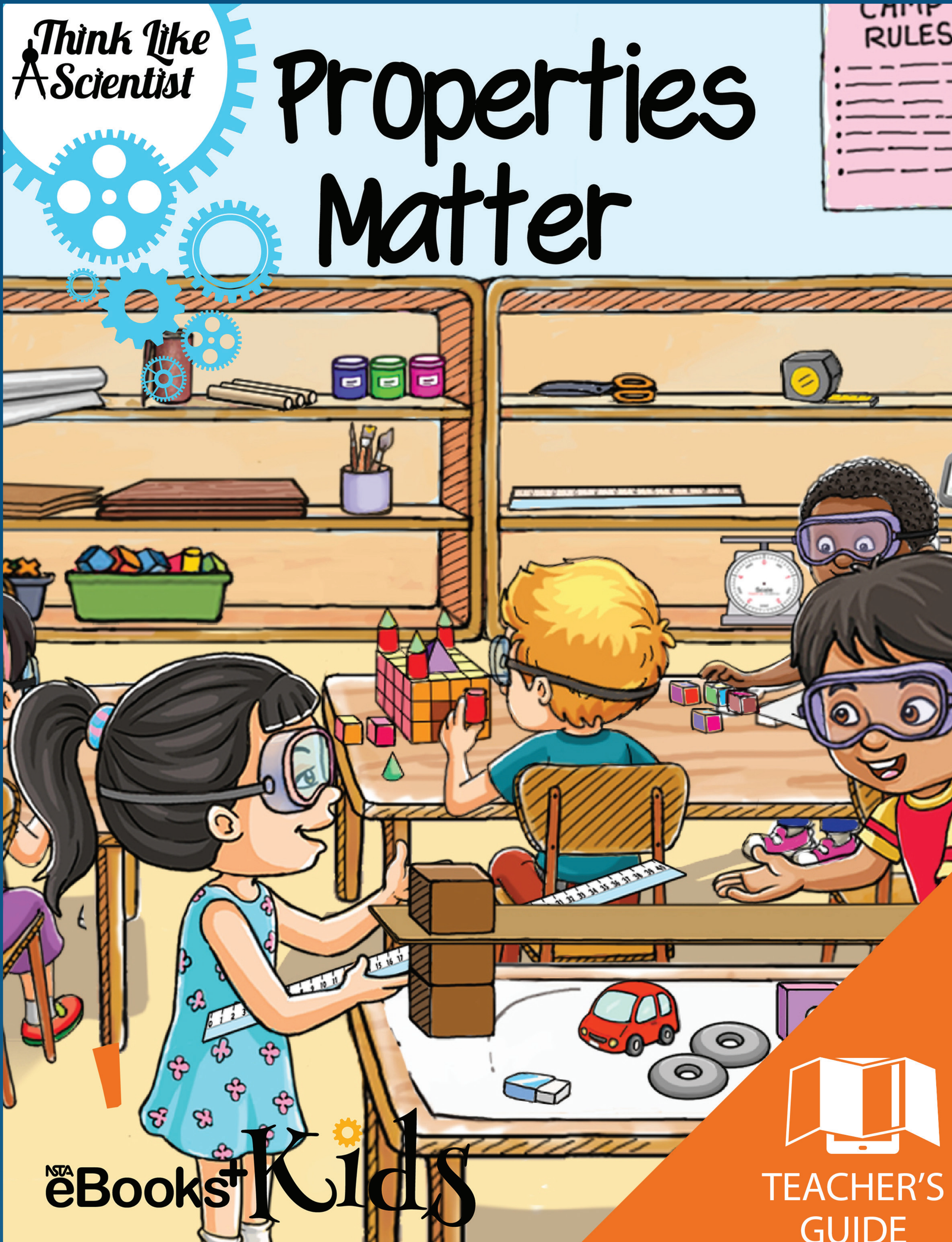
Think Like A Scientist

Properties Matter



NSTA eBooks+ Kids

TEACHER'S GUIDE

Overview

This teacher's guide is designed to assist teachers and parents in the planning, implementation, and management of instruction for the *Properties Matter* e-book. It lays out learning goals for each topic, shares likely student misconceptions and how to address them, and highlights where students explicitly practice science and use crosscutting concepts to support their learning. It also provides investigations that connect readings and interactives in the book with students' world.

