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UPLANDS | PROUD PARTNER

Grade 6-8 STEM Challenge

# Can You Draw It?

Inspired by Sarah, a Production Technician in the  
Indiana Uplands.



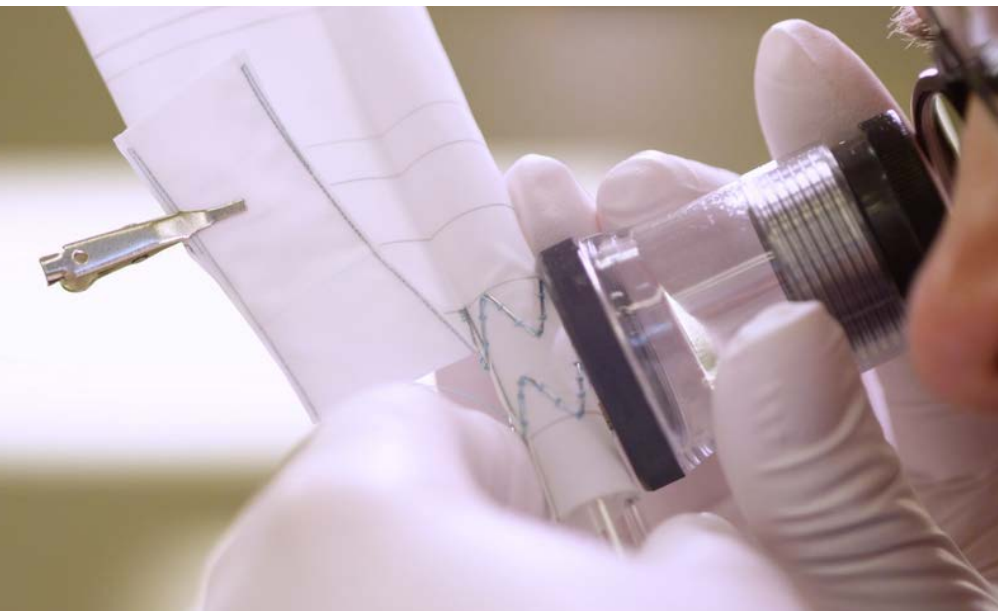
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## GRADE 6-8 STEM CHALLENGE

# Can You Draw It?

Inspired by Sarah, a Production Technician in the Indiana Uplands.

Students will learn about how instructions and processes are streamlined to create a consistent product.



## LESSON TIMELINE

- DAY 1**
- Show the inspiration video, "[Sarah - Team Assembler Trainer](#)" (5 minutes)
  - Introduce the challenge (5 minutes)
  - Free draw and instructed draw rounds (30 minutes)
  - Group time to plan drawings and instructions.

- DAY 2**
- Regroup, finish instructions (15 minutes)
  - Trade and try other groups' instructions
  - Discussion and debrief (10 minutes)

## Recommended Supplies

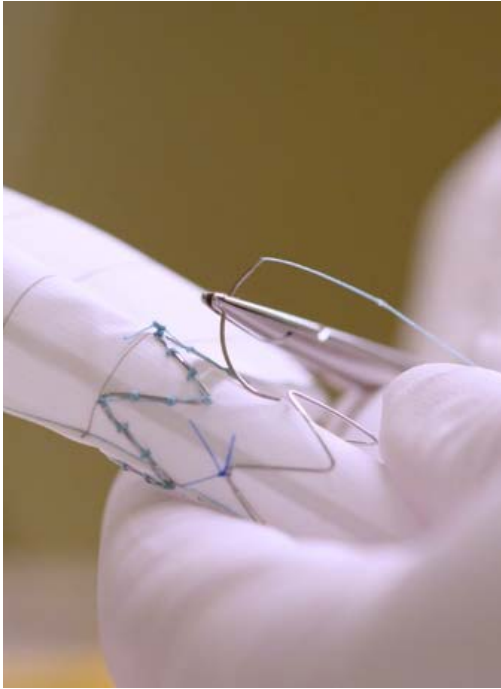
For each student:

- Blank sheets of 8.5" by 11" paper
- 3x3 Grid sheets (at end of packet)
- Markers
- Stopwatch

## CAREER CONNECTION AND LESSON OVERVIEW

Sarah is a production technician and assembler for COOK Medical in Bloomington, Indiana. Sarah hand-makes stents for patients who have a potentially life-threatening weakening of large arteries. She also trains the next generation of production technicians, teaching them how to carefully stitch and assemble these life-saving devices. COOK depends on production technicians like Sarah to ensure that the products they manufacture are free of defects and safe for use in people.

It's important that every piece of medical equipment that COOK Medical manufactures is made exactly the same way, even if it's assembled by different people. In this activity, students explore what it means to have a standardized process and practice creating instructions for others to follow.



