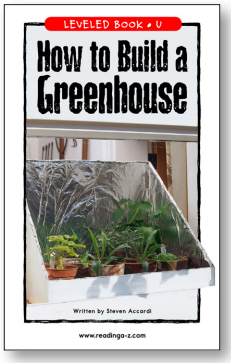
How to Build a Greenhouse



About the Book

Text Type: Nonfiction/How-To **Page Count:** 20 **Word Count:** 1,491

Book Summary

Greenhouses have been built since ancient Rome. As people began exploring and trading goods from all over the world, an increased need developed or existed to keep new and unique plants alive throughout the cold winter months. This book walks students through the process of making their own shoebox greenhouse, complete with helpful tips for ensuring a successful growth cycle. Photographs and diagrams support the text.

About the Lesson

Targeted Reading Strategy

- Ask and answer questions

Objectives

- Use the reading strategy of asking and answering questions to understand text
- Understand and identify cause-and-effect relationships
- Identify and understand the use of parentheses
- Identify concept words—time and order

Materials

Green text indicates resources available on the website

- Book—*How to Build a Greenhouse* (copy for each student)
- Chalkboard or dry erase board
- KWLS, cause and effect, parentheses worksheets
- Discussion cards

Indicates an opportunity for students to mark in the book. (All activities may be demonstrated by projecting the book on interactive whiteboard or completed with paper and pencil if books are reused.)

Vocabulary

- **Content words:**
  - **Story critical:** *climate (n.), conditions (n.), germinate (v.), greenhouse (n.), humidity (n.), wavelengths (n.)*
  - **Enrichment:** *botany (n.), carbon dioxide (n.), classify (v.), foreign (adj.), hobbies (n.), photosynthesis (n.)*

Before Reading

Build Background

- Write the word *greenhouse* on the board. Ask students to tell what they already know about the structure and what it is used for.
- Create a KWLS chart on the board and hand out the KWLS worksheet. Review or explain that the *K* stands for knowledge we know, the *W* stands for information we want to know, the *L* stands for the knowledge we learned, and the *S* stands for what we still want to know about the topic. As various topics are discussed, fill in the first column (*K*) on the board with information students know about the topic. Have students complete the same section of their KWLS worksheet.

- Ask students what they would like to know about greenhouses. Have them fill in the second section (*W*) of their chart. Write their questions on the class chart.

Preview the Book

Introduce the Book

- Give students their copy of the book. Guide them to the front and back covers and read the title. Have students discuss what they see on the covers. Encourage them to offer ideas as to what type of book it is and what it might be about.
- Show students the title page. Discuss the information on the page (title of book, author's name). Point out the glossary and ask volunteers to explain its use.

Introduce the Reading Strategy: Ask and answer questions

- Discuss with students how having prior knowledge about the topic, and asking and answering questions while reading, can help readers understand and remember the information in a book.
- Direct students to the table of contents. Remind them that the table of contents provides an overview of the information in a book and how it is organized. After previewing the table of contents, use it to model asking questions.
  Think-aloud: *I can use the table of contents to think of questions I would like to have answered about greenhouses. For example, section 2 is titled "The History of Greenhouses." This makes me wonder when and where the first greenhouses were made. I'll have to read the book to find out. I'll write these questions on the chart.*
- Have students look at the other section titles. Have them write any questions they have based on the covers and table of contents in the *W* section of their KWLS worksheet.
- Have students preview the rest of the book, looking at the photographs and diagrams. Invite students to read through the glossary. Have them add any additional questions they might have to their KWLS worksheet. Invite students to share their questions aloud. Write shared questions on the class chart.
- As students read, encourage them to use other reading strategies in addition to the targeted strategy presented in this section.