Properties Matter and the teacher's guide were carefully crafted to provide opportunities for the implementation of additional teaching strategies that the author has found to be very useful when teaching elementary science. Teachers often ask how they can use cooperative grouping with their students and how to show students what working cooperatively looks like. This e-book provides both opportunities. The main characters, Bobby and Carmen, work cooperatively as a team throughout the story. They have found themselves short on time and materials, but by working cooperatively, as scientists, they are able to successfully complete their tasks. This story theme provides students with many opportunities to evaluate how they can work together cooperatively to accomplish their tasks. Within this guide, teachers will find student job cards for cooperative grouping. You will notice that the job cards can be easily used with several subjects such as science, literature, and math. The author suggests adapting the jobs to meet the needs of your students.

Another area of concern for many teachers is vocabulary and language development. Teachers have found that children seem to be using more filler words or substitution words, calling an object *that thing or it*, *for example*, rather than using correct vocabulary. The importance of incorporating vocabulary repetition with multiple exposures into science lessons is often a major concern of teachers. *Properties Matter* exposes students to correct vocabulary in context, including vocabulary of solid shapes and their physical properties. The *Properties Matter* teacher's guide provides suggestions for student discussion and vocabulary development. These opportunities, while helping all students, are very important to English language learners.

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.

Lexile® Measure: 540L

Book Description

Bobby and Carmen want to design and build a useful engineering project for fellow campers. Time is short, and most of the materials have been used! Will Bobby and Carmen succeed in using science and engineering to build something useful before their afternoon hike?

Readers will be engaged in motivating interactive activities as they learn about the anchor phenomenon: observing physical properties of matter. They will identify, describe, classify, and measure objects by their physical properties, such as flexibility, texture, and dimensions. Readers will learn that physical properties can be observable and measurable. This project-based story focuses on physics, math, language arts, and engineering.

In this interactive e-book, readers will identify physical properties of matter through the concept of teamwork and the engineering design process. The engineering design process is a series of steps that guides the characters in the story as they solve engineering problems. The design process provides a vehicle by which children can repeat the steps as often as necessary, making improvements along the way. In *Properties Matter*, Bobby and Carmen learn from their setbacks as they redesign and rebuild, making improvements to their track and their cars. They persevere through the design steps and find success and feel pride at the conclusion of their project. Mr. Lap provides encouragement to follow the steps, which strengthens the children's understanding of an open-ended design process.

The events in this story introduce students to the concepts, methods, and attitudes of scientists and engineers. The science discipline does not exist in isolation, nor does this e-book. The suggested tasks in this teacher's guide are interdisciplinary and include coordinating activities in math, language arts, art, and engineering. *Properties Matter* models an engineering design process appropriate for most students in grades 2–5. Teachers looking for ways to introduce their students to STEM or STEAM will find these steps quite doable for most of these students.

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 Bobby and Carmen select the most suitable materials to build their track and model cars?

Three-Dimensional Learning and *Properties Matter* 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 idea:

PS1.A: Structure and Properties of Matter **Different properties are suited to different purposes.**

This e-book also partially addresses the disciplinary core idea:

PS1.A: Structure and Properties of Matter **Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.**

The e-book explores different observable properties but does not cover solids, liquids, and temperature.

Disciplinary Core Ideas (DCIs)

This e-book addresses all three of the K–2 Engineering, Technology, and Applications of Science (ETS) disciplinary core ideas.

ETS1.A: Defining and Delimiting an Engineering Problem

A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (K-2-ETS1- 1) (secondary to KPS2-2)

Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) (secondary to K-ESS3-2)

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-ETS1-1) (secondary to K-ESS3-3) (secondary to 2-LS2-2)

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-ETS1-1) (secondary to 2-ESS2-1)

Science and Engineering Practices

> Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. The actual doing of science or engineering can also pique students' curiosity, capture their interest, and motivate their continued study.