## IN THIS CHALLENGE, STUDENTS WILL:

- Attempt to create a drawing of a fish given different levels of instruction.
  - Work as a group to create their own sets of instructions to draw something. They will then trade with another group and see how good their instructions were.
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## Standards

### Science & Engineering Process Standards

SEPS.1 Posing Questions (for science) and defining problems (for engineering)

SEPS.2 Developing and using models and tools

SEPS.4 Analyzing and interpreting data

SEPS.6 Constructing explanations (for science) and designing solutions (for engineering)

SEPS.8- Obtaining, evaluating, and communicating information

### Grade 6-8 Employability Skills

6-8.M.1 Apply new strategies based on lessons learned from feedback.

6-8.WE.4 Understand failure as an opportunity for growth.

6-8.LS.5 Understand how effective work habits and personal characteristics demonstrated in school transfer to occupational settings.

### Preparing for College and Careers

PCC-2.1 Determine roles, functions, education, and training requirements of various career options within one or more career clusters and pathways

PCC-2.2 Analyze career trends, options and opportunities for employment and entrepreneurial endeavors for selected career clusters and pathways

PCC-2.3 Evaluate selected careers and pathways for education requirements, working conditions, benefits, and opportunities for growth and change

PCC-2.4 Use appropriate technology and resources to research and organize information about careers

# Planning and Implementation

## CAN YOU DRAW IT?

### Essential Vocabulary

- **STANDARDIZED WORK:** a way of doing work in which the sequence of tasks has been efficiently organized and is done the same way each time, regardless of who does the work.
- **VARIABILITY:** lack of consistency or fixed quality.

### In this challenge, students will:

- Attempt to draw a fish given different levels of instruction.
- Work as a group to create their own sets of instructions to draw something. They will then trade with another group and see how good their instructions were.

### Before Class:

- Read the activity outline sheet and leader notes to become familiar with the activity.
- Gather necessary materials. A stack of blank printer paper will be helpful here as well as lined notebook paper for writing up their instructions.

### Guiding Questions

1. Why might it be important for products to all be identical?
2. How do companies ensure that every product they make is the same?
3. How could we standardize processes to make sure we're all drawing the same thing?

### Introduction

Show students Sarah's career shadow video, found at <http://www.regionalopportunityinc.org/sarah/>. Sarah is a production technician and trainer at COOK Medical. Her part of COOK manufactures the AAA stent, which is a piece of medical equipment used to repair weakened blood vessels and keep them from breaking. She is so good at making these devices that she is also responsible for training new employees on how to create them as well.

Because these small devices are implanted into real people, it is critically important that all of the parts be identical and assembled in the exact same way. This means there are specific protocols and instructions for how to make these complex devices.

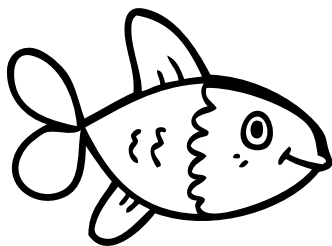
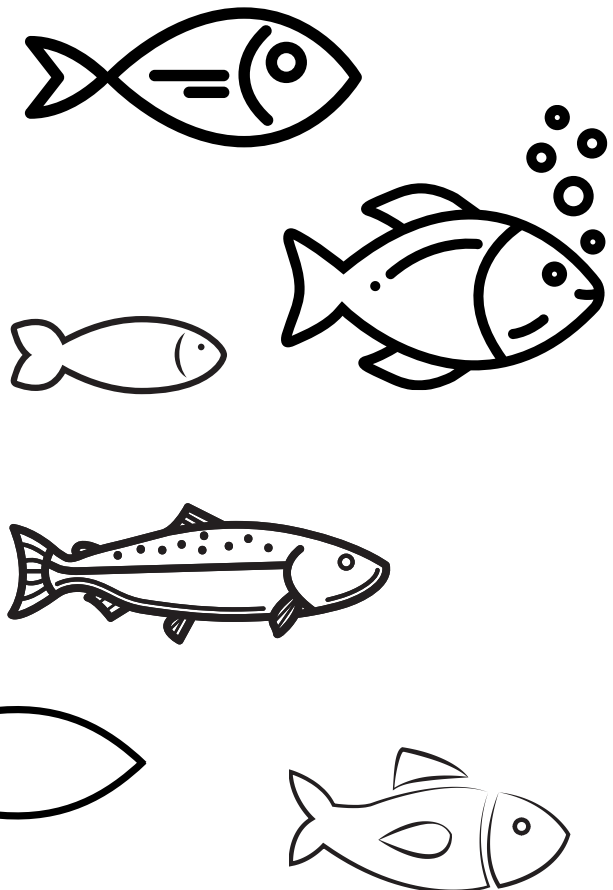
In this activity, students will be given a general challenge (“draw a fish”) and think through how to ensure that everyone in the class can draw the fish that the client (the teacher) wants. The fish drawing needs to be consistent, even when drawn by different students or even a different classroom of students. In manufacturing, this is called standardized work. As designs are refined and improved over time, it’s important to document what works best, not only in the design itself but in the process of creating it. Here, students are exploring how processes evolve and how to write clear instructions for others to follow.

