TABLE OF CONTENTS

GETTING STARTED

Introduction 5
How to Use This Book 6
The Standards 13
Integration in the Engineering Design Challenge 14
STEAM Design Process 15
Recording Information in a Science Notebook 16

LIFE SCIENCE

Be a Bee! 74
Build a Zoo 80
Grow, Plant, Grow! 86
Spread the Seeds 92

EARTH AND SPACE SCIENCE

Buried Treasure 20
Protect the Marina 26
The Sturdy Swine 32
This Model Flows! 38

PHYSICAL SCIENCE

Directional Mishaps 98
Help Humpty! 104
I Scream, You Scream. 110
I'm Freezing! 116
Take Apart and Build Anew 122

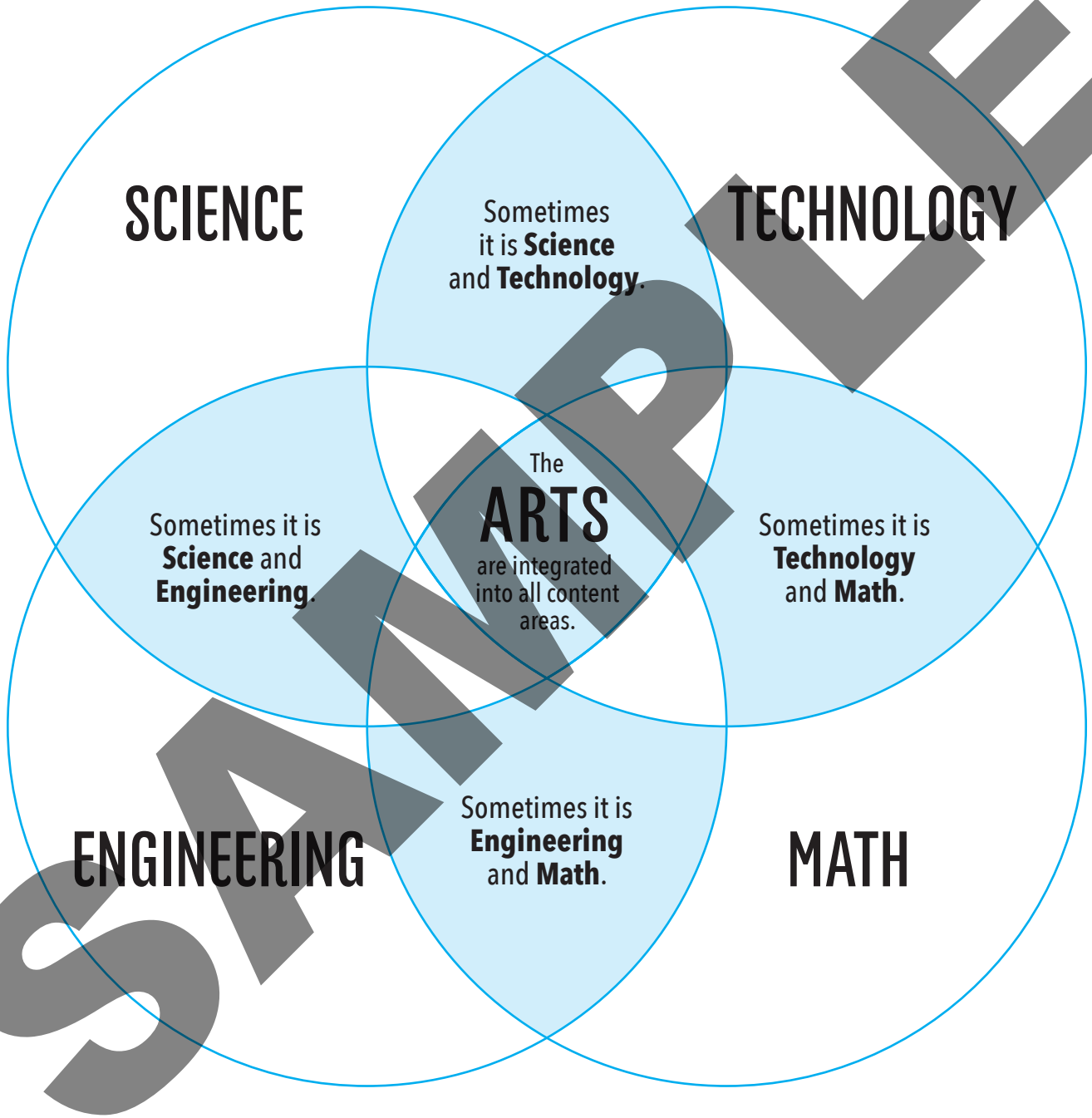
ENGINEERING DESIGN

Blazing Books 44
Candy Corn Catapult 50
Protect Yourself 56
Snow Fort Structures 62
Troll Transport 68

APPENDIX

Lesson Plan–Specific Reproducibles 129
Individual Blueprint Design Sheet 142
Group Blueprint Design Sheet 143
Budget Planning Chart 144
STEAM Job Cards 145
Science Notebook Cover 146
STEAM Money 147
STEAM Rubric 149
Bibliography 151

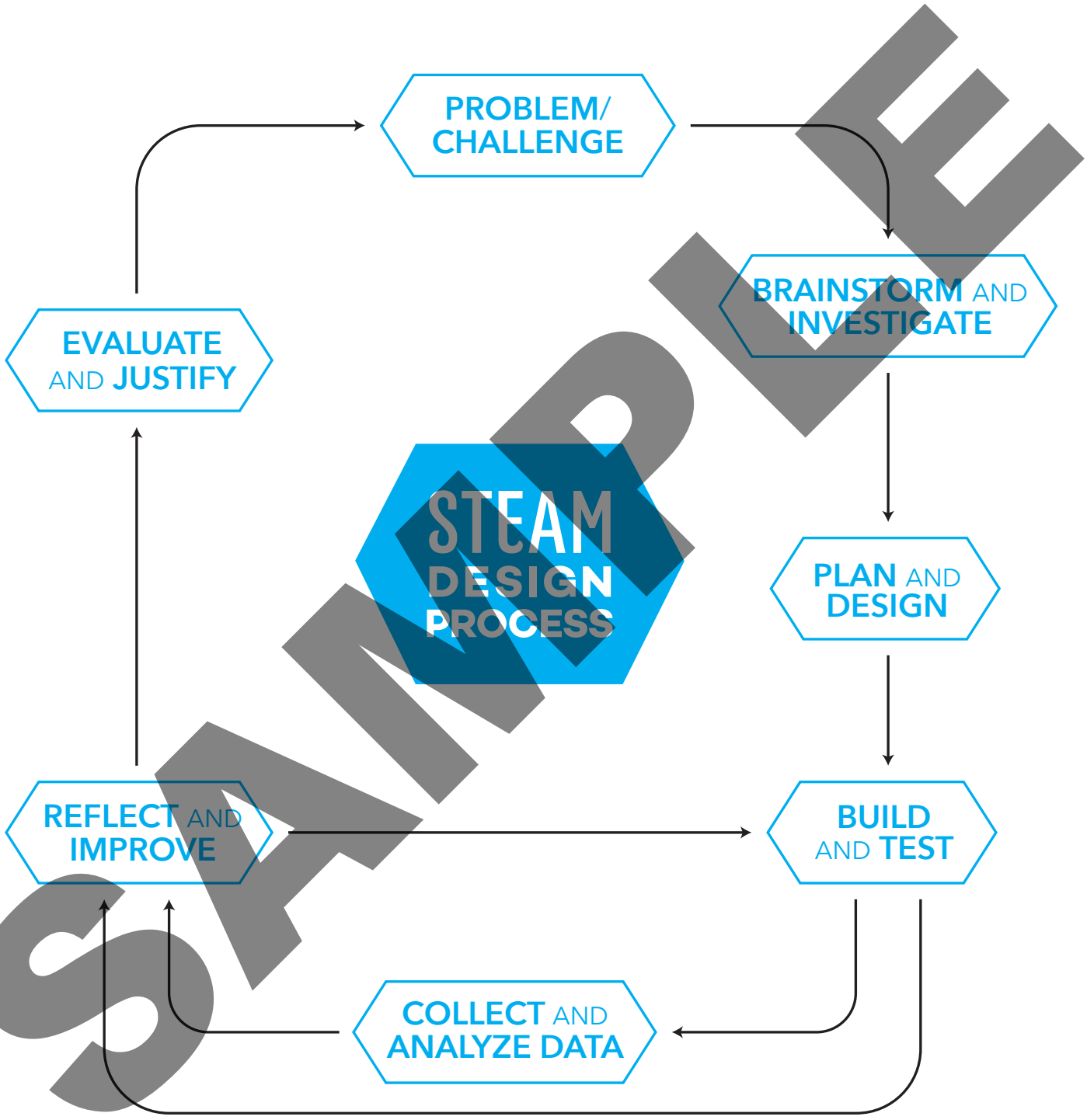
INTEGRATION IN THE ENGINEERING DESIGN CHALLENGE



