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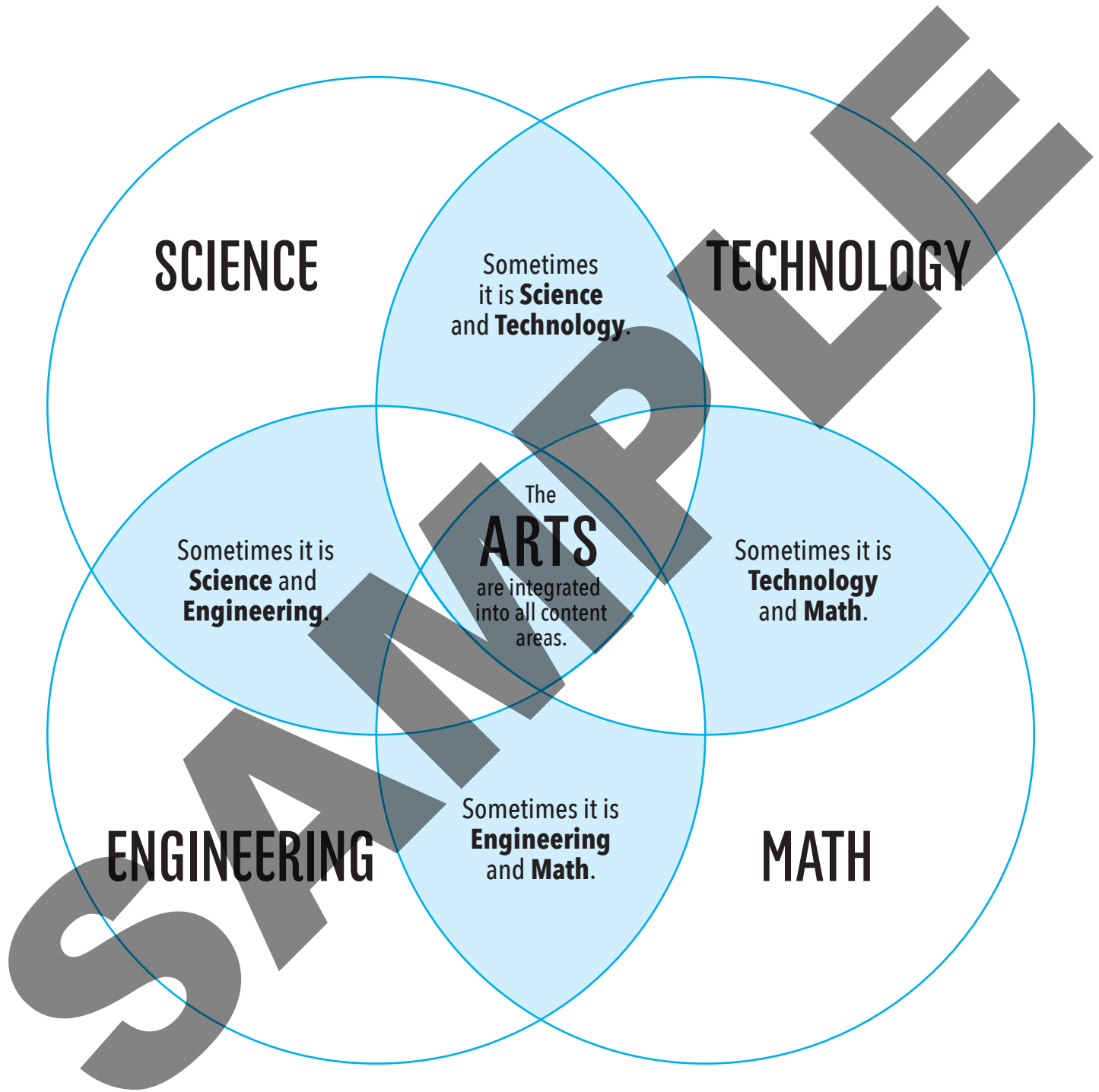
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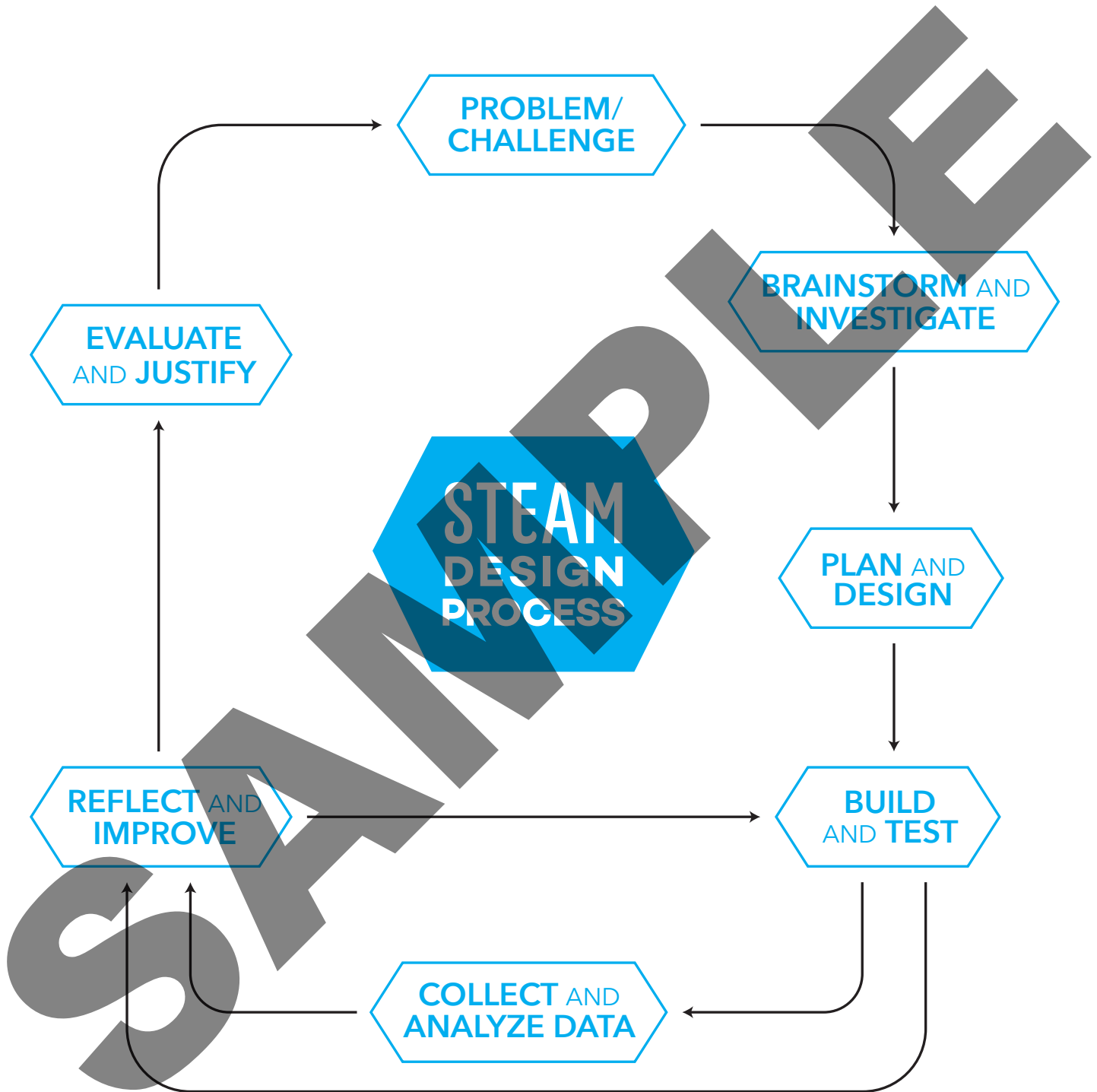
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INTEGRATION IN THE ENGINEERING DESIGN CHALLENGE



