Lesson Plan

Why Do Leaves Change Color?

About the Book

Text Type: Nonfiction/Informational **Page Count:** 16 **Word Count:** 548

Book Summary

Nature is dazzling in the fall season with its colorful array of leaves. *Why Do Leaves Change Color?* explains the science behind this amazing transformation. Lovely photographs emphasize the beauty of trees and their foliage, and illustrations help clarify the scientific concepts. In addition to teaching students about plants and photosynthesis, this book also gives them the opportunity to study cause and effect and prepositions.

Book and lesson are also available at Levels G and J.

About the Lesson

Targeted Reading Strategy

- Ask and answer questions

Objectives

- Ask and answer questions to understand text
- Determine cause and effect
- Identify consonant *ch* digraph
- Recognize and use prepositions
- Identify and use homographs

Materials

Green text indicates resources that are available on the website.

- Book—*Why Do Leaves Change Color?* (copy for each student)
- Chalkboard or dry-erase board
- Dried leaves
- Sheets of paper
- Posters
- Pictures cut out of an extra copy of the book
- Cause and effect, prepositions, homographs worksheets
- Discussion cards

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

Vocabulary

*Boldface vocabulary words also appear in a pre-made lesson for this title on VocabularyA–Z.com.

- **Content words:**
  Story critical: ***change*** *(v.),* ***chemical*** *(n.),* ***chlorophyll*** *(v.),* ***fall*** *(n.),* ***leaves*** *(n.),* ***photosynthesis*** *(n.)*
  Enrichment: ***carbon dioxide*** *(n.),* ***oxygen*** *(n.),* ***store*** *(v.)*

Before Reading

Build Background

- Spread a pile of dried leaves of various colors and patterns on a table in front of the class. Have students observe the leaves and on a separate sheet of paper, draw sketches and write down some observations. Ask students to describe to a partner their favorite leaf.

- Have students discuss with a partner the changes a tree goes through in each season. Remind students that in the fall, the leaves change from green to a variety of other colors. Have students share with a partner their thoughts on why leaves change their colors every fall, and invite volunteers to share ideas with the rest of the class.

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 (genre, text type, and so on) and what it might be about.
- Show students the title page. Discuss the information on the page (title of book, author's name).
- Preview the table of contents on page 3. Remind students that the table of contents provides an overview of the book. Ask students what they expect to read about in the book, on the basis of what they see in the table of contents. (Accept all answers that students can justify.)

Introduce the Reading Strategy: Ask and answer questions

- Review or explain to students that engaged readers ask questions before and during reading, and seek the answers while they read. Point out that asking and answering questions helps readers to understand and remember what they read.
- Remind students that information from all parts of the book can trigger questions for a reader. Emphasize that the text, the cover, the illustrations and photographs, and the table of contents can all suggest new questions.
- Model asking questions.
  Think-aloud: *On the cover, I see a vast forest in the fall, with leaves that are orange, yellow, and green. The title of the book is* Why Do Leaves Change Color? *That is a great question. Why do they change colors? I will search for the answer to this big topic as I read. When I read the table of contents, the section titles bring to mind more questions. How do leaves make food? How many possible leaf colors are there? I will search for the answers to these questions as I read.*
- Record your questions on the board.
- Have students preview the table of contents and the book's illustrations and photographs with a partner. Ask students to think of at least two questions that this information raises and share them with their partner. Have students write their questions on a separate sheet of paper. Invite volunteers to share their questions with the rest of the class, and record them on the board.
- 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

- Explain to students that one way to understand information in a book is to think about what happened and why it happened. Explain that a cause is an action that leads to a new event, and the effect is the event that happens as a result of the action.
- Point out to students that asking the question *why?* can reveal the cause, and asking the question *what happened?* can reveal the effect.
- Draw a T-chart on the board with the labels *Cause* and *Effect.* Write the following sentence on the board under the *Cause* heading: *I ride my bike.*
- Model determining a sequence of cause-and-effect relationships.
  Think-aloud: *If I ride my bike, I am taking an action that can lead to other events or occurrences. For example, I could ride my bike to a friend's house. Arriving at a friend's house is the effect, or the result, of riding my bike. Now that effect can become a cause. Since I arrived at a friend's house, I need to knock on her door. The action that occurs is arriving at a friend's house, and the result of that action is knocking on the door. Knocking on my friend's door is the new effect of my new cause. Since a cause can lead to an effect that is a new action leading to more effects, we often have a string of related cause-and-effect relationships.*