SAMPLE

Sometimes it is all five!

STEAM DESIGN PROCESS



SAMPLE

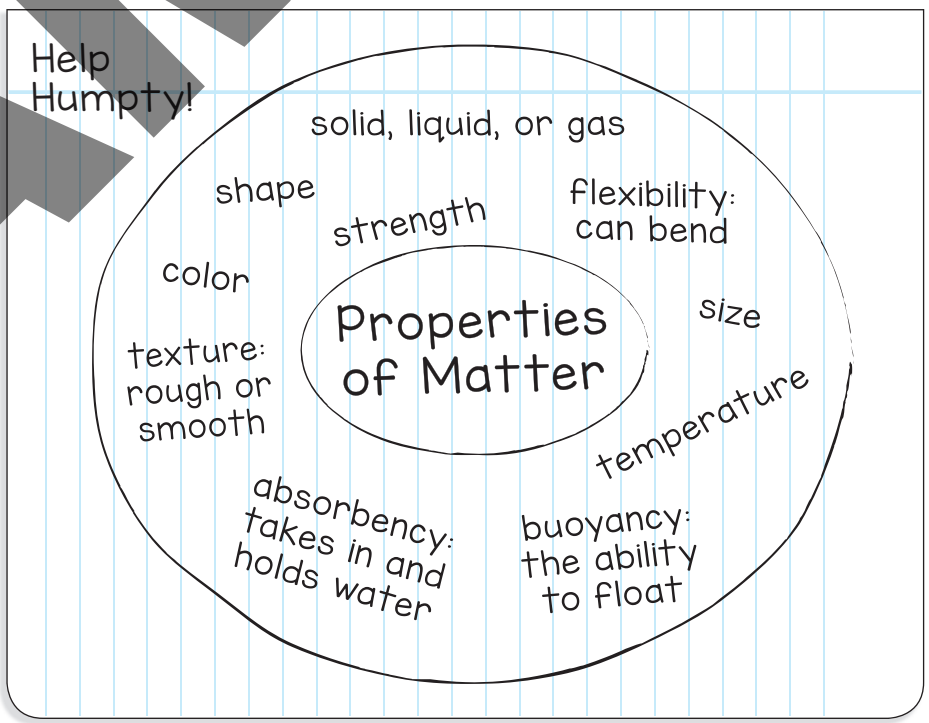
RECORDING INFORMATION IN A SCIENCE NOTEBOOK

Students will record their thinking, answer questions, make observations, and sketch ideas as they work through each design challenge. It is recommended that teachers have students designate a section of their regular science notebooks to these STEAM challenges or have students create a separate STEAM science notebook using a spiral notebook, a composition book, or lined pages stapled together. A generic science notebook cover sheet has been provided in the Appendix.

