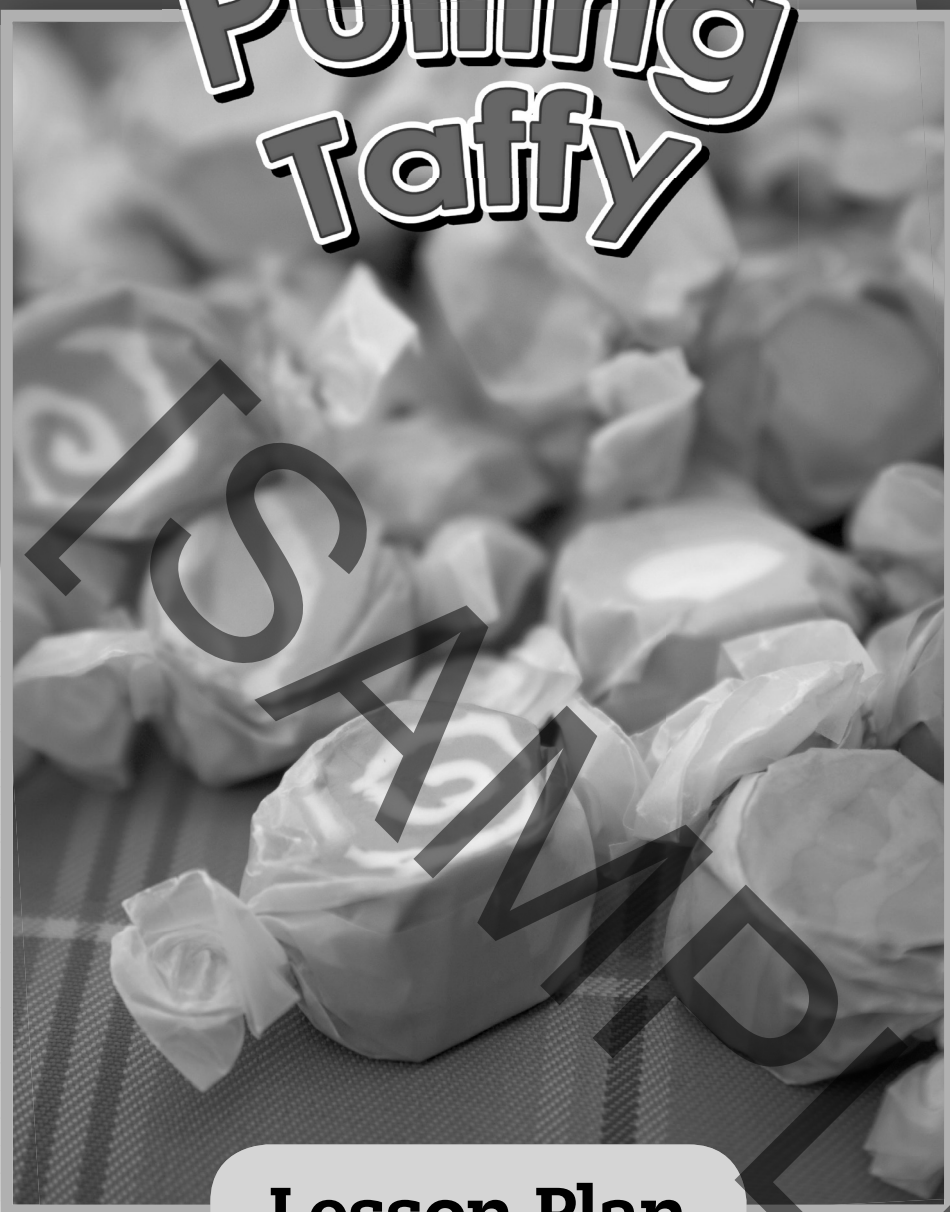
Pulling Taffy



Unit 4
Creative Solutions

Lesson Plan

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References to digital components are included for educators who purchased the full kit: *Smithsonian STEAM Readers: Grade K.* Please disregard digital component references if this lesson was purchased in a different product configuration.