Introduce the Comprehension Skill: Cause and effect

- Review or explain that a *cause* is an event that makes something happen, and the *effect* is what happens because of, or as a result of, the event. Create a two-column chart on the board with the headings *Cause* and *Effect.* Write the following sentence on the board under the *Effect* heading: *I put on my hat.*
- Model identifying a series of cause-and-effect relationships.
  Think-aloud: *I know that there are reasons, or causes, for events to happen. When I put on a hat, it might be because it is hot outside. The hat shades me from the sun and keeps me cool. So, a cause for putting on the hat might be because I want to stay cool. However, I also sunburn easily. Since a hat shades my face from the sun, another reason to put on a hat might be to prevent me from getting sunburned. There can be more than one effect for a cause.*
- Invite students to explain other possible causes for putting on a hat (*it is cold, it is windy, it is raining, it is part of a uniform,* and so on).
- Write each of the following sentences on index cards: *I go to sleep. I am tired. I put on my coat. It is cold outside. I drink water. I am thirsty. I eat an apple. I am hungry.* Mix up the cards and give each volunteer a card. Have volunteers find a match to their sentence on one of the other cards. Then have each person in the pair identify who is the cause and who is the effect. Ask the remaining students to explain whether or not the match and explanation are correct.

Introduce the Vocabulary

- Write the following content vocabulary words on the board: *greenhouse, humidity, germinate,* and *photosynthesis.* Read the words aloud with students. Ask them to share what they know about the meaning of each word. Point out to students that using familiar words might help them identify the meanings of the words. (For instance, the word *greenhouse* is a compound word, and the two words that make up the compound word can help them in thinking about what *greenhouse* might mean.)
- Write each of the content vocabulary words on a piece of poster board. Place students in small groups and assign each group to a poster. Have them discuss what they know about the meaning of their word and write a definition on the poster. Rotate the groups and have them repeat the process with the other words.
- Review all four words and the information about the words that students wrote on the posters. Create a single class definition based on students' knowledge and write it on the board.
- Have a volunteer read the definition for each word from the glossary. Compare students' definitions with the glossary definitions. Use the comparison to modify the definition for each word on the board.

Set the Purpose

- Have students think about what they already know about greenhouses as they read the book to find answers to their questions. Have them write what they learned in the *L* section of their KWLS worksheet.

During Reading

Student Reading

- **Guide the reading:** Have students read to the end of page 8. Remind them to look for information about greenhouses that will answer questions on their KWLS worksheet. Encourage students who finish early to go back and reread.
- When students have finished reading, have them circle any questions on their KWLS worksheet that were answered and write any new questions that were generated.
- Model answering a question and filling in the third section (*L*) of the KWLS chart.
  Think-aloud: *I wanted to know when and where the first greenhouses were made. I found out that greenhouses have been built since ancient Rome, as early as AD 30 for the Roman emperor Tiberius. I also read that in the sixteenth century, Europeans began exploring and trading with people from all over the world. In order to keep their rare, new plants alive through the harsh winter months, a shelter was designed to keep them growing. The people of Italy were the first to construct what we consider modern greenhouses. I wonder how greenhouses work. I will write this question on my chart.*
- Have students write answers to the questions they circled in the *L* section of their KWLS worksheet. Invite them to share the information they learned and the questions they generated as they read the book. Record shared responses on the class KWLS chart.
- Create a cause-and-effect chart on the board. Write *Explorers and traders returned with new and unique plants* under the *Cause* heading. Ask students to use the text and think-aloud discussion to identify the effect of this cause. (They designed a shelter to keep them growing through the winter.) Write this information on the chart under the *Effect* heading.
- Introduce and explain the cause-and-effect worksheet. Ask students to write the information from the board on their worksheet. Have them identify and write on their worksheet a cause-and-effect relationship that happened as a result of the creation of greenhouses. (*Cause:* Interest in botany surged; *Effect:* Colleges and universities began to collect, classify, and grow all the known varieties of plants.)
- **Check for understanding:** Have students read to the end of page 11. Have them write any answers they found while reading in the *L* section of their KWLS worksheet and additional questions they raised in the *W* section. Invite them to share the information they learned and the questions they generated as they read pages 9 through 11. Write shared responses on the class KWLS chart.

