Lesson 3.2
Reading About Gravity
Lesson Overview

Students investigate more about how gravity makes objects fall, particularly whether gravity acts between two objects, as touching forces and magnetic forces do. Students return to *Handbook of Forces* and read with this purpose in mind. Through a class discussion, a demonstration of a weight stretching a rubber band, and revisiting the Class Data Table, the class concludes that gravity is a pull that acts between two objects. The class concludes that when they observe evidence of gravity, Earth is one of the two objects involved. Partners then choose their own purposes for reading by rereading the section in the book about gravity. The purpose of this lesson is to establish key ideas about gravity and Earth that students will use in upcoming lessons.

**Anchor phenomenon:** The floating train rises, floats above the track, then later falls back to the track. **Everyday phenomenon:** A ball drops falls if you drop it.

**Students learn:**

- Like other forces, gravity acts between two objects.
- When we observe evidence of gravity, Earth is one of the two objects involved.
- Scientists often reread a text with a new purpose in mind.
- There are often many good options when setting a purpose for reading.
Revisiting Handbook of Forces

Students return to the unit’s reference book, Handbook of Forces, to find out more about how gravity makes objects fall, with a focus on whether gravity acts between two objects.

Instructional Guide

1. **Introduce the lesson and review the Investigation Question.** Read aloud the Investigation Question, *What makes an object fall?*

2. **Reintroduce the reference book, Handbook of Forces.** Remind students that this is a reference book with information about many kinds of forces. Also remind them that scientists look for specific topics in reference books rather than reading them straight through.

3. **Review learning about the force that causes falling.** Call on volunteers to share what the class has discovered so far about the investigation question. [Gravity is a force that makes things fall; you can feel evidence of gravity when you hold something heavy; you can see evidence of the force of gravity when something starts falling.]

4. **Record a purpose for reading.**

   We will read to find out more about gravity. I have a question about gravity, based on a pattern I noticed with other forces. Other forces we have investigated act between two objects. I wonder if gravity does too. If so, what is the other object besides the falling object?

   In the “Reading” column of the Setting a Purpose for Investigating and Reading chart, write “Find out if gravity also acts between two objects.”

5. **Refer to Partner Reading Guidelines.** Review these if necessary.

6. **Project and introduce the notebook page.** Select the correct page in the table of contents. Have students turn to page 30, Reading About Gravity: Two Objects?, in their notebooks. Let students know that once they finish reading and marking evidence that helps with the reading purpose, they should complete this notebook page.

7. **Distribute books and sticky notes.** Distribute 1 copy of Handbook of Forces and 10 sticky notes to each pair of students.
8. Use the table of contents to locate the “Gravity” section. Have students turn to the table of contents and locate the section of the text about gravity. [Page 10.]


10. Students write about the evidence they found. Remind students to record in their notebooks the evidence they found in the text.

Teacher Support

Instructional Suggestion

Providing More Experience: Today’s Daily Written Reflection
We saw evidence that gravity could make an object start moving. Do you think gravity could also make an object STOP moving? Why or why not? Don’t worry if you aren’t sure of your answer. This prompt (on page 29 in the Investigation Notebook) invites students to consider a key idea they learned about forces (that starting or stopping motion is evidence of a force) to the new context of the force of gravity. It is also an opportunity for students to consider the crosscutting concept of Stability and Change. Students may not be very sure of their answer, since the class has not considered this kind of evidence about gravity but their thinking should be productive even if they draw incorrect conclusions.

Background

Literacy Note: About Text Features
Text features are the elements of a text that are used to organize information and highlight important ideas. Text features include headings, tables of contents, bold print, illustrations, captions, graphs, etc. Learning to use these features is a strategy that students can employ to locate and make sense of information in nonfiction texts. In this unit, students learn to use the table of contents; in this lesson, students should be able to use the table of contents independently to locate the section of the book about gravity.