- Write the following sentence under the *Effect* heading: *I arrive at my friend's house.* Then, write the same sentence under the *Cause* column, and draw an arrow between the matching sentences. Emphasize to students that an effect can become the cause for a new event if the effect is an action that prompts something else to occur.
- Remind students that the effect of arriving at a friend's house was knocking on the door. Write the following sentence under the *Effect* heading: *I knock on my friend's door.* Write the same sentence beneath the *Cause* heading, and draw another arrow linking the matching sentences.
- Ask students to consider the new sentence in the *Cause* column, *I knock on my friend's door.* Have students discuss with a partner a possible effect for that action. Invite volunteers to share an effect with the rest of the class, and record the effect under the *Effect* heading of the T-chart.
- Rewrite the sequence of cause-and-effect relationships to help students better understand the concept of linking causes and effects. First, write the following sentence: *I ride my bike.* Then, draw an arrow beneath the sentence pointing down, and beneath that, write the following sentence: *I arrive at my friend's house.* Draw another downward-pointing arrow, and beneath it, write the following sentence: *I knock on my friend's door.* Write the word *cause* before the first two sentences on the left side, and the word *effect* beside the second two sentences on the right side. Discuss with students how they would add their new effect to the chain, and whether the chain could continue with even more effects. Extend the chain as time permits, and continue to label appropriate sentences with *cause* on the left side and *effect* on the right side.

Introduce the Vocabulary

- While previewing the book, reinforce the vocabulary words students will encounter. For example, while looking at the picture on page 4, you might say: *What season is presented in the picture? The trees display a crowd of orange, yellow, and green leaves. Leaves on a tree change color in the fall, which is another name for autumn. Point to the word* fall *on this page.*
- Remind students of the strategies they can use to sound out words they don't know. For example, they can use what they know about letter and sound correspondence to figure out the word. They can look for words within words, and prefixes and suffixes. They can use the context to work out the meanings of unfamiliar words.
- Write the words *photosynthesis* and *chlorophyll* on the board, and work with students on decoding strategies to pronounce these difficult words. Discuss the meanings of the words with the class, using the picture on page 8 as a visual aid.
- Write the story-critical vocabulary words on posters, one word for each poster. Then, attach a picture from the book that best demonstrates the meaning of that word. Hang the posters around the room.
- Break students into six groups, and assign each group to a poster. Have students discuss the word and the picture, and determine a definition for the word. Ask groups to record their definition on the poster, using a sentence or key words. Have groups rotate to the poster to their left, and repeat the process. Continue rotating until every group has the chance to define each word.
- Review the posters with the class, and lead students to a consensus on an accurate definition for each word. Write the definitions on the board beneath the corresponding word.
- Have students write the words on a separate sheet of paper and write a sentence for each word that accurately demonstrates its meaning. Then, have students draw a picture that portrays the meaning of the word. Read aloud each vocabulary word, and invite volunteers to share with the rest of the class their sentence and picture for that word.

Set the Purpose

- Have students read to find out more about how leaves change colors. Remind them to continue asking questions as they read and to determine cause-and-effect relationships presented in the information.

