

*Think Like
A Scientist*

Did You Get My Message?



NSTA eBooks⁺ Kids



TEACHER'S
GUIDE

Overview

This teacher's guide is designed to provide ideas for how to use pages of the *Did You Get My Message?* e-book with students. It explains the concepts and suggests what to look for in students' learning, while also supplying information about how they are practicing science and using crosscutting concepts.

The goals of this teacher's guide are as follows:

- engage students in grade-level appropriate, three-dimensional learning;
- use the e-book as a tool in class-wide, small group, or independent explorations of its content;
- provide additional ideas and activities that utilize the e-book content but are not included in the e-book;
- explore how STEM content can be effectively integrated into literacy (English language arts);
- facilitate investigations that utilize the e-book content and connect it with students' own classroom and community; and
- assess students on the second-grade content standards to which this e-book is aligned and additional *Common Core State Standards*, in English language arts and mathematics suggested throughout the e-book.



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Book Description

In this book students will explore some of the many ways we communicate. The possibilities for communication methods are endless. The book focuses on how sights and sounds help us send and receive messages. The anchor phenomenon for this e-book is that sound and light can be used to communicate messages. As students explore communication systems, they will discover that each has benefits and drawbacks. Students will also discover that usage is determined by the method that works best for the situation. Some methods work better over long distances. Some methods are easy to understand. Other methods require learning or decoding. After reading the book, students will be able to design their own communication devices.

The Driving Question

A driving question is one that drives the

teaching and learning for a given unit, or even an entire school year. It provides context for the purpose of student exploration and understanding of a phenomenon. This e-book is written around the driving question:

How can I communicate with someone who is far away?

Three-Dimensional Learning and the *Did You Get My Message?* E-book

You will notice throughout the document that certain words and phrases are highlighted in different colors: blue, green, and orange. These colors correspond to the [science and engineering practices](#) (blue), [crosscutting concepts](#) (green), and [disciplinary core](#)

[ideas](#) (orange). The book also incorporates [engineering design](#) (purple). This will help you quickly notice how each of the three dimensions and engineering design are used on a page. Refer back to this section for the full descriptions.

This e-book does not use all of the grade-level elements for the practices and crosscutting concepts, but that does not mean that you should not be aware of the other practices and concepts your students need to know. For a full list of all grade-level elements for the science and engineering practices and crosscutting concepts, refer to [Appendix A](#).

For engaging in literacy ideas, refer to [Appendix B](#).

Disciplinary Core Ideas (DCIs)



This e-book examines an anchor phenomenon related to the following disciplinary core ideas:

PS4.C: Information Technologies and Instrumentation

People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4).

ETS1.A: Defining and Delimiting Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)

Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)

Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

ETS1.B: Developing Possible Solutions

Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Chapter 1

Sending Messages

This chapter is meant to **engage** students and expand their thinking about how to send and receive messages. The term **communicate** is introduced at the end of the chapter to give students multiple experiences with the concept before naming it.


By the end of the topic, students will be able to:

- **analyze patterns** of **communication** using various devices;
- **define a problem that can be solved** through **communication**; and
- **compare multiple solutions to the problem** of how to **communicate**.


Page 1


Send a Message

Chapter 1



You are on the street. A fire truck comes rushing by. Cars and people stop and wait. What tells people a fire truck is coming?

 Check Your Thinking

 1

The topic of fire trucks engages students with the idea that communication comes in many forms. Play the audio of the fire truck. Ask students how people know they should stop and get out of the way of the fire truck. The lights and sirens of the fire truck are a system that sends messages to the drivers nearby. This is a good time to introduce the idea of the lights and sirens as a system. A system is something that has parts that work together.

Discuss with your students:

- What are the parts of the system (fire truck siren) that make it work? (A battery, lights, sirens, switches, wires.)
- What would happen if you removed one of the parts? (The system wouldn't work in the same way.)

Thinking Beyond





Talk or write to emergency responders to find out other ways they send and receive messages.

Preconceptions

Some students may believe that the vehicle operator makes the siren change pitch (get high and low) as it passes the student. This is not the case. The change in pitch is due to the frequency of sound waves moving towards or away from the person hearing the sound.

Page 2

When you send a **message**, you give information. We have many ways to send messages. What do these messages mean?




✓ Check Your Thinking

✓ Check Your Thinking

✓ Check Your Thinking

✓ Check Your Thinking



This page introduces students to the idea of sending messages. The word **message** is in bold. You may want to demonstrate for students that they can click on bold words to get their definitions.

This page also allows students to explore several more communication tools. You may want to have students begin to **collect data** about **communication systems** using a data table. This will help students **analyze the advantages and disadvantages** of various tools.