(NRC Framework for K-12 Science Education, 2012)

Through classroom experiences supported by this e-book, students should be capable of performing the following practices:

- Asking Questions and Defining Problems
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions

The specific science and engineering practices addressed include:

Asking Questions and Defining Problems

- **Ask questions based on observations to find more information about the natural and/or designed world(s).**
- **Ask and/or identify questions that can be answered by an investigation.**
- **Define a simple problem that can be solved through the development of a new or improved object or tool.**

Planning and Carrying Out Investigations

- **With guidance, plan and conduct an investigation in collaboration with peers.**
- **Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.**
- **Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.**
- **Make observations (firsthand or from media) to collect data that can be used to make comparisons.**
- **Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.**
- **Make predictions based on prior experiences.**

Analyzing and Interpreting Data

- **Record information (observations, thoughts, and ideas).**
- **Use and share pictures, drawings, and/or writings of observations.**
- **Compare predictions (based on prior experiences) to what occurred (observable events).**
- **Analyze data from tests of an object or tool to determine if it works as intended.**

Using Mathematics and Computational Thinking

- **Describe, measure, estimate, and/or compare quantitative attributes of different objects and displays the data using simple graphs.**
- **Use quantitative data to compare two alternative solutions to a problem.**

Constructing Explanations and Designing Solutions

- **Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.**
- **Generate and/or compare multiple solutions to a problem.**

Engaging in Argument from Evidence

- **Identify arguments that are supported by evidence.**
- **Analyze why some evidence is relevant to a scientific question and some is not.**
- **Distinguish between opinions and evidence in one's own explanations.**
- **Construct an argument with evidence to support a claim.**
- **Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence.**

Obtaining, Evaluating, and Communicating Information

- **Describe how specific images (e.g., a diagram showing how a machine works) supports a scientific or engineering idea.**
- **Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

Crosscutting Concepts

The crosscutting concepts are the lenses through which scientists think about the natural world. They are the big ideas that connect the sciences and help to understand nature and how science and engineering work. Students who understand the crosscutting concepts will have a deep framework for integrating and understanding science ideas across disciplines.

Through classroom experiences supported by this e-book, students should be able to use the crosscutting concepts in the following ways appropriate for students in grades K–2:

The crosscutting concepts most commonly used throughout this book are:

- Energy and Matter
- Cause and Effect
- Scale, Proportion, and Quantity

The specific crosscutting concepts elements addressed include:

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Cause and Effect

- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Scale, Proportion, and Quantity

- Relative scales allow objects and events to be compared and described (e.g., bigger and smaller, hotter and colder, faster and slower).
- Standard units are used to measure length.

Systems and System Models

- Objects and organisms can be described in terms of their parts.

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes.

A Note About Safety

Throughout this e-book teacher's guide are hands-on activities and demonstrations that help to foster the learning and understanding of science. The reader will find safety notes and safety statements that help to make it a safer learning experience for students and teachers. In most cases, personal protection equipment (PPE) like glasses/goggles, non-latex gloves and aprons are required. Sanitized safety glasses and/or indirectly vented safety goggles noted must meet the ANSI/ISEA Z87.1 D3 safety standard. When dealing with hazardous chemicals, consult with the Safety Data Sheets prior to doing the activity. Make sure there are appropriate engineering controls; e.g., eyewash, shower, etc. The safety procedures and use of PPE must be followed based on legal safety standards and better professional safety practices.

For additional safety information, check out the NSTA Safety Portal at http://www.nsta.org/safety/. A safety acknowledgement form ("Safety in the Science Classroom, Laboratory, and Field Sites"), which is designed to review safety-operating procedures for students, needs to be used to address safety and teacher liability. A sample form is available at http://static.nsta.org/pdfs/SafetyAcknowledgmentForm-ElementarySchool.pdf.

Be aware that conditions of actual use of activities and demonstrations may vary and the safety procedures and practices described in this e-book teacher's guide are intended to serve only as a guide. Additional precautionary measures may be required. NSTA and the authors/reviewers do not warrant or represent that the procedures and practices in this e-book meet any safety code or standard of federal, state, or local regulations. NSTA and the authors/reviewers disclaim any liability for personal injury or damage to property arising out of or relating to the use of this e-book, including any of the recommendations, instructions, or materials contained therein. Selection of alternative materials or procedures for these activities may jeopardize the level of safety and therefore is at the user's own risk.

