Lesson 1.3
Exploring Systems
Lesson Overview

Through hands-on investigation, rereading a portion of the *Systems* book, and class discussion, students explore the parts and functions of various systems in order to answer the question *What is a system?* Students work in groups to build a simple, solar-powered, electrical system from a kit of materials. The class discusses the various parts of this system and their functions and draws connections to the parts and functions of the larger electrical system. This serves as students’ introduction to the various parts of the electrical system, which will be revisited throughout the unit. Then students return to the *Systems* text to choose a system and record the parts and function of each component of that system, then discuss their diagrams with the class. The purpose of this lesson is to provide students with an opportunity to think about the commonalities between various systems in order to gain a deeper understanding of the concept of a system.

**Anchor Phenomenon:** Ergstown has frequent blackouts.

**Investigative Phenomenon:** The way a bicycle works and the way a home works

**Design Problem:** Make a small electric fan spin.

**Students learn:**

- A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall function.
- Simple electrical systems and larger electrical systems have commonalities.
- Text features can help a reader navigate an informational text.
Pairs return to the book *Systems*, select a specific system, and record its parts and their functions.

### Instructional Guide

1. **Introduce the next activity.** Let students know that they will have another opportunity to dive into *Systems* with their reading partners today. Explain that they will be filling out tables for different systems in the book.

2. **Point out the importance of text features.** Let students know that before they get started working with their partners, you want to share a strategy that may help them to navigate through the book. Explain that using text features can help students find their way around a text and make sense of the information in the text.

3. **Project page 3, Contents.** Have partners turn to the same page in their student books. Point out the list of section headings and their corresponding page numbers.

#### Contents

<table>
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<td>Glossary</td>
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</tbody>
</table>

Page 3 is the Contents page, also known as a table of contents. It lists sections of the book.

Point to the first section heading and the corresponding page number.
The first section is called “What Makes a Wheel a Wheel?” and it begins on page 5.

If I turn to page 5, I will see that it contains a heading that is the same heading as the one listed in the table of contents.

Instruct students to turn to page 5 and ask a student to read the heading aloud.

You can use the table of contents in *Systems*, as well as the headings in the book, to help you understand where to look in the book as you search for certain information today.

4. **Have students turn to page 6 in their books.** Ask students to point out what they notice. [A heading, photos of bicycle parts, words that name the parts.]

If I hadn’t read this page before, what would the heading and the images tell me that I might read about on this page? [That it is about bicycle parts.]

Have a student read page 6 and point out the connection between the heading, the text, and the images.

5. **Have students turn to page 7.** Direct students’ attention to the table. Explain its purpose.

You’ll recall this table from reading it in the last lesson. This table provides us with more detailed information about each of the bicycle parts, including the function of each part.

Informational texts often organize information into tables like this one, so it is important to read them carefully.

6. **Have pairs look through the book and identify text features.** Provide students with a few moments to look through the book and look for text features such as the table of contents, headings, diagrams, photos, and tables. Ask students to point out any text features they find to their partners. Pick a few students to share with the class what text features they found and where they found them.

7. **Have students turn to page 10, Parts of a System, in their notebooks.** Read and explain the instructions to students.

   - Point out that students may wish to refer to the table of contents to choose a system.
   - Remind students to use text features such as headings and diagrams to help them find the information that they need about the system they’ve chosen.

8. **On-the-Fly Assessment: Parts of a System and Their Functions.** Have pairs complete page 10 in their notebooks. Let the class know that although they are working in pairs, all students should complete page 10 in their own notebooks.

   - Circulate and provide support. Pairs may need support identifying the function of their systems. Encourage them to refer to the text and also to draw on prior knowledge in order to construct a statement about the system’s function.
9. Invite students to share with the class. Ask a few students to share the parts and functions of the systems they and their partners chose. Encourage students to refer back to the text as they discuss each system. Then guide students to synthesize what they have learned.

   How are the systems we read about similar? What do they have in common?

   Remember, when we connect ideas together to come to a new understanding, we are synthesizing ideas.

10. Point to the Investigation Question from Lesson 1.2. Read it aloud.

   What is a system?

   What do you think a system is now?

   Call on students to respond. You may wish to collect responses on the board.