Possible Responses

What evidence did you find in the book that helps you answer this question: Does the force of gravity act between two objects?
Yes, gravity acts between two objects. The book says that Earth pulls on you. It says leaves fall because Earth pulls them down, and this is gravity.
Students return to *Handbook of Forces*. This time, they set their own purposes for reading.

**Instructional Guide**

1. **Explain that there can be many good purposes for reading the same thing.** Explain that scientists often read the same thing several times, with different purposes in mind each time. Let students know that partners will now get to choose their own purposes for rereading the section on gravity in *Handbook of Forces*.

2. **Revisit the Gravity Anticipatory Chart for possible purposes.** Direct students’ attention to this chart and ask them to review it for possible purposes for reading about gravity. If necessary, suggest an idea or two yourself. Record students’ ideas on the chart. [Find out about gravity and space. Find out if gravity can repel. Find out if gravity is always a downward force.]

3. **Pairs look through the “Gravity” section of Handbook of Forces for more ideas.** Have students flip through pages 10–13 to look at the heading, photographs, and illustrations to get more ideas. Remind students to mark their evidence with sticky notes. Take more suggestions and add them to the Gravity Anticipatory Chart.

4. **Partners choose and record their purposes for reading.** Have students turn to page 31, Reading About Gravity: My Purpose for Reading, in their notebooks. Have partners discuss and agree on a purpose for reading and record it in their notebooks.

5. **Partners remove sticky notes from the book.** Explain that partners will now look for and mark evidence related to their new purposes for reading. Before they do so, have students remove the sticky notes from their first read.

6. **Partners read pages 10–13 again with their new purposes.** Remind students to mark evidence with sticky notes.

7. **On-the-Fly Assessment: Add to Gravity Anticipatory Chart.** When students have finished reading, get their attention and focus on the chart.

   - **New ideas.** Ask volunteers to share any new ideas and record them in the “What we think we know about gravity” column.
8. Conclude the lesson. Explain that in future lessons, students will add to the Gravity Anticipatory Chart as they learn more about gravity.

Embedded Formative Assessment

On-the-Fly Assessment 10: Revisiting the Gravity Anticipatory Chart

Look for: As students add new ideas and questions and answer and correct old questions and initial ideas, you will get a sense of the class’s learning progress. Before recording something new on the chart, ask to see who else in the class might also think that. Although this is a class chart, it can’t reflect what every student thinks and wonders. However, it is worthwhile to make an effort to ensure that the chart reflects more than one student’s ideas. Listen for students to mention the ideas they have been learning over the last couple of lessons. Also listen for new ideas that are partial or incorrect and make note of ideas already on the chart that need revising or further fleshing out.

Now what? If the chart does not yet have ideas that represent what the lessons have addressed, consider revisiting some of those ideas. A good way to help students’ understanding evolve to become more accurate is to face off an accurate idea with an alternate conception about that same idea. Project a pair of statements and ask questions such as:

- Which statement is more true?
- How do you know that?
- What evidence do you have?
- How could you convince someone else that it is true (or false)?

Help the class come to agreement.

Teacher Support

Rationale

Pedagogical Goal: Reasons for Students Setting Their Own Purposes for Reading

Students have had several opportunities to apply the strategy of reading with a particular purpose in mind. Up to now, the process of setting a purpose for reading has been teacher-led. In order for students to continue to develop and integrate this strategy, we recommend giving them this opportunity for more ownership in setting a purpose for their reading. Though there may be several possible options from which to choose, it is important for both students within a partnership to decide on a single purpose. Reading for two different purposes simultaneously would detract from that peer support and could be unnecessarily confusing as well.
Rationale

Discourse Routine: The Gravity Anticipatory Chart
The Gravity Anticipatory Chart helps students access prior knowledge and serves as a bank of students' questions. Revisiting the chart helps students recognize all they’re learning as well as synthesize new information with what they knew at the start of the unit. It is also a chance for them to engage in the important science practice of asking questions.