How to Work: Nine Steps Toward a Safer and More Productive Classroom

Teaching children how to work together safely in groups is crucial for creating a positive educational environment. In *Properties Matter*, the children at the engineering camp are taught the following steps:

1. Always ask permission.
2. Wear appropriate protective gear when directed, e.g., safety goggles, boots, and other outdoor gear. Teachers must have all participants wear safety glasses or goggles during all phases of this inquiry activity (set-up, hands-on investigation, and take down) when required.
3. Share all materials.
4. Walk indoors; never run.
5. Give each member of your group a chance to speak.
6. Listen when each person speaks.
7. Respect each team member's suggestions.
8. Take turns.
9. Ask for help if disagreements arise that can't be resolved by the team.

Properties Matter Possible Pre-assessments

Allow students to touch and manipulate materials and ask them to describe the materials.

Consider using this e-book in the classroom as a digital Big Book. Project this onto a screen then decide when you want the class to break into groups to discuss an item in the e-book or to collaborate on an idea. This can help students with independent reading and language development, as well as model how children can participate in science.

Safety Note: Make sure that students are not throwing or hitting things with the materials so they do not hurt themselves.

Record students' responses in a table somewhere in the room. Accept all answers, even when they are not properties. Later, when students have had experience with the concept of properties, revisit this list and have students make revisions. Ask, "What do you think you can make with these?" The materials can then be given at the end of the unit along with the original questions and the responses can be compared for growth in vocabulary and creativity.

Material	Descriptive Words	Uses	What We Want to Add
Wood Block	Heavy, brown, solid, square, rough	Paperweight, step, wall	

Another possible pre-assessment combines science and writing. Ask students to think about their experiences building projects. How did they select the materials that they would use for their projects? Have students write a brief story about building a project.

Before You Begin

As your students engage with this e-book, they will be learning about the steps in solving a problem using engineering. As you work through the teacher's guide, you will notice that you can do the exact same design challenge with your students in your class. Challenge your students using the guidelines in the teacher's guide to build a structure using limited materials in a limited period of time. The pages of the teacher's guide will give you discussion questions that you can ask your students that are asked about Bobby and Carmen as they go through the engineering steps. Guidelines for implementing this design challenge will appear in the "End-of-Topic Engineering Process Practice" sections throughout the teacher's guide.

You may want students to go through this e-book twice. They will read the e-book the first time to become familiar with the engineering process. Next, have them engage in a design challenge of their own. As they work on their solution, have them use the e-book to guide how they design and build their solutions. There are also questions from this teacher's guide that you can use to guide the students.

Topic 1

Beginning the Engineering Process

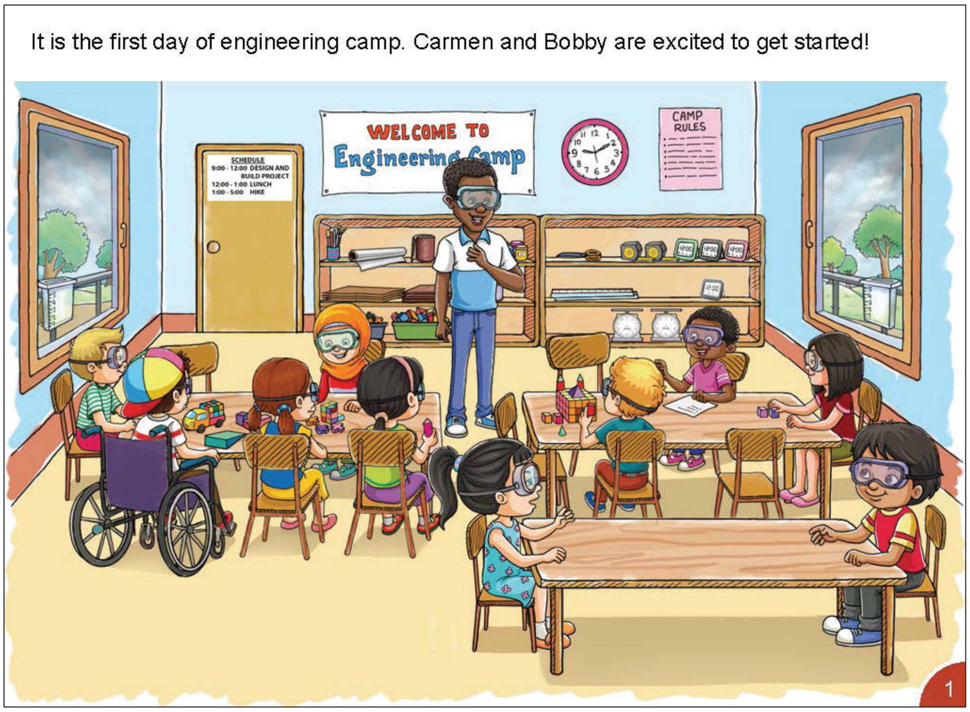
This topic introduces students to steps one and two of the engineering design process: defining the problem and researching possible solutions. These steps are important because they help students understand how to begin planning and carrying out an engineering project as they develop critical thinking skills. The engineering design process is a decision-making process that provides students with a series of steps that are used to find solutions to problems. During topic one, teachers have the opportunity help their students define a problem and to frame their problem as a question. Students also further develop the concept of cause and effect. Teachers can use a T-chart or a flowchart to help their students understand cause and effect. It is important for students to understand that the cause is the action or event that makes something happen and the effect is the result of the action or event.