11. Post key concept. Post the key concept on the wall and read it aloud.

   A system is a collection of interacting parts that work together. Each part in the system plays a role to perform an overall function.

12. Post the system vocabulary card to the wall.

   A system is a group of parts that work together.

13. Conclude the lesson. Let students know that in the next lesson they’ll get to do more investigations of electrical systems and observe what happens when devices in the electrical system are working.
Embedded Formative Assessment

On-the-Fly Assessment 2: Parts of a System and Their Functions

Look for: Understanding that systems have parts and that each part has a specific function is critical to making sense of the electrical system in this unit. In this lesson, students should be able to discuss the components of the system they have chosen from the text as the parts of that system. They should be able to describe what they think individual parts do for the system in a general sense, but it is not important that students actually understand the specific functions of each of the individual parts. Students should be left with an understanding that the system they have chosen to write about, like other systems, has different parts and that each part plays a role in how the system works.

Now what? If students are struggling with understanding how parts in a system perform particular functions, you may want to present additional mystery system examples for students to investigate, such as a citrus juicer, a garlic press, a salad spinner, a can opener, an adjustable wrench, a compass, or a turkey baster. Having an opportunity to discover the function of each part in a hands-on way may help students better understand the system’s parts and functions. For a more extended activity, you could set up a few of these systems at stations and have students investigate each one. Students can complete their own system table (with parts and functions) for one of these mystery systems.

Teacher Support

Rationale

Literacy Note: Returning to the Text
Returning to Systems after students have read the whole book with a partner can deepen students comprehension and understanding of key concepts. Before students reread with the purpose of recording the parts and each part’s function for a particular system, it would be helpful to model using both comprehension strategies and text features to reread and understand the text. Engaging in purposeful rereading of text prepares students to focus on key ideas and details as they read more independently.

Background

Literacy Note: About Text Features
Text features are the visual elements of a text that are used to organize information and highlight important ideas. Text features include headings, tables of contents, bold print, diagrams, captions, tables, etc. Students can learn to use these features as a strategy to locate and make sense of information in informational texts. In the Energy Conversions unit, students have multiple opportunities to make sense of systems using informational texts. They learn that text features are important elements of texts that convey information. These text features are used to supplement, further explain, and add information to the running text.

Instructional Suggestion

Providing More Experience: Text Features
To support the brief review of text features invite students to complete an optional Text Features Scavenger Hunt on pages 8–9 in the Investigation Notebook. One example has been done. If you feel that students would benefit from a second example, remind students that in Lesson 1.2 they examined a table on page 7 in the student book Systems. On
notebook page 8, model recording page 7 and a description of that text feature in the row next to “Table.” Then ask students to share how this table helps you understand the text. Explain that next, students should work with a partner to locate different text features, record the page numbers on which they are found, write a description of each text feature, and note what it helps the reader understand. You may wish to challenge students to complete the entire page. You can also invite students to return to this page as a reference when they read other informational texts.

**Instructional Suggestion**

**Classroom Management: Helping Students Work Effectively with a Partner**

Throughout the unit, there will be many opportunities for students to work with a partner. It is well worth the time to discuss your expectations for partner work with the class beforehand. Guidelines to cover might include procedures for sharing ideas, managing shared materials, listening to each other, and overall cooperation. Discuss your expectations explicitly and specifically with regard to conversations staying focused on the school work at hand. You might invite a pair of students to model effective partner work in front of the class. Consider assigning partners that will support each other during the building of the system and during the writing for this lesson.

**Possible Responses**

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<tr>
<td><strong>Parts of a System</strong> (page 10)</td>
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</table>

**Public Water System**

**Function:** provide water to people’s homes

**Part/Function Table**

- **Part:** water tank  
  **Function:** holds water

- **Part:** pumps  
  **Function:** moves water through the pipes

- **Part:** homes  
  **Function:** use water

- **Part:** pipes  
  **Function:** carry water into homes

- **Part:** water treatment plan  
  **Function:** cleans the water
Parts of a System

1. With your partner, look through *Systems* and choose one of the systems described in the book.
2. Write the name of the system and its function on the two lines below.
3. Record each part of the system in the left column of the table below.
4. Beside each part, record the part’s function.
5. Use as many rows as you need.