Sometimes it is all five!

STEAM DESIGN PROCESS





RECORDING INFORMATION IN A SCIENCE NOTEBOOK

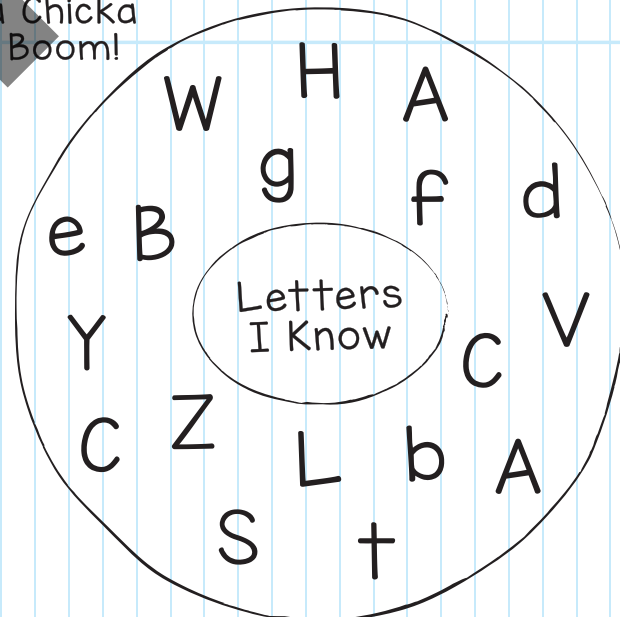
Students will record their thinking, answer questions, make observations, and sketch ideas as they work through each design challenge. It is recommended that teachers have students designate a section of their regular science notebooks to these STEAM challenges or have students create a separate STEAM 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