Have students set up their notebooks based upon the natural breaks in the lesson. Remind students to write the name of the design challenge at the top of the page in their notebooks each time they prepare their notebooks for a new challenge.

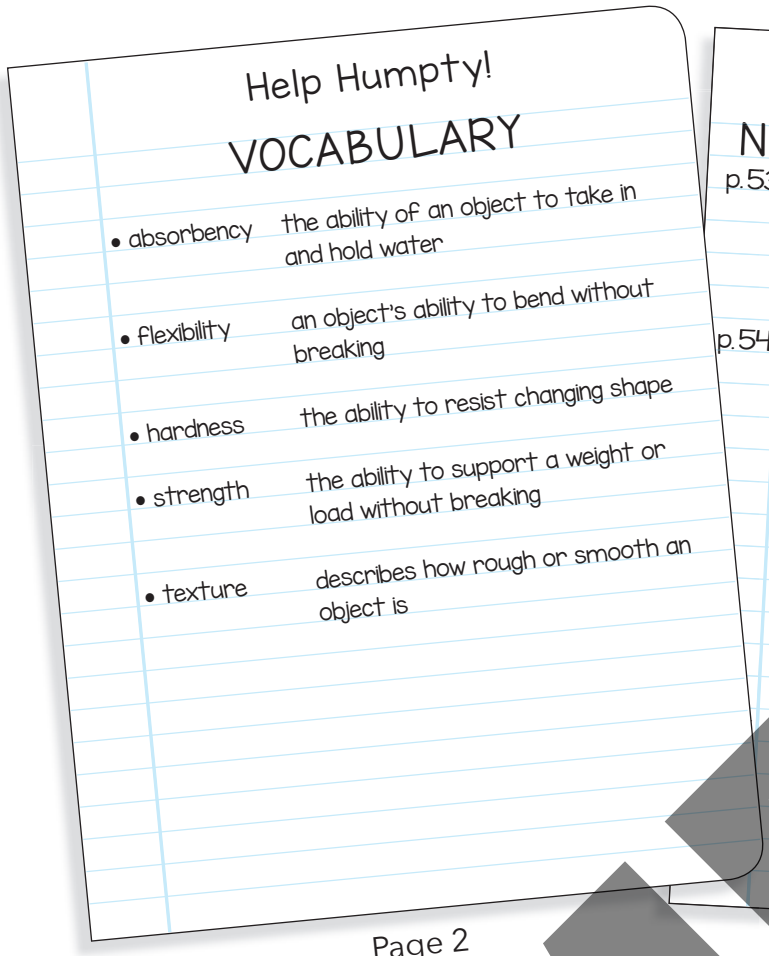
Pages 1–3 Background Information

- Students record notes from any information provided by the teacher during whole-group instruction.
- Students record related vocabulary words and their definitions.
- Students record notes from their own independent research, including information gathered through literacy connections and existing background knowledge.