- Have students identify and write on their worksheet a cause-and-effect relationship that happened as a result of France being introduced to the orange tree. (*Cause:* The French constructed "orangeries" to protect the fruit from frost; *Effect:* The French redesigned greenhouses in style and size, the largest being at the Palace of Versailles.) Allow time for students to make additions and corrections on their worksheet.
- Have students read the remainder of the book. Remind them to continue to look for and write answers to their KWLS worksheet questions, and to look for cause-and-effect relationships to record. Encourage them to add new questions they might have to their KWLS worksheet as they read.

  Have students make a question mark in their book beside any word they do not understand or cannot pronounce. Encourage them to use the strategies they have learned to read each word and figure out its meaning.

After Reading

- Ask students what words, if any, they marked in their book. Use this opportunity to model how they can read these words using decoding strategies and context clues.

Reflect on the Reading Strategy

- **Think-aloud:** *I wanted to know how greenhouses work. I read that a lot of the success of a greenhouse depends on the amount of sunlight it receives. I read that the short waves of light from the Sun pass through the glass. The plants use the light to convert carbon dioxide and water into food, which allows them to grow. I also read that once inside the glass, the Sun's light is absorbed by the plants, and that they then release the extra energy gained from the Sun's light as heat. This heat cannot pass back through the glass, so it raises the temperature and humidity of the greenhouse to ideal growing conditions. I'd like to know more about the types of fruits and vegetables that are grown year-round in greenhouses. I will write this in the* S *column of my chart.*
- Ask students to share questions they added to their KWLS worksheet while reading, and ask them what questions were answered (or not answered) in the text. Have students write answers they found while reading in the *L* column of their KWLS worksheet.
- Reinforce that asking questions before and during reading, and looking for the answers while reading, keeps readers interested in the topic. It also encourages them to keep reading to find answers to their questions and helps them understand and enjoy what they have read.
- Point out to students that all of their questions may not have been answered in this text. Brainstorm other sources they might use to locate additional information to answer their questions. Invite students to fill in the final section (*S*) of their KWLS worksheet with information they would still like to know about greenhouses.

Reflect on the Comprehension Skill

- **Discussion:** Discuss with students the information on their cause-and-effect worksheet. Have students reread page 9 to identify the cause-and-effect relationship that occurs as a result of sunlight passing through the glass of a greenhouse. (*Cause:* The light waves pass through the glass, get converted into heat waves, and get trapped inside; *Effect:* The temperature and humidity are raised, creating ideal growing conditions.)
- **Independent practice:** Have students complete the cause-and-effect worksheet, looking for cause-and-effect relationships on pages 18 and 19. If time allows, discuss their responses.
- **Enduring understanding:** In this book, you read about an invention that was created out of a desire for better living. People wanted to save their non-native plants from dying during the harsh winter months, so they created greenhouses. Now that you know this information, how does it make you feel about our ability to have fresh fruits and vegetables year-round? If greenhouses weren't invented, how would your winter diet differ from your summer diet?

Build Skills

Grammar and Mechanics: Parentheses

- Review or explain that parentheses ( ) are punctuation marks. Parentheses can be used to give a reader extra information, to enclose an abbreviation, or to add an extra statement, direction, or question to a sentence. Parentheses can also contain words or spellings that clarify information within a sentence.
- Direct students to page 11 and have them find the sentence containing parentheses. Read the following sentence aloud as they follow along: *This could be along the side of your house or within a group of deciduous trees* (*which will protect it from cold winter wind and intense sunlight on summer afternoons*). Ask students how the parentheses are used in this instance (to add extra information to the end of the sentence).
- Direct students to page 18 and have them find the sentence containing parentheses. Read the following sentence aloud as they follow along: *After the initial watering for your seeds, use a spray bottle of distilled water (water that has been left out overnight in a container with no lid) to keep your plants watered.* Ask students how the parentheses are used in this instance (to clarify the definition of distilled water).

  Check for understanding: Have students find and circle the parentheses in the book. Have them write in the margin how the parentheses are used in each instance.
- **Independent practice:** Introduce, explain, and have students complete the parentheses worksheet. If time allows, discuss their responses.