During Reading

Student Reading

- **Guide the reading:** Have students read from page 4 to the end of page 8. Encourage those who finish early to go back and reread.
- Model asking and answering questions.
  Think-aloud: *Before I started reading, I thought of some questions for this book. I wondered how leaves make food and how many possible leaf colors exist. On pages 6 through 8, I learned about how leaves make food. Leaves take in sunlight, water, and carbon dioxide, and use a chemical called* chlorophyll *to transform these elements into food. Chlorophyll also makes the leaves green. The whole process is called* photosynthesis. *As for the other question, although the book has shown many leaf colors in the photographs and illustrations, I'm not sure it has described them all, so I will keep reading to learn about all the possible leaf colors. I had one other question, a big one, the question the book poses in its title: Why do leaves change colors? I have not learned the answer to that question yet, so I will keep looking. I will also be seeking the answers to new questions I thought of on the basis of information I read in the book: If photosynthesis and chlorophyll turn the leaves green, why do they change into different colors? Does photosynthesis stop? I will continue to look for answers and ask new questions as I read.*
- Write the answers on the board underneath their corresponding questions. Review with students the other questions on the board.
- Have students discuss with a partner whether the book answered any of the remaining questions on the board. Invite volunteers to share answers with the rest of the class, and have students come to the board and record the answer beneath the corresponding question.
- Ask students to review the questions they wrote on a separate sheet of paper. Have them write the answers for any questions the book answered,
- Ask students to think about new questions they formed while they read. Have them write two new questions on their separate sheet of paper, and share them with a partner. Invite volunteers to share questions with the rest of the class, and record them on the board.
- Review the cause-and-effect T-chart on the board. Write the following sentence under the *Cause* heading: *Leaves use a chemical called* chlorophyll *for photosynthesis.* Have students work with a partner to discuss the effect of that cause (photosynthesis makes sugar out of the air and carbon dioxide). Invite a volunteer to share the effect with the rest of the class, and record it under the *Effect* heading.
- Rewrite the cause and effect so they are in a vertical chain, like the one created in the Introduce the Comprehension Skill portion of the lesson. Discuss with students an effect that proceeds from the cause of photosynthesis making sugar out of air and carbon dioxide. Record the new effect as the third event in the chain. Remind students that the effects can become the cause for a new effect.
- **Check for understanding:** Have students read to the end of page 11. Have them record on their separate sheet of paper the new questions they generated while reading and any answers they found. Invite volunteers to share new questions with the rest of the class, and record them on the board.
- Have students share with a partner any cause-and-effect relationships they discovered while reading this section of the book.
- Write the following sentence under the *Effect* heading of the chart: *The roots, branches, and buds store sugar for the cold months.* Have students work with a partner to determine the cause of this effect. Remind students that the cause describes why an event happens, so they are looking of why the tree stores sugar. Invite volunteers to share with the rest of the class the cause for this effect, and record it under the *Cause* heading in the chart.
- Have students read the remainder of the book. Remind them to ask and answer questions while they read and to consider the relationships between causes and effects described in the book.

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

- Have students review the questions they wrote on a separate sheet of paper, and ask them to add new questions they generated while reading the end of the book. Have them discuss the answers they found with a partner and record them on their paper.
- **Think-aloud:** *As I read, I continued to look for answers to my questions and ask new ones. Now that I have finished reading, I have learned all the answers the book had to give. I wanted to know about all the leaf colors, and I learned that leaves can turn brown, yellow, orange, and red. I also finally learned why leaves change color.* Photosynthesis *slows down because trees receive less sunlight, and therefore, they make less chlorophyll, which creates the green color. This information answered my question about whether photosynthesis stops; it does slow down in fall and stop in winter. Not only did asking questions help me learn more about leaves, it also helped me to remember the information in the text and better understand what I read. Books will not always answer all the questions I ask, but the process of asking questions and searching for answers is an important method of engaging with a book.*
- Invite volunteers to share any final questions with the class and record them on the board. Invite volunteers to share an answer with the rest of the class, and have them record it under the appropriate question on the board.
- Call on students to come to the board and circle any questions that were not answered by the book. Discuss with students how they could find answers to those questions, using other resources such as articles, the Internet, and other nonfiction books. Encourage students to research the unanswered questions that intrigued them.
- Have students discuss with a partner how asking and answering questions helped them to remember and understand what they read. Invite volunteers to share their thoughts with the rest of the class.