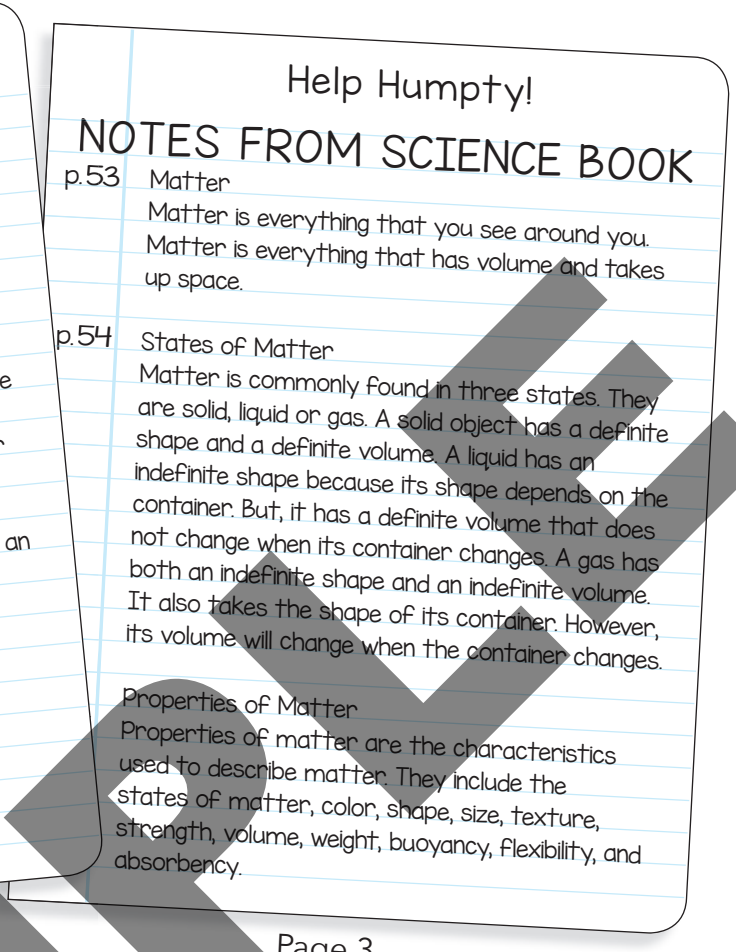


Page 1

SAMPLE



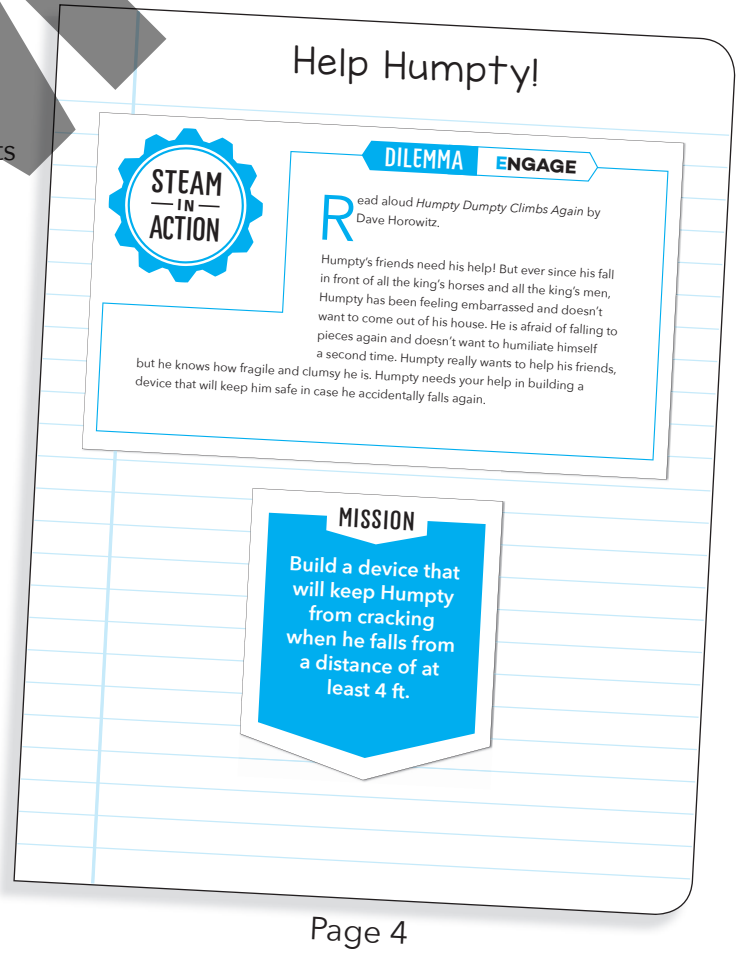
Page 2



Page 3

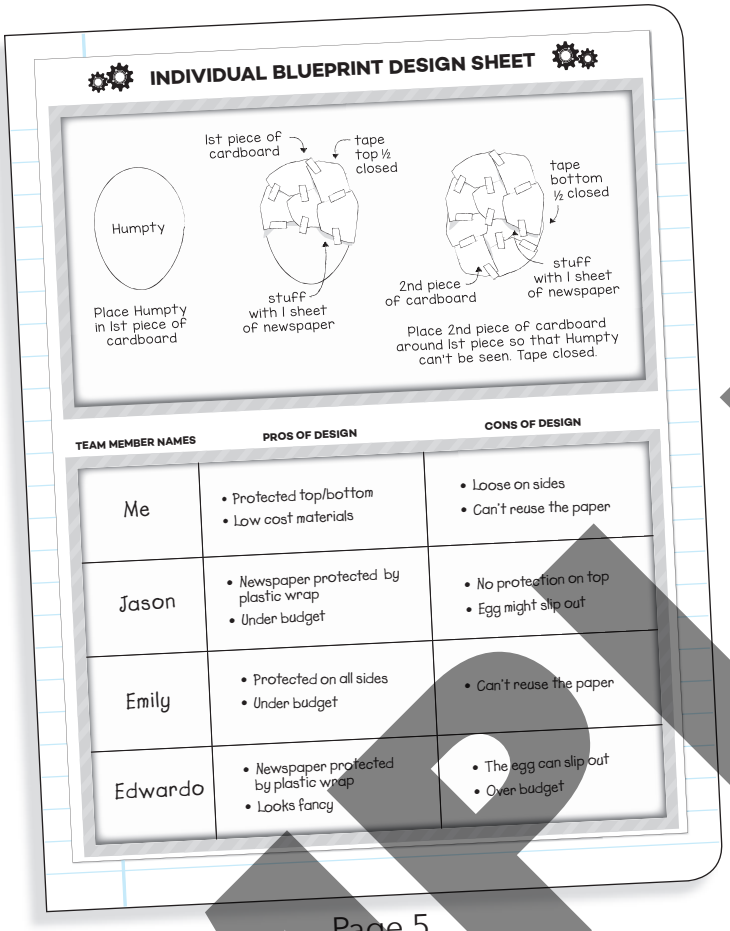
Page 4 Dilemma and Mission

- Display the dilemma and mission for students to record.
- Or make copies of the dilemma and mission for students to glue into their notebooks to use as a reference.