Answer Key: *Pulling Taffy*

page 10—Words and Pictures

1. The words tell more about the photo.
2. The photo tells more about the words.
3. The words tell more about the photo.
4. The words tell more about the photo.

page 11—The Best Flavor

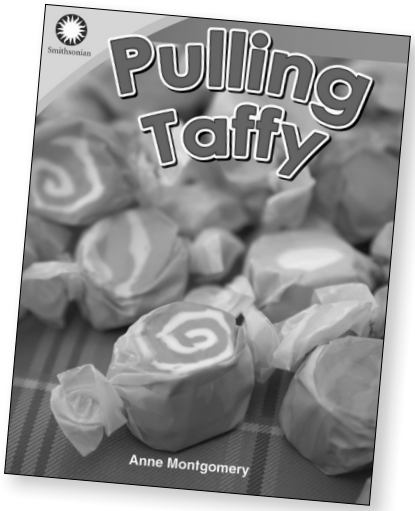
Students should color the candy picture at the top of the page. They should write their opinions about their favorite flavors.

page 17—*Pulling Taffy* Quiz

1. B
2. C
3. The taffy is wrapped in a wrapper.

Pulling Taffy

Materials



- *Pulling Taffy* books
- copies of student activity sheets (pages 9–19)
- three small paper squares per student
- **STEAM Challenge materials include but are not limited to the following:**
  - ✓ putty recipe: Combine one part each white glue, cornstarch, and baking soda. Mix with several drops saline solution.
  - ✓ bowls (paper or plastic)
  - ✓ spoons

Learning Objective

- **Reading:** With prompting and support, describe the relationship between illustrations and the text in which they appear.
- **Writing:** Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or name of the book they are writing about and state an opinion or preference about the topic or book.
- **Speaking and Listening:** Participate in collaborative conversations with diverse partners about grade appropriate topics and texts with peers and adults in small and larger groups.
- **Engineering:** Define an engineering problem, design and evaluate solutions, and optimize a design based on test results.

Phenomena

Matter can be pulled.

Lesson Timeline

Day 1	Day 2	Day 3	Day 4	Days 5–10
Introductory and **Before Reading Activities** (page 4)	**During Reading Activities** (page 5)		**After Reading Activities** (page 5)	**STEAM Challenge** and **Assessments** (pages 6–8)
Define the STEAM Challenge and think about the relationship between the text and the images.	Research taffy, find the relationship between the text and the images, and brainstorm design solutions.		Write about favorite taffy flavors.	Make a recipe; create a method; and test, improve, reflect on, and share taffy pulling techniques. Complete the assessments.

Pulling Taffy (cont.)

STEAM Vocabulary

cuts	rolls
folds	wraps

Introductory Activity

Define the Problem

1. Ask students to name their favorite candies.
   - Display the cover of *Pulling Taffy*, and ask students to describe what they see. Explain that taffy is a kind of soft candy. Ask students to share any experiences they have had with taffy. If possible, bring taffy for students to taste. Discuss the taste and texture of taffy.
   - Tell students they are going to learn about how taffy is made.
2. Distribute the *Pulling Taffy* books to students. Reveal the STEAM Challenge by reading aloud to students pages 18–19 of the book.
   - Display the Interactiv-eBook for a more digitally enhanced introduction to the challenge.
3. Distribute *Make a Plan* (page 9) to students. Read the STEAM Challenge summary aloud to students. Have each student complete the summary by tracing the words.

   Note: You may wish to distribute all student activity sheets as one packet. They will be used throughout the STEAM Challenge.

Before Reading

1. Write the vocabulary words on the board, and define each word.
2. Distribute three small squares of paper to each student. Say a vocabulary word, and have each student use one of their papers to demonstrate the action denoted by the word. For example, if you say the word *cut*, students should cut their papers. Discuss the effect on the paper.
3. Remind students that the author writes words to help us understand the topic, and images are also carefully chosen to help us understand the topic. Tell students that as they read the book, they will look at how the images help them understand the text.

Pulling Taffy (cont.)