Define Problem	**Question**

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

- describe a problem that can be addressed by the development of a new product;
- make observations in the classroom or community to use as evidence of a design problem that can be solved; and
- identify constraints of a design problem and how they will affect the process and product.

Page 1



This page introduces the story while also setting up constraints for the engineering challenge. Bobby and Carmen are the last ones to start their project in engineering camp. Because of this, they find that other campers have selected most of the materials already. Students should recognize that Bobby and Carmen will be creating an engineering project with limited materials and time. The properties of these materials will be important for students to test as they continue in the e-book. This supports the anchoring phenomenon that materials have specific properties that work well for some tasks but not well for others.

Consider making a copy of the engineering design steps chart and posting it in the classroom for student reference. You can find a printable engineering design steps chart in Appendix C.

Direct students to look carefully at page 1. Ask students to use the information on the page along with their prior knowledge to make predictions about the e-book. What do they think they are going to learn? What do they know about engineering? Have they ever participated in an engineering challenge? Have students record their predictions and observations. They can do this directly within the e-book by creating a note and typing their predictions and observations, or you can have the students write out their predictions and observations in their science notebooks.

Possible discussion prompts:

1. What possible problems might Carmen and Bobby experience by starting their project after everyone else? Explain your answers.

    Accept answers with explanations. Example: They might not have enough materials for their project.

2. How are you thinking like a scientist or engineer when you gather information about this page?

    Answer: You are making observations and inferences and identifying cause and effect relationships. You are thinking like a scientist when you use these skills.

3. How would the items in the illustration be useful to engineering campers? Explain your answer.

    Answers could include that the measurement tools found on the shelves are needed to test things, that the campers will use the materials on the shelves for their projects, that there are many tables where they can spread out and work in groups, etc.

Think Like a Scientist and Engineer

How are Bobby and Carmen thinking like scientists and engineers? After reading each page, ask students to record the science skills used by Bobby and Carmen. Students can record the skills they find with the note-taking tool on each page, or you could have the class create a poster. Another option would be to use a T-chart to compare how Bobby and Carmen work like scientists or like engineers. This activity is designed to have students locate and retrieve information, think critically, draw conclusions, and make inferences. Locating and analyzing text is a very important skill.

Provide students with opportunities to lead discussions and share their notes about thinking like a scientist and engineer. Look for them to provide evidence for why they think these are science skills.

Students might recognize on this page that Bobby and Carmen are using clues from around the room to identify the problem they need to address and come up with a solution for. Ask students to explain what Bobby and Carmen see that allows them to do this. Do both scientists and engineers make observations? (Yes! Scientists make observations about natural phenomena to form questions they can answer through investigation. Engineers observe a problem that needs to be solved.)

Differentiated Instruction

Direct students to look carefully at page 1 and verbally describe the details in the illustration. This helps students to increase vocabulary and language skills and to improve observational skills.