Example data table:

Tool used	What does it tell us	How far is it useful?	Advantages: how does it helps us	Disadvantages: what problems might we have	What questions do we still have
Siren	A fire truck is coming	A few blocks	Loud and easy to hear	Hard to tell where it is coming from	
Doorbell	Someone is at the door	Within the house	Easy to hear	Might not be loud enough	

Further discussion may highlight the **structure and function of the systems**.

Why were red or yellow chosen as warning colors?

(They are bright colors that are easy to see. Bright colors and large letters on caution tape allow it to be seen from far away. Stoplights that are red, yellow, and green are easy to see.)

Have students consider how the **relative scale** of a communication method affects the delivery of a message. Are letters on signs larger or smaller than letters in, say, a book? Is the signal on a microwave louder or quieter than a smoke detector? Why?

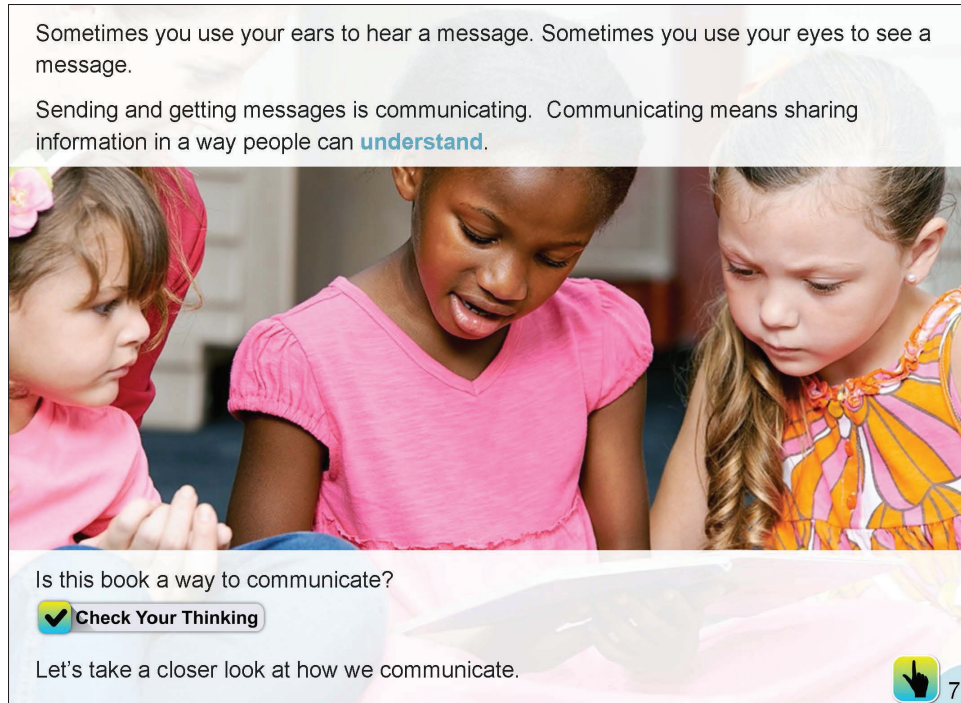
Math Connection

Discuss with students what kinds of units we might use to measure distance. Minutes? Teaspoons? Liters? Pounds? Kilos? If we are considering units used in a classroom, we might measure in feet or meters. Units used outdoors might work for a range of feet, blocks, kilometers, or miles.

Differentiated Instruction

Students may not have a concept of the differences between measuring tools. Have a variety of measuring tools out in front of the classroom and ask what each is used to measure. Then discuss the units associated with each tool. Measuring spoons, rulers, and scales work well.

Page 7



The term **communicate** is introduced here. At this point in the book students have had experiences with a variety of communication methods so they are ready to learn the terminology. Discuss the terms that have been used and how they relate.

- What is communication? (Sharing a message that someone understands)
- What is information? (A message or knowledge that is shared)
- What is a message? (Information that is shared with someone else)

Use the following questions to initiate classroom discussions.

- How do we send messages?
- How do people choose or develop ways to communicate?
- What are the benefits of choosing one way to communicate over another?

This page checks students' understanding of the term **communicate**. You may want to discuss other types of books, such as traditional paper books or audiobooks.

Investigation

Give students a challenge and see if they can figure it out.

Lay out several colors of paper on a table. Have students work in teams or small groups to figure out a way to ask for a certain color of paper without talking. What are different ways to communicate what you want? Students may come up with a variety of solutions. They could hold

TOPIC 1: Sending Messages

up or point to something red. They could use a finger to spell a color in the air. They could point or use eye gaze to indicate which color they want. They could use sign language.