Word Work: Time and order words

- Review or explain that writers present the events of a story in a particular order. Signal words are often provided to help readers identify the order of the events. Ask students to identify examples of signal words (the words *today, first, then, while, dates, times of the day, seasons,* and so on). Point out that this book also uses numbers to separate ordered steps.
- **Think-aloud:** *I know that a process, like a story, has a sequence of events. For example, when I brush my teeth, first I take the lid off the toothpaste. Next, I put the toothpaste on the toothbrush. Then, I put the toothbrush head in my mouth and begin wiggling the bristles against my teeth. Then, I spit out the foamy toothpaste. Last, I rinse my mouth with clean water.*
- Have volunteers explain the order of a simple process, such as making a sandwich or getting ready for school. Use time and order words (*first, next,* and so on) to record the steps on the board.
- Point out that the steps in making a greenhouse must be completed in a very specific order. Have students turn to page 10 and recall the details of the section titled "Getting Ready to Build." (*Before* getting the supplies to build, you must find the best location. *First,* find a window that faces south or southeast. *Second,* make sure the window is away from heat sources. *Third,* make sure the location is in a place that will not be disturbed. Write the example sentences on the board, underlining the sequencing words and phrases (*Before, First, Second, Third*).

  Check for understanding: Have students review the book, highlighting all of the time and order words or phrases used (*winter, hundreds of years, year-round, since, AD 30, later, sixteenth century, first, during, seventeenth century, today, time of year, once, before, first, second, third, summer, 1, 2, 3, 4, 5, 6, 7, 8, over a weekend, after, now*). Remind students to look carefully, as some order words, such as *first* and *after,* are used more than once throughout the text.
- **Independent practice:** On a separate sheet of paper, have students describe a process—such as getting dressed, making a snack, or crossing the street—using time and order words. If time allows, have students act out the steps as the writer reads his or her work aloud.

Build Fluency

Independent Reading

- Allow students to read their book independently. Additionally, partners can take turns reading parts of the book to each other.

Home Connection

- Give students their book to take home to read with parents, caregivers, siblings, or friends. Have students also take home their completed KWLS worksheet and explain to someone at home what each column means. Have them tell about the information they wrote on the chart.

Extend the Reading

How-To Writing Connection

Have students write a how-to article describing the steps to create something with which they are very familiar. Help them brainstorm ideas for subjects, such as how to make an origami bird, how to carve a jack-o-lantern, or how to make Jello. Instruct them to use time and order words or numbers to clearly identify the steps. Point out that on pages 14 through 17, the author wrote very direct directions to tell his readers how to make a greenhouse. Instruct students to be very clear in their steps as well. Allow all writers the opportunity to celebrate by reading their work aloud, if they so choose.

Visit Writing A–Z for a lesson and leveled materials on procedural writing.

Science Connection

Give students index cards to write the facts they discover in the following exercise. Supply print and Internet resources for students to learn more about the different types of food and flowers grown in greenhouses throughout the world. Have them find out which countries grow in greenhouses to export for profit and which countries import greenhouse-grown goods. Have students search to find out which locations grow plants that are native and do not need greenhouses to thrive. Invite them to share their findings, along with any other interesting facts they uncovered, in a class discussion.

Skill Review

Discussion cards covering comprehension skills and strategies not explicitly taught with the book are provided as an extension activity. The following is a list of some ways these cards can be used with students:

- Use as discussion starters for literature circles.
- Have students choose one or more cards and write a response, either as an essay or as a journal entry.
- Distribute before reading the book and have students use one of the questions as a purpose for reading.
- Cut apart and use the cards as game cards with a board game.
- Conduct a class discussion as a review before the book quiz.

Assessment

Monitor students to determine if they can:

- consistently ask relevant questions about a topic prior to and during reading; locate answers to their questions and write them on a worksheet
- understand and identify cause-and-effect relationships in the text during discussion and on a worksheet
- correctly identify the use of parentheses during discussion and on a worksheet
- identify time and order words in discussion

Comprehension Checks

- Book Quiz
- Retelling Rubric