Science Literacy: Mystery Pals

Properties Matter provides a variety of ways for students to interact with and think about properties. Mystery Pals is a writing activity that helps children develop language and deeper understanding of descriptive words. Number your students (e.g., 1–30). Record the number and student's name and assign each one a mystery pal. Give each student a mystery pal number, which they are to keep secret. Tell students that they are to write a letter to their mystery pal. They are to use descriptive words to describe themselves. They should sign the letter as "Your Mystery Pal," followed by their mystery pal number. The teacher collects the letters and pairs them with mystery pals. The teacher records the name and number of the pal. Example:

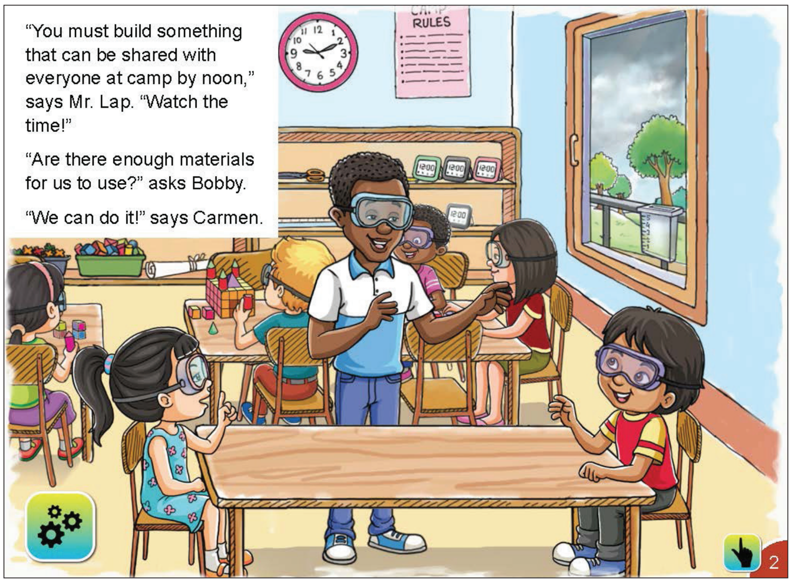
1. Sally Jones... Mystery Pal: 22. Maria Garcia

Teachers distribute the letters in students' mailboxes or on their desks. Children underline the descriptive words in the letter that they receive and try to guess their mystery pal. This project can be ongoing by having students continue to send letters and make things for their pals. The children could make cut-out gifts for their pals using the design process in this book.

Descriptive Activity: Children choose from a set of shape patterns. They make and decorate a shape for their pal. Each shape is placed in a mystery pal bag. Students are given an index card and asked to write descriptive words about the shape. The index card with the descriptive words is taped to the bag. Teachers distribute the bags. Students read the descriptive words and guess what is in the bag before opening it.

Extension Activity: Collect the index cards. Place students into cooperative groups. Evenly distribute the cards to the groups. Direct students to come up with ways that the words could be categorized (e.g., size, color, shape, number of angles, number of sides, etc.) After five minutes ask each group leader to share their group's ideas. List the categories on a whiteboard or a chart. Then ask students to provide descriptive words from their index cards that belong in the various categories. This activity will help students develop understanding of the concept of physical properties. Note: The Friendship Bracelet activity in Topic 3 could also be incorporated into the Mystery Pals activity.

Page 2



Bobby and Carmen are worried. Will they be able to complete their project before the afternoon hike? This page represents the first step in the engineering process: defining the problem. Without telling your class the engineering problem, use the discussion prompts to work your students through identifying the problem; the characters will need to build something with limited materials that can be used or enjoyed by all.

Possible discussion prompts:

1. Why are Bobby and Carmen worried about completing their project?

    Answer: They may not have enough time to complete their project. There may not be enough materials to make a project.

2. How could having less time affect their project? Explain your answer.

    Answer: Accept answers with reasonable explanations. Bobby and Carmen might skip steps that are important such as not taking time to make a design plan. They could run out of time before they finish. They could ruin their materials by rushing to complete a project.