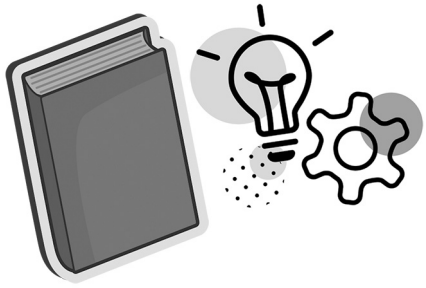
During Reading

Research and Brainstorm

1. Distribute the *Pulling Taffy* books to students. Read aloud the title, and discuss the cover photo. Then, ask students: *How does the photo help you understand the title? How does the title help you understand the photo?* Discuss the idea that the photo puts a picture in your head to make you think of taffy and understand what it is.
2. Read the book aloud to students as they follow along in their own books. Encourage them to point to the words with their fingers.
   - Reread the text again, encouraging students to read along.
   - Display the Interactiv-eBook for a more digitally enhanced reading experience. You may wish to have students annotate the PDFs as you read.
   - Play the audio recording as students follow along to serve as a model of fluent reading in small groups or at a listening station. The recording will help **English language learners** practice fluency and aid in comprehension.
3. Reread the book with students. Encourage them to read words they know. Stop at each page to discuss how the text and photographs work together.
4. Distribute *Words and Pictures* (page 10) to students. Discuss each set of words and photographs to identify how they work together. Ask students: *How do the words and photographs on the page help you understand more about taffy?*
5. Lead students with guiding thoughts and questions as they discuss the STEAM Challenge: *What does it mean to pull something? What does it mean to fold something?* Then, have students record ideas on their *Make a Plan* activity sheets.

After Reading

1. Review the meanings of the vocabulary words. Place students into groups, and assign each group a word. Have groups create dances to show the meanings of their words. Allow time for groups to create and rehearse their dances. Then, have groups share their dances. See if students can guess the words based on the dances.
2. Have students name flavors of taffy. Write the flavors on the board. If students are not familiar with flavors specific to taffy, ask them to name flavors of candy (most should work). Ask students to imagine that a taffy candy factory is going to make a lot of taffy. They want to know which flavors to make.
3. Distribute *The Best Flavor* (page 11) to students. Have students draw and write about their favorite taffy flavors. Students can get ideas from the flavors named and written on the board, or they can create their own new flavors. If needed, provide support for students by writing sentence frames on the board (e.g., *I like the flavor _____. My favorite flavor is _____.*)



Pulling Taffy (cont.)

Prep

- Prepare all materials for the STEAM Challenge.
- You may choose to invite volunteers to help monitor and facilitate group work if you are doing the STEAM Challenge with multiple groups at once.
- Review all designs prior to building.

STEAM Challenge

Design and Build

1. Discuss the following questions to guide student thinking with the STEAM Challenge:
   - *What can happen if you pull something too hard or too far?* Have students draw on prior experience to share times things broke when they were pulled too hard or too far. Help students identify that some things can stretch a little and some things cannot. Ask students to identify whether or not taffy can be stretched.
   - *How does the machine fold the taffy?* Return to the photographs on pages 7 and 11. Discuss how far the taffy is pulled in each photograph. Have students identify the arms of the machine on page 11. *Do you think that putty will pull the same as taffy? Why or why not?*
2. Distribute previously completed activity sheets. Review the STEAM Challenge on pages 18–19 together. Create an anchor chart of names and drawings of the materials for students to refer to when recording their designs. Encourage students to preview all the materials available.
3. Ask students to independently sketch and label their designs on their *Make a Plan* activity sheets.
4. Organize students into teams of two or more. Distribute one copy of *Team Plans* (page 12) to each team. Ask teams to have members share their plans. Then, have each team choose, sketch, and label a team plan.
   - **Challenge** students by adding goals (e.g., experiment with different amounts of the ingredients to make the pulling putty a different consistency, or require a specific tool or utensil to be used as part of the pulling method).
5. Explain to students that when experimenting with their methods, they must follow their design plans. Reassure them they will have an opportunity to change and improve their design plans after they present them. Review classroom expectations for working with materials. Then, give teams time to make the recipe and experiment with taffy pulling techniques.
   - Digitally record students' processes to share at a later date with students and parents.
6. Distribute *Think about It* (page 13) to students. Explain that reflection is an important part of the engineering design process. Read aloud numbers 1 and 2 on the activity sheet, and have students mark their responses. Ask volunteers to share.

Pulling Taffy (cont.)