Page 4

SAMPLE

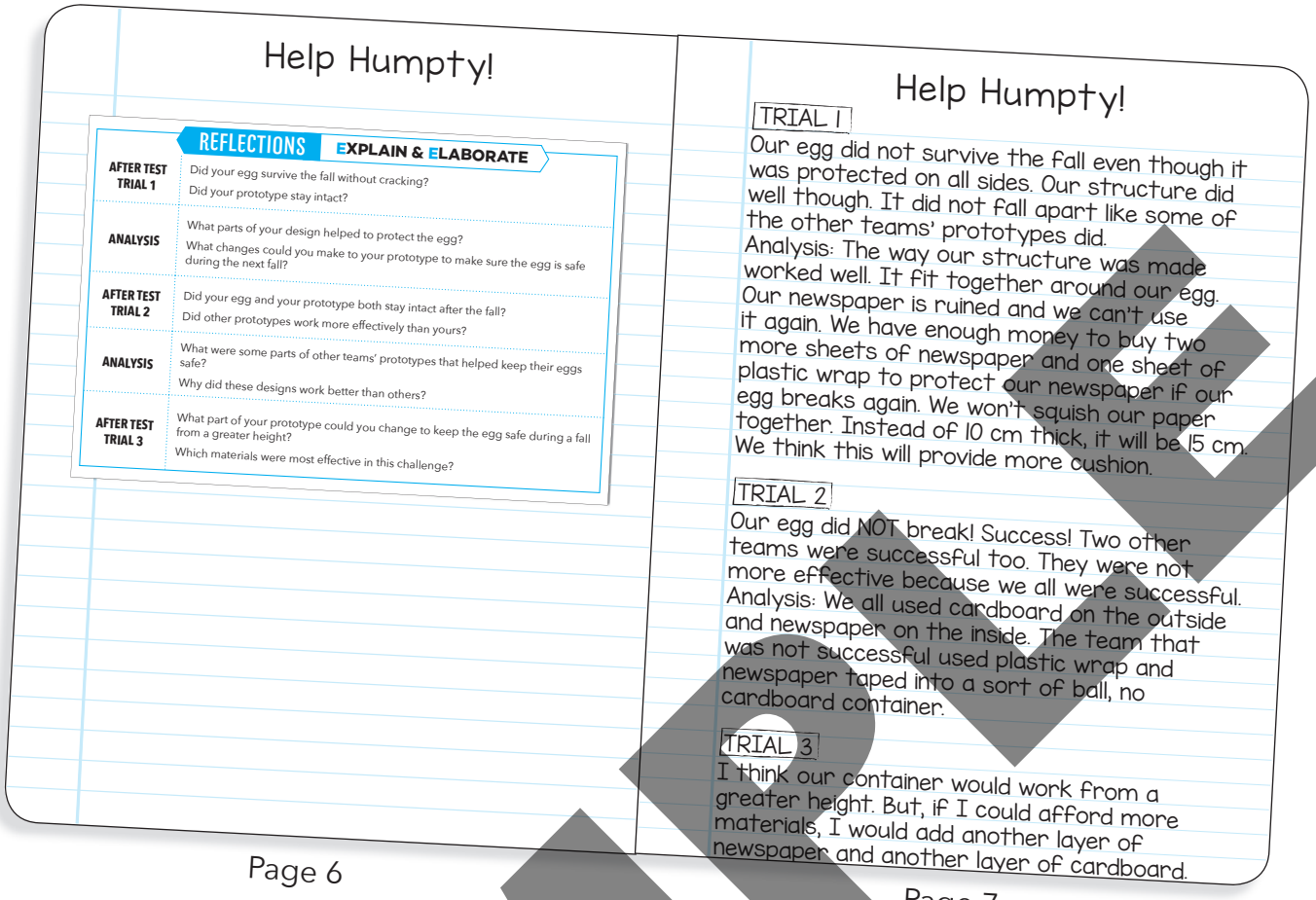


Page 5

Page 5 Blueprint Design

- Students draw their own suggested design. Then students write the pros and cons of their and their teammates designs.
- Or make copies of the Individual Blueprint Design Sheet for students to complete and glue into their notebooks.

