

# Silly Straw Challenge

Dear Family,

Your child has been engaged with a team of other students in solving an engineering problem. The team designed a display stand for silly-shaped straws that would fit on a small food cart. Acting like engineers, they...

- identified and learned about a problem
- planned ways to solve the problem
- made and tested a prototype
- reflected on the results and made a new plan

In this exploration, children learned about properties of matter and engineering design and solved word problems involving measurement. They also practiced skills, such as developing and using models, making claims based on evidence, and communicating technical information.

Let your child tell you what his or her team did in this engineering effort. Prompt your child if he or she needs help.

- What was the problem you were solving?
- What were the criteria (goals or conditions) that your prototype had to meet?
- What constraints (limits) to cost and materials did you have to work with?
- How did you determine the properties of the building materials you used?
- How did you measure the success of your prototype?

This challenge included a communication component. Teams wrote step-by-step instructions and made diagrams that would enable a cart worker to build the display stand within 15 minutes. Ask your child about the experience.

- Were your team's instructions clear? How do you know?
- How did the prototype you got back compare to the one your team built?

On the back of this sheet, work with your child to extend the design challenge.

## Silly Straw Challenge

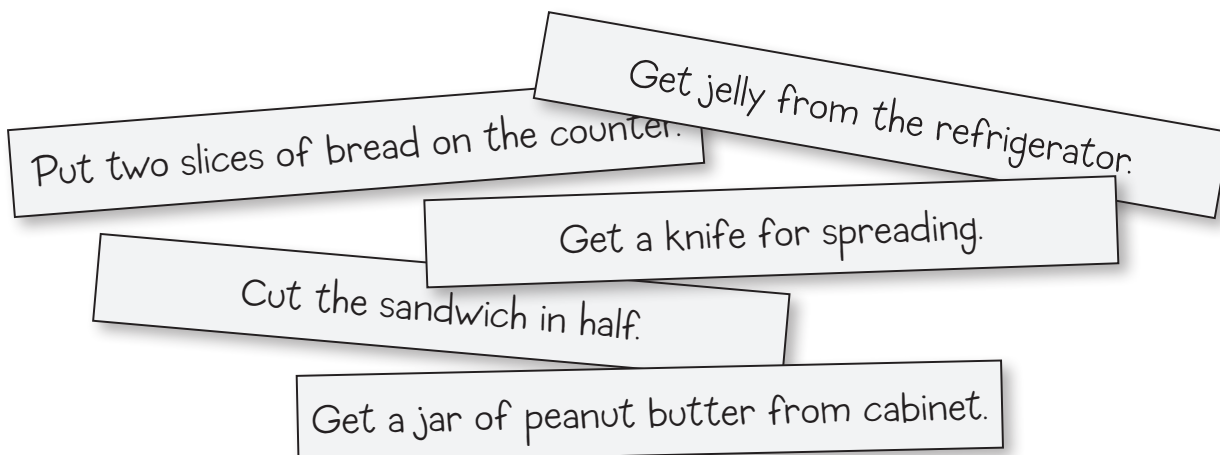
On your next visit to a convenience store, craft store, or grocery, talk with your child about the displays located near the cash register. Or, do an Internet search of “point-of-purchase display counter” to find images. Talk about how counter displays are like and different from other displays in stores. Prompt your child, if needed.

- What problem might this company be trying to solve?
- What do you think the criteria might be for this display?
- What might be some of the constraints?
- How successful do you think the solution is?

If possible, take photographs of a small display stand from various perspectives. Then have your child use the photos to identify the materials used to build it and tell you the steps necessary for assembly instructions.

### Try it!

1. Disassemble a simple product package, such as a cereal box, a shoebox, or game packaging. Alternately, identify a process, such as making a peanut butter and jelly sandwich or taking out the trash.
2. Write step-by-step instructions for the package’s reassembly or carrying out the process. Write each step on a separate strip of paper.
3. Have your child determine the best sequence of steps. Encourage the addition of more steps to make the instructions clearer. Ask why the steps were sequenced as they were.



# Cost of Materials

Name \_\_\_\_\_

Material	Quantity	Cost per Item
Aluminum foil	1 sheet	25¢
Craft sticks	1 stick	10¢
Felt	1 sheet	60¢
Index cards	1 card	50¢

Material	Quantity	Cost per Item
Masking tape	1 piece	35¢
Pipe cleaners	1 pipe cleaner	15¢
Straws	1 straw	25¢
String	1 piece	25¢

## Complete the chart.

1. **List** the Materials you will need to build your display stand. Write the amount, or quantity, of each material in the Quantity column.
2. Find the Cost per Item of each Material. Write it in the Cost per Item column.

## Does your plan meet the \$2.50 cost constraint?

3. **Calculate** To find the Total Cost for each material, multiply the Quantity by the Cost per Item.
4. **Calculate** To find the Total Cost of the Display Stand, add the total cost for all the materials.