Prep

- Prepare all materials for the STEAM Challenge.
- Review all designs before teams begin improvements.

STEAM Challenge

Test and Improve

1. Discuss the following questions to guide student thinking with the STEAM Challenge:
   - *How can you tell how far something can be pulled without breaking?* Guide students to understand that they will need to test items to find out. Identify ways to test. For example, students can begin by stretching the item just a little at first and then gradually stretching further and further until they reach a breaking point. Or, students can try the opposite and begin by stretching something far and then determining if it can be stretched farther or if it should not be stretched as far.
   - *What are different ways to pull something?* Return to the photographs on pages 5, 7, and 11 to identify the ways taffy is pulled in the book. Discuss with students how the arms of the machine rotate in opposite directions to pull the taffy. Have students move their arms and hands in this way. Discuss other ways or directions things can be pulled.
2. Gather teams for testing. Explain that teams will offer feedback after the test. Use *Friendly Feedback* (page 14) to review best practices for giving feedback.
3. Distribute *Pulling Taffy Test Results* (page 15) to students, and ask them to record results for each team.
4. Have one team at a time share the method they created to pull the putty without it breaking. Have the team explain and demonstrate their method. Allow each team time to present.
5. Provide time for teams to brainstorm ways to improve their designs based on test results and feedback. Refer students back to their *Team Plans* activity sheets. Ask them to sketch their improved design plans and explain any changes.
   - **Challenge** successful teams with additional goals for the second method (e.g., experiment with different amounts of the ingredients to make the pulling putty a different consistency, or require a specific tool or utensil to be used as part of the pulling method).
6. Have teams gather materials to improve their designs. Then, have them make their improvements and retest their pulling methods. (**Note:** If students will be observing, recording, and offering feedback for the retest, provide extra *Pulling Taffy Test Results* sheets for students.)
7. Have students complete numbers 3 and 4 on their *Think about It* activity sheets.

Pulling Taffy (cont.)

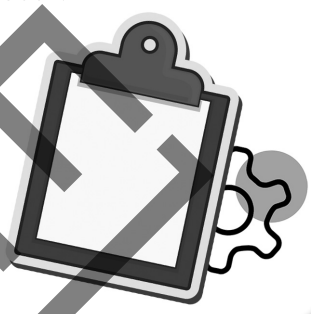
STEAM Challenge

Reflect and Share

1. Discuss the STEAM Challenge with students. Have them share their responses to numbers 1–4 on their *Think about It* activity sheets. Guide the discussion by prompting students with the following questions: *How did your team create a plan? Did your plan work? How did you make it better? Did you get ideas from other teams? How did you use those ideas? Did your second plan work better or worse than the first plan?*
2. Have students complete numbers 5 and 6 on their *Think about It* activity sheets.
3. Distribute *Engineering Design Process* (page 16) to students, and review how they used each step to complete the challenge. Use the statements on *Engineering Design Process Reflection* (page 19) to help students think about the steps.
   - Ask students to circle the steps that were the most challenging for their teams.
   - Have students color their favorite parts of the process.
4. Ask students: *Why do you think people invented the taffy pulling machine?* Guide students to understand that the machine was made so people did not have to pull the taffy by hand anymore. Ask students to brainstorm other machines that have been invented to help people do work.
   - Explain to students that each time a machine like this is made, someone has to design what the machine will look like and determine how it will work. Explain that scientists and designers look at the things around them and try to find ways to improve them.

Assessment Activities

1. Have students complete a short posttest, *Pulling Taffy Quiz* (page 17), to assess this lesson's reading objective. Read the questions on the posttest aloud for students.
   - Students may use the Interactiv-eBook activities in the Digital Resources for assessment purposes (optional).
2. Guide students to complete *Teamwork Rubric* (page 18) to reflect on and evaluate their work and collaboration skills.
3. Have students verbally answer the Think and Do questions from the book.

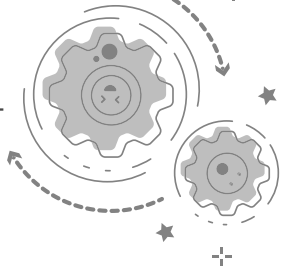


Do you want to make candy?