- Teachers may lead a brief whole-group discussion that focuses on students' background knowledge of the concepts covered in the challenge. Students can write letters, words, symbols, or sketches in their notebook to help direct their thinking during the group discussion. Or teachers can give students an activity worksheet to complete and then glue into their notebooks.

Chicka Chicka
Boom Boom!



Chicka Chicka Boom Boom!

VOCABULARY

engineer	A person who designs and builds machines or structures	
blueprint	A plan for building	
prototype	The first model of something	

Page 2

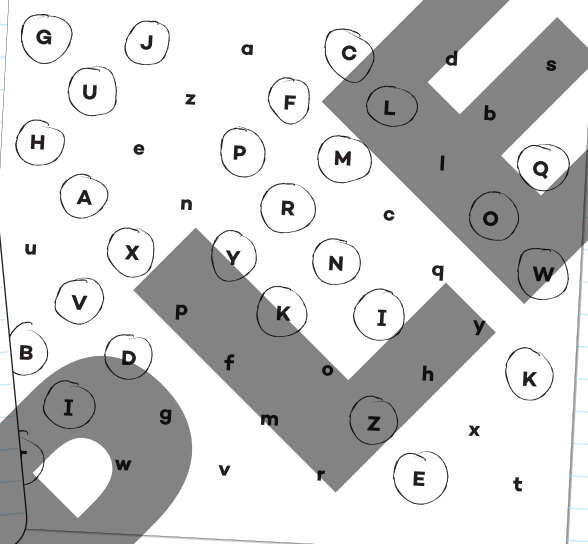
Chicka Chicka Boom Boom!

NOTES FROM THE TEACHER

Name: Fredrick

Find the Uppercase Letters

Directions: Circle all of the uppercase letters.



Page 3

- Students can cut out words and their definitions to match up by gluing the pieces into their notebooks. Teachers can also provide a sheet of definitions for students to cut out and glue into their notebooks and then write the word for each definition. Or make copies of the Vocabulary Sheet (page 146) and have students complete it and glue it into their notebooks.

Page 4 Dilemma and Mission

- Read the dilemma and mission aloud.
- Make copies of the dilemma and mission for students to glue into their notebooks to use as a reference.

Chicka Chicka Boom Boom!