Material	Quantity	Cost per Item	Total Cost of Material
<i>Example: Felt</i>	<i>2</i>	<i>60¢</i>	<i>\$1.20</i>
<b>Total Cost of the Display Stand</b>			

# Display Stand Tests

Name \_\_\_\_\_

## Follow these steps.

1. Circle one:      Prototype      Display Stand Built from Assembly Kit

2. **Measure** Place the display stand on the Tester Rectangle. Does it fit within the rectangle?

\_\_\_\_\_

3. **Measure** Use a ruler to measure your display stand.

Length \_\_\_\_\_ inches

Width \_\_\_\_\_ inches

Height \_\_\_\_\_ inches

**TESTER RECTANGLE**

4. **Observe** Place 4 Silly Straws in the display stand. How well does the stand hold them?

\_\_\_\_\_

5. **Observe** Place the display stand and straws on a large book. Gently shake the book. Record your observations.

\_\_\_\_\_

6. **Analyze** Will the display stand fit on a Frothy Fruit cart? Explain why or why not.

\_\_\_\_\_

7. **Analyze** Does the display stand meet the criteria of the problem? Explain.

\_\_\_\_\_

\_\_\_\_\_

## Display Stand Diagrams

Name \_\_\_\_\_

**Draw diagrams, or pictures, of your prototype. Use separate sheets for the front, side, and top. Label all the materials. Include measurements of the different parts.**

Circle One:

Front

Side

Top

[illegible]

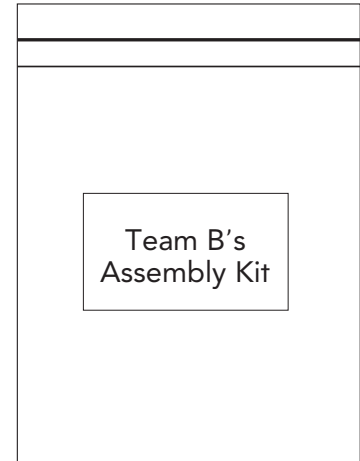
# Build from a Kit

Name \_\_\_\_\_

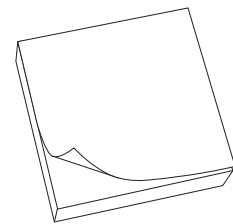
**Use the Assembly Kit made by another team to build a display stand.**

1. Examine the materials in another team's Assembly Kit. Read the list of materials. Do you have all the materials you need? If not, get what you need from your teacher.
2. Study the diagrams. Read the step-by-step directions. Decide how to divide the work among your team members.
3. You will have 15 minutes to build a display stand according to the instructions in the Assembly Kit. Your teacher will signal you to start and to stop.
4. Answer the questions on the **Assembly Kit Feedback** page.
5. Do not write on the other team's instructions. Instead, write suggestions for improving their instructions on sticky notes. Attach your suggestions to their instructions.

## What You Use



**Another Team's Assembly Kit**



**Sticky notes**

Assembly Kit Feedback	
Team that Made the Assembly Kit _____	
<b>Use the materials and instructions in the Assembly Kit to build a display stand. Do not write on the instructions in the Assembly Kit.</b>	
1. Was the list of materials in the Assembly Kit complete and accurate? Explain. _____	
2. Did the kit include all of the materials? If not, what was missing? _____	
3. Were the diagrams easy to understand? Circle one: Very easy    Somewhat easy    Somewhat difficult    Very difficult	
4. What was good about the diagrams? _____	
5. How could the diagrams be improved? _____	
6. Were the step-by-step directions easy to follow? Circle one: Very easy    Somewhat easy    Somewhat difficult    Very difficult	
7. What was good about the step-by-step directions? _____	
8. How could the step-by-step directions be improved? _____	
9. Write other suggestions on sticky notes and attach them to the list of materials, diagrams, or step-by-step directions.	

**Assembly Kit Feedback**

# Assembly Kit Feedback

Team that Made the Assembly Kit \_\_\_\_\_

**Use the materials and instructions in the Assembly Kit to build a display stand. *Do not write on the instructions in the Assembly Kit.***

1. Was the list of materials in the Assembly Kit complete and accurate? Explain. \_\_\_\_\_  
\_\_\_\_\_
2. Did the kit include all of the materials? If not, what was missing? \_\_\_\_\_  
\_\_\_\_\_
3. Were the diagrams easy to understand? Circle one:  
Very easy      Somewhat easy      Somewhat difficult      Very difficult
4. What was good about the diagrams? \_\_\_\_\_  
\_\_\_\_\_
5. How could the diagrams be improved? \_\_\_\_\_  
\_\_\_\_\_
6. Were the step-by-step directions easy to follow? Circle one:  
Very easy      Somewhat easy      Somewhat difficult      Very difficult
7. What was good about the step-by-step directions? \_\_\_\_\_  
\_\_\_\_\_
8. How could the step-by-step directions be improved? \_\_\_\_\_  
\_\_\_\_\_
9. Write other suggestions on sticky notes and attach them to the list of materials, diagrams, or step-by-step directions.