Reflect on the Comprehension Skill

- **Discussion:** Review the cause-and-effect relationships recorded in the T-chart on the board. Have students work with a partner to discuss other examples of cause and effect they found while reading.
- Invite volunteers to share with the rest of the class a cause from the book, and record it on the board under the *Cause* heading. Have students work with a partner to determine the effect. Invite a volunteer to share the effect with the rest of the class, and have other students give a thumbs-up signal if they agree the effect stems from the cause. Record the effect under the *Effect* heading of the T-chart. Repeat the process to add several cause-and-effect relationships to the T-chart.
- Discuss with students whether any of the effects under the *Effect* heading are also causes for a new effect. Draw an arrow from the effect to a sentence describing the new effect, and remind students that effects can become the cause of a new event.
- **Independent practice:** Introduce, explain, and have students complete the cause-and-effect worksheet. Have students work with a partner to check their answers.
- **Enduring understanding:** In this book, you learned about the process behind leaves changing color in the fall. How is the changing of color related to a leaf's life cycle?

Build Skills

Phonics: Consonant *ch* digraph

- Write the word *change* on the board and say it aloud with students.
- Have students say the /ch/ sound aloud. Then, run your finger under the letters in the word as students say the whole word aloud. Ask students to identify which letters represent the /ch/ sound in the word *change*. Explain to students that the letter combination *ch* often creates a special sound, the /ch/ sound. Point out that this sound is made by no other letter combination.
- Have students practice writing the letters *ch* on a separate piece of paper while saying the /ch/ sound.
- Write the word *chemical* on the board and say it aloud with students. Ask students to nod their head if the consonant *ch* digraph creates the /ch/ sound, and shake their head if it does not. Explain to students that while the letters *ch* often create the /ch/ sound, in certain words they instead make a /k/ sound.
- Write the words *chance* and *choir* on the board. Invite a volunteer to come to the board and underline the letters *ch* in each word. Read the words aloud with students, and have them point to the word that uses the consonant digraph /ch/ sound.
- Have students work with a partner to find and circle all the words that begin with the letters *ch* in the book. Point out to students that the majority of these words actually use the /k/ sound for that letter combination.
- **Check for understanding:** Write the following words on the board and read them aloud with students: *chum, chin, chorus, chair, chaos, chat, chlorophyll,* and *chip.* Ask students to identify all the words that use the consonant *ch* digraph to make the /ch/ sound. Have students copy the words on a separate sheet of paper. For each word, have them underline the letters *ch* while they practice making the /ch/ sound. Invite volunteers to share with the class the words they wrote, and have other students give a thumbs-up signal if they chose words that use the consonant *ch* digraph.

Grammar and Mechanics: Prepositions

- Write the following sentence on the board: *New leaves grow on the trees.* Read the sentence aloud with students. Ask students to identify where the new leaves grow *(on trees).* Have students point to the word that specifies the location of the leaves. Invite a volunteer to come the board and circle the word *on.*
- Explain to students that *prepositions* are words that *show a relationship between parts of a sentence,* and often *locate objects in space or time.* Prepositions provide information about where, when, how, and with what something happens. Point out that *on* is an example of a preposition.
- Have students read the first sentence on page 12. Ask students to identify what time of year the leaves are green *(in summer).* Have students to point to the preposition in the book, and have them underline the word *in.* Emphasize that *in* shows when the leaves are green.
- Brainstorm with students a list of common prepositions and record them on the board. Remind students that prepositions explain where and when. The list may include the following: *in, on, over, under, above, below, off, between, beside, during, with, without, by,* and *around.*
- Write the following sentence on the board and read it aloud with students: *The leaves are above the ground.* Invite a volunteer to come to the board and draw a picture for the sentence. Erase the word *above* and replace it with the preposition *in.* Have students discuss with a partner how the meaning of the sentence has changed. Have students work with a partner to write the sentence using a different preposition and discuss how the meaning of the sentence changes. Invite volunteers to share their sentence with the rest of the class, and have other students identify the preposition in the sentence.
- **Check for understanding:** Have students work with a partner to choose five prepositions and use them to write sentences about trees and leaves. Invite volunteers to come to the board and record a sentence to share with the rest of the class. Have the other students identify the prepositions in the sentences.

- **Independent practice:** Introduce, explain, and have students complete the prepositions worksheet. If time allows, discuss their answers.