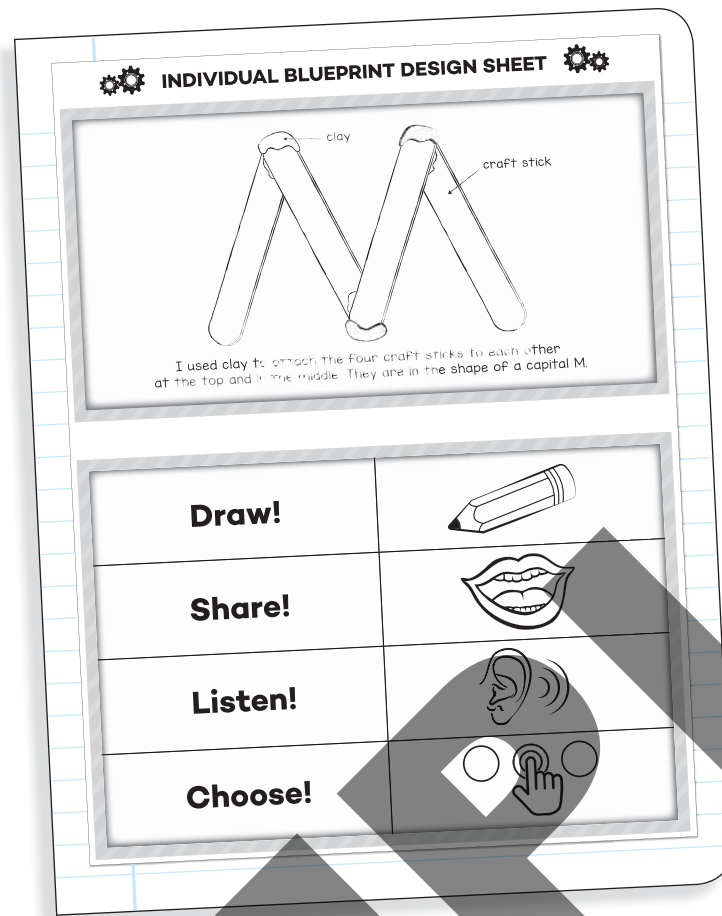
DILEMMA ENGAGE

The children of Chicka Chicka Boom Boom are on the move again! They are looking for some more letter and number friends who can help them climb to the top of the coconut trees quickly and safely. Those trees are tall, and the children need some strong, steady friends to help them reach the top. Can you build a letter or number friend that can stand on its own so the children can use it to climb to the top of the trees?

MISSION

Build a letter or number that will stand on its own. You must use two different materials.

Page 4



Page 5 Blueprint Design

- Students draw their own suggested designs. Then students verbally explain and describe their designs to other members of the team and to the teacher.
- Teachers may need to assist students in labeling their designs and in writing descriptions of how the students plan to construct their prototypes.
- Teachers can make copies of the Individual Blueprint Design Sheet for students to complete and glue into their notebooks.

Engineering Task, Test Trial, Analyze, Redesign

- Teachers can lead a whole-class discussion during which they discuss the reflection questions and students' overall understanding of the concepts covered in the challenge.
- Students can also verbally summarize what they did during the challenge and tell one thing they learned.

CHICKA CHICKA BOOM BOOM! **STEAM**

REFLECTIONS		EXPLAIN & ELABORATE
AFTER TEST TRIAL 1	Which letter or number stood the tallest? Which letters and numbers didn't fall over? Did certain parts of the letters or numbers help make it possible for them to stand?	
ANALYSIS	Which teams' prototypes stayed standing? What were the differences between the different prototypes?	
AFTER TEST TRIAL 2	Did your prototype stand on its own?	
ANALYSIS	Which letters and numbers stood on their own? Why do you think they were able to do this?	
AFTER TEST TRIAL 3	What changes did you make to your prototype and why? Was your letter or number more sturdy than before?	

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SAMPLE

BEAR IS LOST!



3 HOURS
TIME FOR COMPLETION

S T E A M



DESIGN CHALLENGE PURPOSE

Design a map of Bear's home and his surroundings.

TEACHER DEVELOPMENT

This particular science standard focuses on students using models to represent the relationship between the needs of different plants or animals and the places they live. Plants, animals,

and their surroundings make up a **habitat**. Plants and animals have **needs** such as water, sunlight, food, air, and shelter. Many plants and animals have adapted to their surroundings in order to survive.

STUDENT DEVELOPMENT

Before beginning this lesson, review vocabulary terms (*habitat, needs, hibernate, survive*) and then read the books listed in literacy connections in order to prompt discussion with students. Ask questions such as *Why do bears sleep so*

*much in winter? What is **hibernation**? What to animals need to do in order to prepare for hibernation? What happens when animals awake from hibernation? What are some things animals need in order to **survive**?*

STANDARDS

SCIENCE	TECHNOLOGY	ENGINEERING	ARTS	MATH	ELA
K-ESS3-1	ISTE.1	K-2-ETS1-1	Creating #1, #2, #3		CCSS.ELA-LITERACY.SL.K.1
		K-2-ETS1-2	Performing/ Presenting/ Producing #4, #5, #6		CCSS.ELA-LITERACY.W.K.3
			Responding #7, #8, #9		CCSS.ELA-LITERACY.W.K.6

SCIENCE & ENGINEERING PRACTICES

Developing and Using Models: Use a model to represent relationships in the natural world.

Obtaining, Evaluating, and Communicating Information: Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.

CROSSCUTTING CONCEPTS

Systems and System Models: Systems in the natural and designed world have parts that work together.

Interdependence of Science, Engineering, and Technology: People encounter questions about the natural world every day.



TARGET VOCABULARY

- habitat
- hibernate
- needs
- survive



MATERIALS

- poster board
- felt
- pipe cleaners
- construction paper
- newspapers
- magazines
- cotton balls
- paint
- markers
- cardboard
- yarn
- glue
- scissors



LITERACY CONNECTIONS

Bear Snores On
by Karma Wilson

Bear Feels Scared
by Karma Wilson

Hibernation Station
by Michelle Meadows

NOTES