Add an extra challenge: do the same thing but with several classroom objects (pencil, ruler, stapler, tape).

Differentiated Learning

If you have students who need even more of a challenge, ask them to figure out a way to do this using sounds but not their voices.



Chapter 2

Hearing And Seeing Words





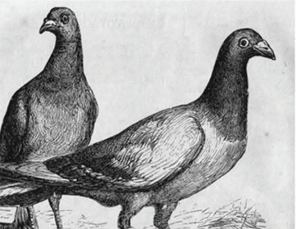
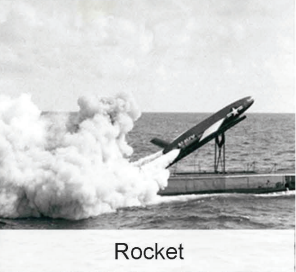

Perhaps the most obvious way of communicating is with words. This chapter encourages students to think about the many ways we use words to communicate. Students can then analyze how various systems work.


By the end of the topic, students will be able to:

- analyze communication systems that use words;
- determine which systems work well at a distance; and
- compare multiple solutions to the problem of how to communicate using words.

Page 10

How could you send a letter to your friend? Can you find all the ways mail has been delivered?

		
Reindeer	Mule	Octopus
		
Boat	Pigeon	Rocket
		
Dog		

 10

This page allows students to **obtain and communicate information** about how people have **solved the problem** of **communicating** with mail.

Our post office is a complicated **system** with many parts, from the tiny stamp to the massive sorting machines that route the mail. Have students brainstorm the parts of the postal system. Then watch one of these videos to **obtain and communicate more information** about how the postal **system** works.

<https://www.youtube.com/watch?v=WX16-52bHvg> (nine minutes)

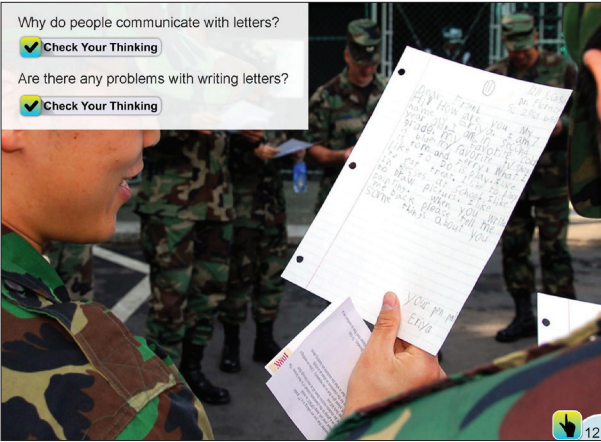
<https://www.youtube.com/watch?v=KYFtalTNzKk> (one and a half minutes)

More information about rocket mail can be found here:

https://www.youtube.com/watch?v=kjsHNAHW_A

Discuss with students why some systems, such as airplane, truck, and mule delivery are still used but others are not. (Rockets were too expensive. Pigeons cannot carry much mail. It takes time to train and take care of dogs or reindeer. Animals need to rest and eat. While animals do need to rest and eat, they can deliver mail to hard-to-reach places.)

Page 11 & 12



Pages 11 and 12 encourage students to **solve a communication problem** by writing a letter.

After reading this section of the book, your class could test different ways to communicate by writing letters, e-mails, texts, or using other tools. You could even video chat with another class and then write letters. Students could then **analyze** the benefits and drawbacks of each **communication** method.

Math Connection

If you measure the amount of time it takes to get a response, you could track your data in a table and then make a graph.

Example data table:

Communication Tool	Time to Get a Response
Text	10 minutes
E-mail	1 hour
Letter	7 days

You can also use data to create a graph comparing length of time needed for different forms of communication. Discuss with students how they would represent time. Perhaps an image of a sun would represent one day. You could estimate and draw a small part of a sun to represent a small part of a day.

Page 13

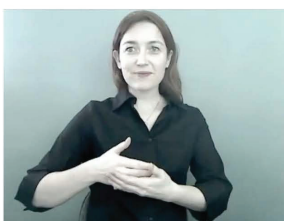
Every **language** has its own words. Words can be spoken. Words can be written. Some people speak a language called **sign language**. They use their hands to say words. Can you tell what these sign language words mean?