3. Why do you think Bobby is worried about having enough materials to make a project?

    Accept answers with explanations. Limited materials can cause many construction problems. Bobby and Carmen might not have materials to make a useful project. The materials on hand might not have the correct physical properties for their project, such as size, shape, etc. They might have problems trying to find substitution materials to complete a project. Bobby may have been last to select materials when working on another project. He may know from prior experiences that this could be a big problem.

4. What problem are Bobby and Carmen trying to solve?

    The problem is how can they make a project that can be used by everyone at camp with the materials available in the remaining time.

5. Bobby and Carmen are working as a team. What makes a good team member? How is Carmen showing that she knows how to be a good team member?

    Possible answers: Good team members can be seen working together, sharing materials and ideas, taking turns, being a good listener, etc. Carmen is encouraging Bobby not to give up.

6. Have you ever been the last person to select materials for a project? Was it a problem? What did you do? What do you think Bobby and Carmen will do?

Think Like a Scientist and Engineer

How are Bobby and Carmen thinking like scientists and engineers? Add these science skills to the list.

On this page, students might recognize that Bobby and Carmen are sharing ideas and working as a team. Why might this be important for scientists and engineers to do?

Communicating information is an important science and engineering practice. Advances are made in science and engineering when scientists and engineers can communicate their findings and designs and learn about what other scientists or engineers found. Communicating can happen orally, in writing, and in diagrams/graphs.

Mathematics Connections

Find two ways that you can tell how much time Bobby and Carmen have. Use math to help you find the answer.

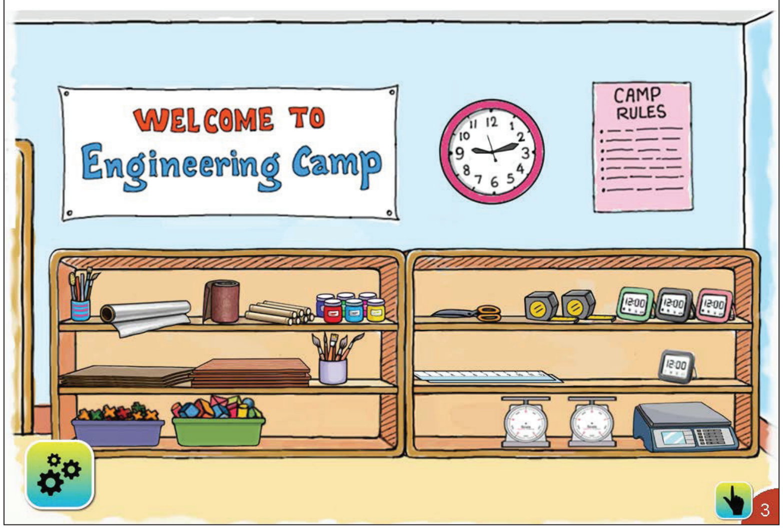
Answer: The schedule for the day tells us that camp started at 9:00 a.m. The clock tells us that they started their project at 9:10. They have 2 hours and 50 minutes. They started their project 10 minutes after camp began.

Art and Science Activity

Working together in a team, students are to make a chart showing what it means to be part of a cooperative group. Be creative. Present and explain your chart to another group or grade. Make sure everyone in your group contributes to the chart and to the presentation.

Page 3

Bobby and Carmen investigate what materials are left for them to use.



On this page Bobby and Carmen delve deeper into the design process. Their problems are becoming more complex! What are the criteria that Bobby and Carmen will need to consider in order to create a successful design? What materials do they have to use? What are the constraints or limitations that they must consider? Bobby and Carmen need to carefully consider these questions in order to make a successful design and and locate the most suitable materials. Will they be able to be successful at researching possible solutions to their questions?