SAMPLE

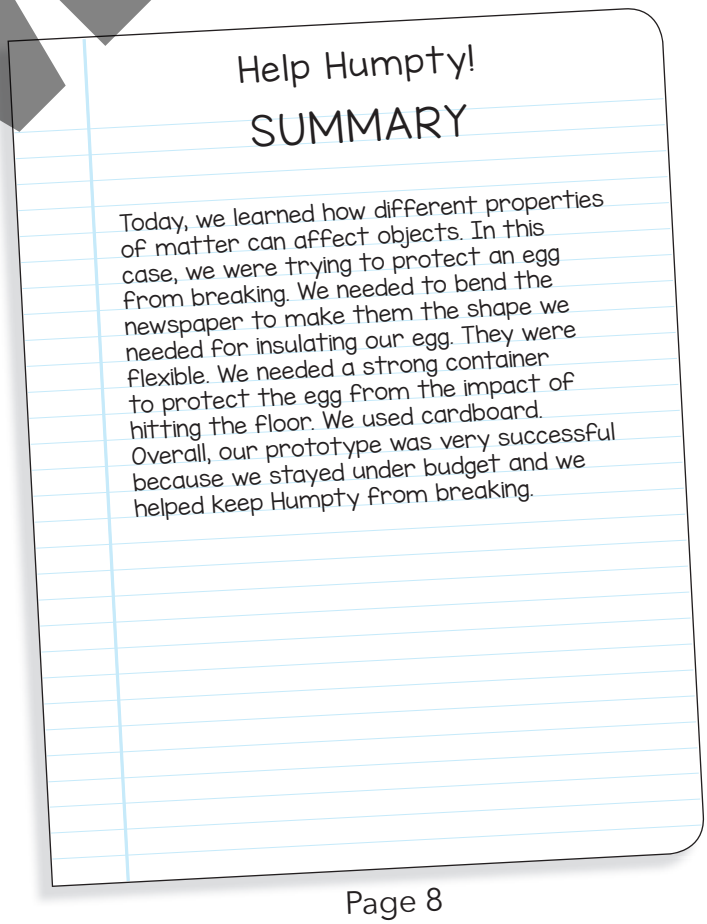


Page 6

Page 7

Pages 6–8 Engineering Task, Test Trial, Analyze, Redesign

- Students record analysis questions from the teacher and then record their answers. Or provide copies of the questions for students to glue into their notebooks.
- Record their reflections on the components of the prototypes that were successful and those that were not.
- Include additional pages as needed to allow students to record any notes, observations, and ideas as they construct and test their team prototype.



Page 8

SAMPLE

BURIED TREASURE

STEAM

1-2 HOURS
TIME FOR COMPLETION

DESIGN CHALLENGE PURPOSE

Create a treasure map that includes all the parts of a map as well as different landforms.

TEACHER DEVELOPMENT

This challenge asks students to create a model that includes landforms. **Models** are used when something is too large or too expensive for scientists to study. A **map** is a model that represents a real place.

A **physical map** includes features such as lakes, mountains, rivers, and forests. In order to meet the standards, teams will need to be specific and detailed when they create their treasure maps.

SAMPLE

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STUDENT DEVELOPMENT

Review the concepts of models, landforms, and the parts of a map (e.g., title, scale, compass rose, and key) to prepare for this challenge.

Lesson Idea: Play pictionary! In advance, prepare a set of cards for each group by writing the name of a different landform (e.g., *lake*, *river*, *forest*, or *mountain*) on each card. Place students into groups of four. Place the stack of cards facedown. Students will take turns choosing a card, not showing it to anyone, and drawing a picture of the landform to get his or her team members to correctly identify it. As an added challenge, set a timer and have teams try to correctly identify all the cards in the pile before time runs out.

STANDARDS

SCIENCE	TECHNOLOGY	ENGINEERING	ARTS	MATH	ELA
2-ESS2-2		K-2-ETS1-1	Creating #1		CCSS.ELA-LITERACY.W.2.3
		K-2-ETS1-2	Creating #2		
		K-2-ETS1-3	Creating #3		

SCIENCE & ENGINEERING PRACTICES

Developing and Using Models: Develop a model to represent patterns in the natural world.

SAMPLE

CROSSCUTTING CONCEPTS

Patterns: Patterns in the natural world can be observed.

Stability and Change: Things may change slowly or rapidly.

TARGET VOCABULARY

compass rose
key (on map)
landform
map
model
physical map
scale (on map)
title (on map)

MATERIALS

- white paper
- sticky notes
- colored pencils
- rulers
- markers
- gold coins
- brown paper bag cut apart or brown craft paper
- various maps for reference

Note: Make this mission more challenging by providing several reference maps of different areas. Make it less challenging by giving the same reference map to each team.

LITERACY CONNECTIONS

How I Became a Pirate
by Melinda Long

SAMPLE

NOTES

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