"I study the history of food and snacks. That means candy too! Did you know the first candies were medicines? I learned that the first candy was given to people who felt sick. Studying history is just one way to learn about candy and how it was made long ago."
— Ashley Young, National Museum of American History

Read this career advice aloud to students. Read the author's name and job title. Discuss the advice, and encourage students to think about what they could do at school and at home to prepare for this type of career.

Name: _____ Date: _____



Make a Plan

Directions: Write the challenge. Brainstorm ideas. Sketch a plan.

Challenge: Create a good way to pull taffy.

My Thoughts

My Plan

Name: _____ Date: _____

Words and Pictures

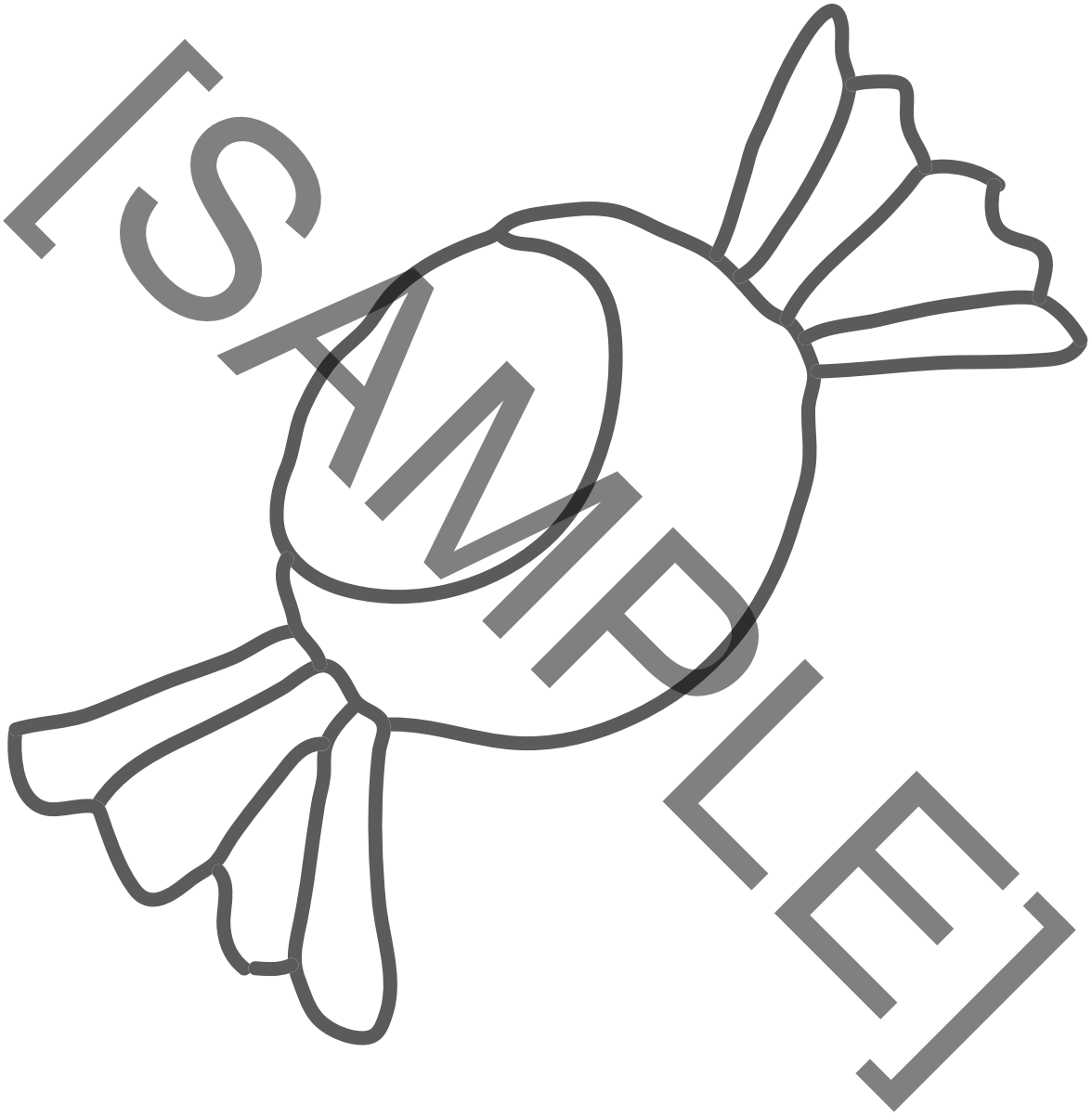
Directions: Read the words. Look at the photos. Talk about the choices. Circle the correct choices.