____________________________________________________________ System

Function: __________________________________________________________

<table>
<thead>
<tr>
<th>Part</th>
<th>Function</th>
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### Contenido

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<td>Partes de la bicicleta</td>
<td>6</td>
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<tr>
<td>Una bicicleta es un sistema</td>
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<td>Una casa es un sistema</td>
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<td>Sistemas hechos de sistemas</td>
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<td>Sistema eléctrico casero</td>
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<td>Parte de un sistema más grande</td>
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<td>Sistema público de agua</td>
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<td>Sistema de energía eléctrica</td>
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<td>Cuando un sistema falla</td>
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<td>¿Por qué debemos pensar en los sistemas?</td>
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</table>

La página 3 es la página del Contenido, también conocida como tabla de contenidos. Indica las secciones del libro.
Point to the first section heading and the corresponding page number.

La primera sección se llama “¿Qué hace que una rueda sea una rueda?” y empieza en la página 5.

Si voy a la página 5, veré que contiene un encabezado que es el mismo que está indicado en la tabla de contenidos.

Instruct students to turn to page 5 and ask a student to read the heading aloud.

Pueden usar la tabla de contenidos en Sistemas, así como los encabezados en el libro, para ayudarles a entender qué parte del libro mirar para buscar cierta información hoy.

4. **Have students turn to page 6 in their books.** Ask students to point out what they notice. [A heading, photos of bicycle parts, words that name the parts.]

Si no hubiera leído esta página antes, ¿qué me dirían el encabezado y las imágenes sobre lo que yo podría leer en esta página?

[Que trata sobre partes de bicicleta].

Have a student read page 6 and point out the connection between the heading, the text, and the images.

5. **Have students turn to page 7.** Direct students’ attention to the table. Explain its purpose.

Ustedes recordarán esta página por haberla leído en la lección anterior. Esta tabla proporciona información más detallada sobre cada una de las partes de la bicicleta, incluida la función de cada parte.

Los textos informativos a menudo organizan la información en tablas como esta, así que es importante leerlas con atención.

6. **Have pairs look through the book and identify text features.** Provide students with a few moments to look through the book and look for text features such as the table of contents, headings, diagrams, photos, and tables. Ask students to point out any text features they find to their partners. Pick a few students to share with the class what text features they found and where they found them.

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- Circulate and provide support. Pairs may need support identifying the function of their systems. Encourage them to refer to the text and also to draw on prior knowledge in order to construct a statement about the system’s function.

- As you listen to student ideas about the parts of the system they have chosen and each part’s function, this is a good time to informally assess student understanding of the relationship between parts and functions.

10. **Point to the Investigation Question from Lesson 1.2.** Read it aloud.

¿De qué manera son similares los sistemas sobre los que leímos? ¿Qué tienen en común?

Recuerden, cuando conectamos ideas para llegar a una nueva comprensión, estamos sintetizando ideas.

11. **Post key concept.** Post the key concept on the wall and read it aloud.

Un sistema es una colección de partes que interactúan y que trabajan juntas. Cada parte en el sistema desempeña una función para ejecutar una función general.

12. **Post the system vocabulary card to the wall.**

Un sistema es un grupo de partes que trabajan juntas.

13. **Conclude the lesson.** Let students know that in the next lesson they’ll get to do more investigations of electrical systems and observe what happens when devices in the electrical system are working.
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Possible Responses

Investigation Notebook
Parts of a System (page 10)

Public Water System

Function: provide water to people’s homes

Part/Function Table

Part: water tank
Function: holds water

Part: pumps
Function: moves water through the pipes

Part: homes
Function: use water

Part: pipes
Function: carry water into homes

Part: water treatment plan
Function: cleans the water
Partes de un sistema

1. Con tu compañero/a, repasa Sistemas y elige uno de los sistemas descritos en el libro.
2. Escribe el nombre del sistema y su función en las dos líneas en blanco a continuación.
3. Apunta cada una de las partes del sistema en la columna izquierda de la tabla debajo.
4. Al lado de cada parte, apunta su función.
5. Usa todas las filas que necesites.

Sistema de__________________________________________________________

Función: ___________________________________________________________

<table>
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<tr>
<th>Parte</th>
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