron o leyeron que muestre un ejemplo de una fuerza. Sus ejemplos pueden venir del texto o de las ilustraciones. Deberían encontrar por lo menos un ejemplo por cada dos o tres páginas que lean.

3. **Distribute books and sticky notes.** Distribute 1 copy of the book and 10 sticky notes to each pair of students. Have pairs begin reading.

4. **On-the Fly-Assessment: Reading with a purpose.** As you circulate, remind students of the purpose of their reading: to find out more about forces and how they can make objects move. Also remind students to use their sticky notes to mark the book so it will be easier to locate when they share ideas with the class.
Embedded Formative Assessment

On-the-Fly Assessment 1: Reading With a Purpose

Look for: Throughout the unit, the strategy of setting a purpose will be taught and applied as students read and as they engage in firsthand science investigations. Beginning with this lesson, students will have many opportunities to learn about and use the strategy of setting goals to support their reading comprehension. As you circulate, make note of how well students use the purpose that was provided to guide their reading of the text. Are they talking with their partners about examples of forces? Do they connect their reading to the experiences they had with forces in Lesson 1.2?

Now what? If not, provide more reminders of what the purpose is and why setting a purpose is helpful. Point out when you notice students mentioning or focusing on the purpose. Next time they are asked to read with a purpose, help students reflect on whether or not they’ve met the purpose and model what it would look like to read with that purpose. Depending on how many students need this support, you could provide it to students individually, in a small group, or to the whole class. Early in the unit, students are given a purpose to read; later in the unit, they will be selecting their own purposes for reading.

Teacher Support

Background

About the Book: Forces All Around
Forces All Around follows the adventures of two kids looking for evidence of forces. The narrator and her friend learn in school that forces are pushes and pulls. On the way home, they decide to play a game: they challenge each other to find evidence of forces in the world around them. As they walk along, they look for things that are starting to move or stopping moving. It turns out there is evidence of forces everywhere—as a kid passes by on a skateboard, as a parent pushes a stroller, as a car gets towed away—and the kids record each example they see. Forces All Around sets the context for this unit, connecting what students are learning with their everyday lives. Non-touching forces are introduced in some of the illustrations, offering an opportunity to go back through the book looking for evidence of gravity and magnetic force.

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Pedagogical Goals: Informational Text

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Rationale

Literacy Note: Partner Reading
Throughout this unit, we suggest that students read the books with a partner. This allows students time to apply and practice the reading strategies they’re learning, keeps them focused on the task at hand, and provides opportunities for them to assist each other with reading. Of course, you can use any effective reading procedures you’ve already established with your class. Before reading this first book in the unit, you may need to provide instruction on how to read with a partner by using the Partner Reading Guidelines provided or your own guidelines. Establishing procedures takes time at first, but will pay off in terms of student learning and management of the lessons. Over time, students gain practice working together and will need fewer reminders about reading together effectively.
Students share forces they found in the book, which are added to the Class Observation Table, and the class analyzes patterns in the chart in order to agree on two key concepts.

Instructional Guide

1. Read aloud the first paragraph of *Forces All Around* on page 7.

2. Introduce evidence.

Está página y muchas otras páginas en el libro usan la palabra evidencia. ¿Alguien sabe lo que significa la palabra? [Acepta todas las respuestas].

Evidencia es información que ayuda a explicar algo o a responder una pregunta. Observar un coche comenzando a moverse es evidencia que nos ayuda a saber que una fuerza actuó sobre el coche. Cuando observaron su bloque comenzando a moverse el otro día, eso fue evidencia de una fuerza. No pueden ver una fuerza por sí misma, pero pueden ver evidencia que les ayuda a saber que una fuerza actuó.

Todos los científicos usan evidencia en su trabajo.

3. Review the Class Observation Table. Point out the table that you started in Lesson 1.2. Remind students what goes in each column.

4. Call on volunteers to share examples of forces, and add to the table. Have a few volunteers share examples of forces that they identified in the book. Have the class help you fill out a row on the table for each example.

5. Ask pairs to discuss ideas and questions about patterns in the table. Remind students that scientists collect many observations in order to look for patterns. Have pairs examine the chart and discuss any patterns they notice, or ideas or questions they have based on the chart. Call on a few volunteers to share and accept all ideas.
6. Ask about the number of objects involved with each force.

¿Hay ejemplos de fuerzas aquí que tengan que ver con un solo objeto? [Los estudiantes pueden decir que no, o pueden señalar el ejemplo del chico cayendo al suelo en la página 15. Si los estudiantes señalan el ejemplo en la página 15, explica que la clase investigará las caídas más adelante, y pregúntale a la clase sobre todos los otros ejemplos].

7. Read aloud and post the first key concept. Hold up the first key concept and read it aloud: *A force acts between two objects*. Post the key concept to the wall under the Key Concepts header, then point out the two objects involved in several forces on the chart.

8. Point out an example of a force stopping a moving object. If the chart already includes an example of a force causing a moving object to stop, point out this example. If one is not already on the chart, read aloud page 8 of the book.

Kai se estaba moviendo, y luego se detuvo cuando golpeó la cerca. Cuando dejó de moverse, eso fue evidencia de una fuerza.

Then add “Friend stopped moving when she bumped into the fence” to the table.

9. Read aloud and post the second key concept. Hold up the second key concept and read it aloud: *When an object starts moving or stops moving, that is evidence that a force has acted on it*. Post the key concept.

10. Highlight how forces can cause changes in an object’s speed and direction.

Hemos visto ejemplos en los que supimos que una fuerza causó que un objeto comenzara o parara su movimiento. En realidad, cualquier cambio en el movimiento de un objeto es evidencia de una fuerza. ¿Pueden pensar en un ejemplo de un objeto cambiando de velocidad o dirección? [Una bici acelerando o bajando la velocidad. Un auto dando vuelta. Una pelota rebotando de una pared].

Cada vez que algo baja su velocidad, acelera o cambia de dirección, eso también es evidencia de que una fuerza actuó sobre ese objeto.

Teacher Support

Background

Science Notes: Forces Act Between Two Objects

The idea that forces always act between two objects is an important concept in physics and one about which this unit hopes to build awareness. It sets up students to understand more sophisticated concepts about forces in middle school—for example, when Object A pulls (or pushes) on Object B, Object B always pulls (or pushes) on Object A with exactly the same amount of force, but in the opposite direction. That important understanding is built on the idea that forces always act between two objects. Students will build more awareness of this basic idea in Chapters 2 and 3 of this unit, as they apply it to magnetic force and the force of gravity.