Words	Photos	Choices
They loved to watch it being made.		The photo tells more about the words. The words tell more about the photo.
Taffy is made with these foods.		The photo tells more about the words. The words tell more about the photo.
This machine folds the taffy.		The photo tells more about the words. The words tell more about the photo.
This machine cuts the taffy.		The photo tells more about the words. The words tell more about the photo.

Name: _____ Date: _____

The Best Flavor

Directions: Draw and write about a taffy flavor that you would like.



Team Members: _____

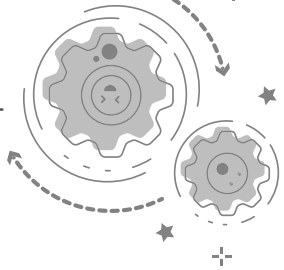
Team Plans

Directions: Sketch **Plan 1**. Sketch **Plan 2**.

Plan 1

Plan 2

Name: _____ Date: _____



Think about It

Directions: Check *yes* or *no*. Circle the words. Fill in the blanks.

1. My team listened to each other. ❑ yes ❑ no

2. I added my ideas to the design. ❑ yes ❑ no

3. Our first plan (worked/did not work) because

_____

_____

_____

_____

_____.

4. Our second plan was (better/worse).

5. I learned

_____

_____

_____.

6. It was hard when

_____

_____

_____.

Name: _____ Date: _____

Friendly Feedback

Directions: Ask questions. Give ideas. Use these sentences to get started.

Clarify

How did you _____

_____?

Warm Feedback

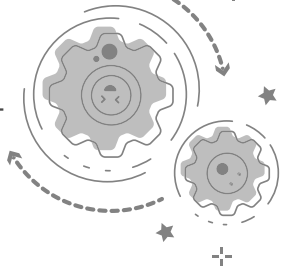
I like _____ because _____.