Word Work: Homographs

- Write the following sentence on the board and read it aloud with students: *Leaves make food for trees to store for the winter.* Have students discuss with a partner the meaning of the word *store,* and invite a volunteer to share its definition with the rest of the class.
- Write the following sentence on the board and read it aloud with students: *I buy shoes at the shoe store.* Have students discuss with their partner the meaning of the word *store* in the sentence. Invite volunteers to describe to the class how the meaning of the word is different from the same word in the first sentence.
- Explain to students that *homographs* are *words that are spelled the same but have different meanings.* Point out that students need to use the context of the sentence to determine an accurate meaning of the word.
- Ask students to locate and point to the word *safe* on page 14, and read the sentence containing the word. Have students work with a partner discuss the meaning of the word as determined by the context of the sentence (in a position that is protected). Then, have students identify a different meaning for the same word (a box that has a strong lock and protects the valuables inside). Invite volunteers to share the two different meanings with the rest of the class. Repeat this process for the word *drop* on page 15.
- **Check for understanding:** Have students discuss with a partner possible meanings for the words *bat* and *light.* Invite volunteers to share with the rest of the class a definition for one of the words, and record it on the board. Continue until each word has at least two recorded definitions. Have students work with their partner to create two sentences for the words, each sentence employing the homograph with a different meaning. Have students write these sentences on a separate sheet of paper. Invite volunteers to share a sentence with the rest of the class, and have other students identify the definition being used for the homograph in that sentence.
- **Independent practice**: Introduce, explain, and have students complete the homographs worksheet. If time allows, discuss their answers.

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 them demonstrate how to ask questions and seek answers while reading to someone at home.

Extend the Reading

Informational Writing and Art Connection

Discuss with students other natural phenomena that interest them. For example, the changing phases of the Moon, the seasons, the way lightning works, and so on. Write a list of these topics. Ask students to choose a topic from the list, and research the scientific process behind these natural phenomena. Give students access to books, computers, and the library and provide them a graphic organizer for notes. Lead students in their research, modeling how to find books on their topic and facts related to the science. Have students write a three-paragraph report explaining their topic and the science involved. Ask students to draw a picture to accompany their report.

Visit WritingA–Z.com for a lesson and leveled materials on informational writing.

Science Connection

Review with students what they learned about how a leaf changes color. Remind students that leaves have different colors, which are overpowered by the green chlorophyll, and these colored chemicals start to show after the leaf stops producing the green chlorophyll. Explain to students that they are going to do an experiment to see the different colors in a leaf. Display the leaves used during the Build Background portion of the lesson. Have students take out their science journals and draw a picture of each leaf, along with written observations (they can reuse their observations made during the lesson). Then, break students into groups, and give each group a leaf, the name of the tree the leaf came from, and a jar. Have groups tear their leaf into very small pieces and put them in the jar. Have students label the jar with the name of the tree. Go around to each group and add just enough rubbing alcohol to cover the leaves. Loosely cover the jars, place them in a shallow tray containing one inch of hot water, and allow them to sit for an hour or more. Allow students to take turns gently twirling each jar every five minutes. After an hour has elapsed, remove the jars from the water. Place a strip of filter paper in the jar so that one end is in the alcohol and the other end is taped over the top of the jar. Allow the jars to sit until colors begin to travel up the paper. Different colors will travel different distances up the paper. Pass out the jars and papers to their original groups, and have students make more observations in their science journals. Have groups present their findings to the rest of the class. Discuss with students what they learned about leaves from the experiment, and have students compare results from leaves from different trees.

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.
- Conduct a class discussion as a review before the book quiz.

Assessment

Monitor students to determine if they can

- consistently use the strategy of asking and answering questions to understand text during discussion;
- accurately determine cause-and-effect relationships during discussion and on a worksheet;
- correctly write the letter symbols that represent the consonant *ch* digraph during discussion;
- correctly identify and use prepositions during discussion and on a worksheet;
- accurately use homographs during discussion and on a worksheet.

Comprehension Checks

- Book Quiz
- Retelling Rubric