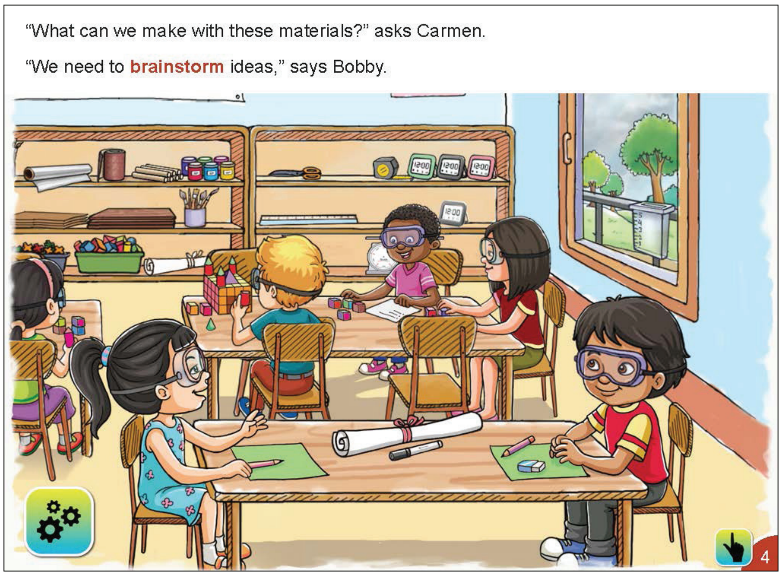
This step provides teachers with another opportunity to teach cause and effect. Direct students to consider various scenarios. What if they make this choice of materials? What is the cause and what will be the effect? What constraints will they face with their design based on their materials choices? Help students to understand the usefulness of asking these questions. Use a T-chart or flowchart to record responses.

Think Like a Scientist and Engineer

How are Bobby and Carmen thinking like scientists and engineers? Record the science skills on their list.

Bobby and Carmen are investigating the materials on the shelves. As students observe the available materials on the shelves, they are asking questions related to their problem. Asking and responding to their own questions allows them to determine criteria for a successful design: what would work and what wouldn't.

Pages 4



Bobby and Carmen have a short amount of time to work as team to create a project. They are researching and evaluating possible solutions by studying the available materials. What should Bobby and Carmen make? Bobby and Carmen are brainstorming to find the best idea.

Engineering Activity

Give students a variety of materials available in your classroom, such as oak tag, pieces of cardboard, construction paper scraps, scraps of art materials, paint, colored pencils, etc. Direct students to brainstorm how they could use the materials to create a real or imagined cityscape or countryscape. Have the students brainstorm in a group what they would build with these materials in one class period. Which buildings would be important to include in their designs? How would their project be affected if they had 5 less minutes in class? How would their project be affected if they had 15 less minutes in class? Typical time for this project is 20 to 30 minutes.

Follow up activity: Tie this project to language arts and social studies by directing students to write about their communities. Provide students with an opportunity to share their stories with the class.

Discuss with your class the importance of brainstorming multiple solutions as a step in the design process.

1. Why do you think Bobby and Carmen took time to complete the brainstorm step?

Answer: They consider brainstorming a very important step. They know that brainstorming can help them.

2. Why is brainstorming an important science and engineering step?

   Answer: Brainstorming gives people a chance to be creative, come up with fresh ideas, develop innovative ideas, and solve problems. Brainstorming ideas can be saved for later projects. Brainstorming helps teams come up with a greater number of ideas by requiring them to look at things in different ways. Brainstorming gives everyone a chance to talk and share ideas. This often results in a number of diverse solutions to a problem, increasing an engineer's chances of a successful end product.

3. How do members of a group brainstorm? What are some good things that your group does? What could your group do better when you brainstorm ideas?

   Possible answers: They take turns giving ideas. They listen when each person talks. They record their ideas. They talk about the idea without saying anything mean about the idea or the person who gave the idea. All reasonable ideas are accepted.

4. How did Bobby and Carmen work together as team members? Would you like to have Bobby and Carmen on your team? Explain your answers.

While this activity does not incorporate all aspects of an engineering activity, you may want to revisit this activity and transition it into an engineering activity once students have completed the e-book.

Think Like a Scientist and Engineer

How are Bobby and Carmen thinking like scientists and engineers? Record the science skills on their list.

On this page, students might come up with the idea that scientists and engineers brainstorm. How could it be different between scientists and engineers? Guide students to understand that answering this question comes down to how scientists and engineers answer questions! Scientists conduct investigations to explain a phenomenon (like why the sky is blue) and engineers conduct investigations to identify how effective their design is.

Another skill is researching possible solutions. Why is researching an important science skill? Researching helps scientists and engineers to identify prior solutions that could potentially be improved upon. It also allows them to evaluate evidence to help form a solution to a problem.