Background

Science Note: About Gravity and Space
Students are generally curious about the topic of gravity in outer space and often believe there is none. Since gravity is an attraction between every two objects, it acts everywhere, including in outer space and on other planets and moons. The force of gravity decreases with distance between objects, so if an object were far out in outer space, far from any large object such as a star or planet, there would be little gravity exerted on that object. The strength of the force of gravity depends on the masses of the objects involved. On the surface of planets and moons that are smaller than Earth, the force of gravity is less than on Earth, but the force of gravity is still exerted there.

Possible Responses

Answers will vary.

Reading purpose:
Is there gravity in space?

What did you find out about your reading purpose?
Earth exerts a force of gravity on the Moon and keeps it from floating away.
Reading About Gravity: Two Objects?

What evidence did you find in the book that helps you answer this question: Does the force of gravity act between two objects?

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Make a drawing if it helps you explain the evidence you found.
Students return to the unit’s reference book, *Handbook of Forces*, to find out more about how gravity makes objects fall, with a focus on whether gravity acts between two objects.

**Instructional Guide**

1. **Introduce the lesson and review the Investigation Question.** Read aloud the Investigation Question, *What makes an object fall?*

2. **Reintroduce the reference book, *Handbook of Forces*.** Remind students that this is a reference book with information about many kinds of forces. Also remind them that scientists look for specific topics in reference books rather than reading them straight through.

3. **Review learning about the force that causes falling.** Call on volunteers to share what the class has discovered so far about the investigation question. [Gravity is a force that makes things fall; you can feel evidence of gravity when you hold something heavy; you can see evidence of the force of gravity when something starts falling.]

4. **Record a purpose for reading.**

   Leeremos para averiguar más sobre la gravedad. Tengo una pregunta sobre la gravedad, basada en un patrón que noté con otras fuerzas. Otras fuerzas que hemos investigado actúan entre dos objetos. Me pregunto si la gravedad también actúa entre dos objetos. Si es así, ¿cuál es el otro objeto aparte del objeto que cae?

   In the “Reading” column of the Setting a Purpose for Investigating and Reading chart, write “Find out if gravity also acts between two objects.”

5. **Refer to Partner Reading Guidelines.** Review these if necessary.

6. **Project and introduce the notebook page.** Select the correct page in the table of contents. Have students turn to page 30, *Reading About Gravity: Two Objects?*, in their notebooks. Let students know that once they finish reading and marking evidence that helps with the reading purpose, they should complete this notebook page.
7. **Distribute books and sticky notes.** Distribute 1 copy of *Handbook of Forces* and 10 sticky notes to each pair of students.

8. **Use the table of contents to locate the “Gravity” section.** Have students turn to the table of contents and locate the section of the text about gravity. [Page 10.]

9. **Partners read and mark evidence.** Have students read pages 10–13 and mark evidence in the text with sticky notes.

10. **Students write about the evidence they found.** Remind students to record in their notebooks the evidence they found in the text.

### Teacher Support

#### Instructional Suggestion

**Providing More Experience: Today’s Daily Written Reflection**

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### Possible Responses

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   - **New ideas.** Ask volunteers to share any new ideas and record them in the “What we think we know about gravity” column.
8. Conclude the lesson. Explain that in future lessons, students will add to the Gravity Anticipatory Chart as they learn more about gravity.

Embedded Formative Assessment

On-the-Fly Assessment 10: Revisiting the Gravity Anticipatory Chart

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Possible Responses

Answers will vary.

Reading purpose:
Is there gravity in space?

What did you find out about your reading purpose?
Earth exerts a force of gravity on the Moon and keeps it from floating away.
**Leer acerca de la gravedad: ¿dos objetos?**

Anota qué evidencia encontraste en el libro que te ayude a responder esta pregunta: ¿La fuerza de gravedad actúa entre dos objetos?

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Haz un dibujo si te ayuda a explicar la evidencia que encontraste.