Cool Feedback

You might want to try _____

_____ .

Name: _____ Date: _____



Pulling Taffy Test Results

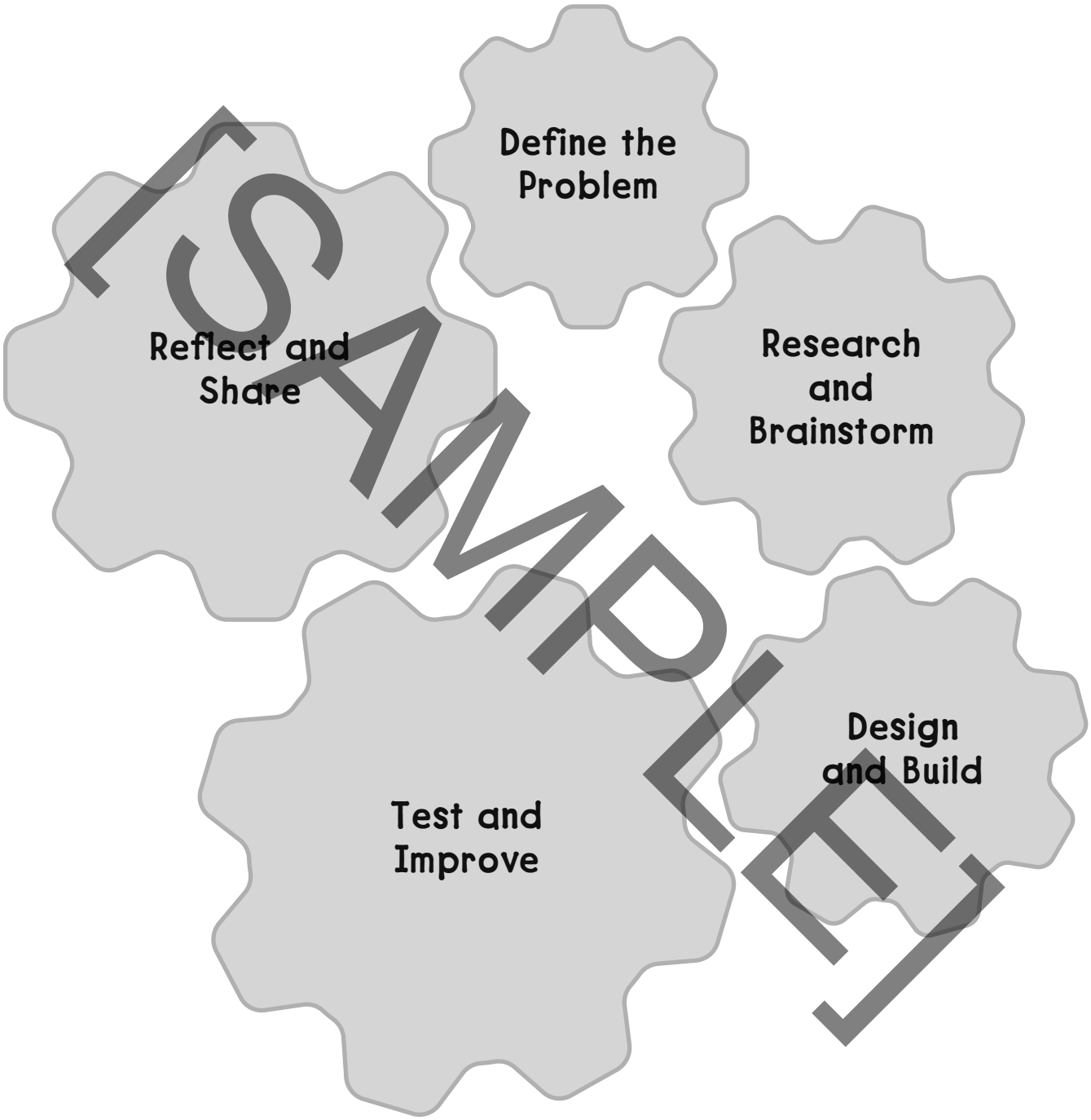
Directions: Mark the chart for the pulling taffy test. Circle *yes* or *no*.

Team	Can the taffy stretch without breaking?	
1	yes	no
2	yes	no
3	yes	no
4	yes	no

Draw the pulling taffy method that was the best.

Name: _____ Date: _____

Engineering Design Process



Name: _____ Date: _____

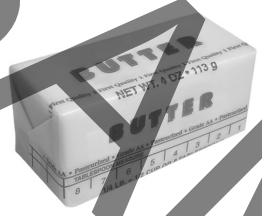
Pulling Taffy Quiz

Directions: Listen to your teacher. Answer the questions. Show what you know.

1. What is in taffy?

Ⓐ milk

Ⓑ butter



Ⓒ eggs

2. What does the machine do?

Ⓐ spins the taffy

Ⓑ turns the taffy

Ⓒ mixes air in the taffy

3. How is taffy packaged?

Name: _____ Date: _____

Teamwork Rubric

Directions: Think about your team. Circle the faces to show what you did. Write about how you helped.

= Always = Often = Sometimes

I listened to people on my team.			
I helped people on my team.			
I shared ideas with people on my team.			
We made choices as a team.			

I helped my team when I _____

_____

_____

_____.

Name: _____ Date: _____

Engineering Design Process Reflection

Directions: Read the list. Check the boxes to show what you did.

Define the Problem

❑ I understood the problem or task.

Research and Brainstorm

❑ I researched and brainstormed ideas.

Design and Build

❑ I designed and built models.

Test and Improve

❑ I tested and improved models.

Reflect and Share

❑ I reflected on and shared my work.

STEAM CHALLENGE

The Problem

Taffy should stretch without breaking. What is the best way to pull taffy so it doesn't break?

The Goals

- Make some putty.
- Roll, pull, and stretch your putty.
- It should stretch without breaking.

1 Research and Brainstorm

Learn about taffy.

2 Design and Build

Plan how you will roll or pull your putty. Make the putty!

3 Test and Improve

Roll or pull your putty. Then, try to stretch it more.

4 Reflect and Share

What did you learn?