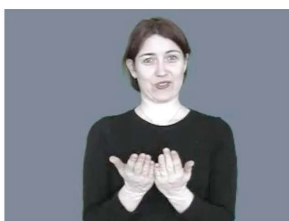
✓ Check Your Thinking



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✓ Check Your Thinking



✓ Check Your Thinking



13

This page allows students to **find out** about another **communication system**. In this book, we have used international sign language words that are the same as American sign language. If your students are familiar with sign language, you may want to discuss the challenges of signing with people from around the world. Some signs are easy to understand, but others are not. Consider hand signals you might use in conversation. For example, you point to yourself to indicate me or I. This is also a sign language word. We don't have a commonly understood hand signal for fish so this may be more difficult to understand or translate.

Students may wish to learn more about sign language. This video introduces more words:

<https://www.youtube.com/watch?v=W5jdJ2CsFuM>

Or check out a sign language dictionary like this one:

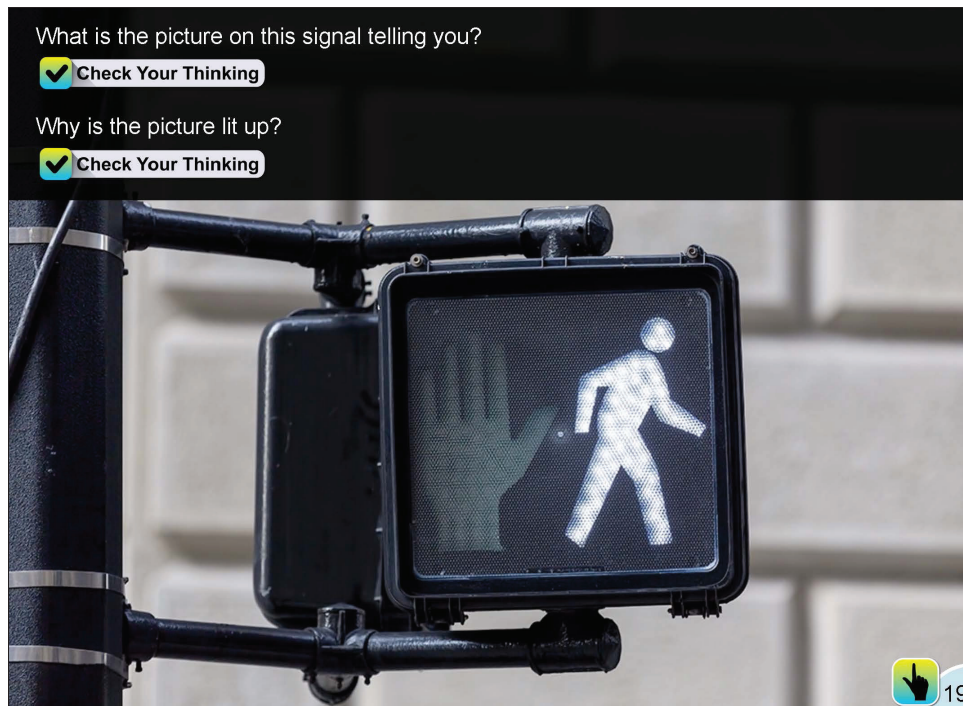
<https://www.handspeak.com/word/search/index.php?id=1847>

The beginning of this book focuses mainly on communication systems that can be used and understood by most people. This page introduces students to the idea that there are languages that don't use spoken words. This can open a discussion in which students share their experiences with adaptive communication tools.

Why do people use sign language? (They may be deaf or hard of hearing, or they may have difficulty speaking. Babies may be taught sign language before they learn to speak. Hearing people often learn sign language to communicate with others.)

Do you know anyone who uses any special communication tools? (Answers will vary but could include hearing aids, reading glasses, Braille, teachers using a microphone device, speech recognition, or picture communication tools.)

Page 19



This page introduces the idea of a picture as a signal.

A signal is something you see or hear that **communicates information**. Signals are generally short bits of communication. Discuss the use of signals with students. What other kinds of signals can you think of? (Quiet signals, turn signal in a car, hand signals on a bike, bells and buzzers that signal when a period of time is up, such as the ones on microwaves.)

You can explicitly address **patterns** and **cause and effect** by discussing with students what happens when a signal is used. For example, when a walk signal is present, people cross the street. When a quiet signal is used, students stop talking. (Sometimes.)

Preconceptions

Students in early grades may be familiar with simple patterns such as ABABAB or the stripes on a shirt. Students (and adults) may not consider patterns in the natural and designed world as patterns. To develop student understanding of the concept of patterns you may want to start with simple observations. When the bell rings at the end of the day, students leave the school. It happens in a way that is repeated and predictable. After bells ring and lights flash, a train comes through. That is a pattern. When we read the letter B, it makes a certain sound. This is a pattern, too.