## The Activity

### Part 1: Set up the challenge

Tell students that you are a customer and you would like some number of pictures of fish (usually however many students are in the class.) Provide each student with a sheet of blank paper. Ask students to draw a fish and give them 1 minute to complete their drawings. Do not provide any additional information and don’t let them discuss their art with each other.

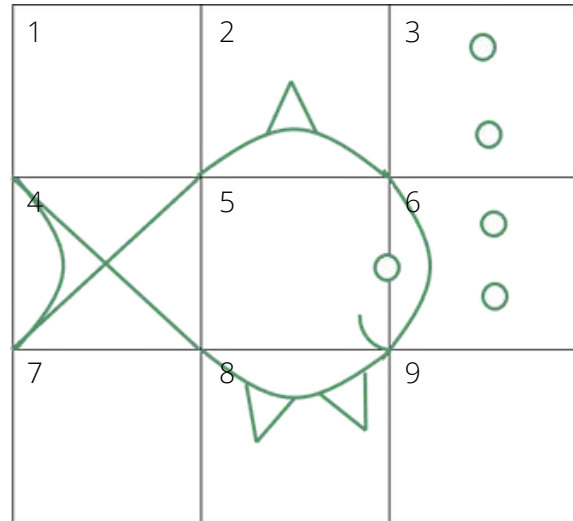
Once the minute is up, have the students post their fish on the wall (names aren’t necessary.) Ask them what they notice about the fish drawings. Are they the same? Are they different? Point out that you, the customer, don’t want ANY of these fish, you wanted something different. Ask the students what would help them draw a fish that you, the customer, want to see. Have students brainstorm the type of information that might help them all draw more similar fish.



## Part 2: Refining the instructions

This time, all of the students will draw together with common instructions. Distribute the gridded sheets (each grid space has a number) and work through the following instructions as a group:

1. Draw a letter X in box 4. The X should fill the box and touch the corners.
2. Draw an upward arc or semicircle from the bottom left corner of box 2 to the bottom right corner of box 2.
3. Draw a downward arc or semicircle from the top left corner of box 8 to the top right corner of box 8.
4. Draw an arc connecting the upper left corner of box 6 to the lower left corner of box 6. This is the fish's face.



5. Draw a circle for the eye in the middle of the line between boxes 5 and 6.
6. Draw an upside-down V for a fin in the middle of the curve in box 2.
7. Draw two V's for fins on the lower curve in box 8.
8. In box 4, draw a curve from the top left corner to the bottom left corner to complete the tail fin.
9. Draw a short curve for the mouth that starts at the bottom right corner of box 5.
10. Finally, draw four circles in boxes 3 and 6 for bubbles.

## Part 3: Compare the drawings

The second set of fish, while not identical, will look a lot more consistent. Giving more specific instructions was helpful!

Ask students to think about:

- *What was easier this time? What was harder?*

Most students will respond that it was easier to draw this exact kind of fish with more detailed instructions. They may express that it was hard to understand the instructions when they were read. Some students may prefer written instructions.

- *Are your drawings all identical? Why or why not?*

While these drawings will be more consistent than the results of the open-ended “draw a fish” intro, there will still be plenty of variability. Have students record what differences they see in the second round drawings and brainstorm instructions they can add to make it more clear.

- *What other information could you have gotten in the instructions that would have made it easier?*

Some of the instructions are too vague—where, exactly, should the bubbles go???. They may also decide that verbal instructions for this challenge are inefficient and decide to create steps that include drawings and examples.

## Making New Plans

(End of day 1 and into day 2)

Provide students with a clean 3x3 grid sheet and divide them into groups of three to four. As a team, decide on a simple drawing and create a list of instructions to re-create their drawing on a fresh grid. Provide these instructions and grid paper to another group and attempt to re-create their drawings.

## Discuss

While this project is about creating a drawing and not a piece of equipment, the ideas are similar. The class was able to create many similar copies of a fish drawing when given a standard set of instructions. Sarah’s production training includes creating specific, detailed instructions on how to assemble the stents. These plans have both written instructions as well as pictures to ensure that each employee is creating the same part in the same way.

Prompt students to consider the drawbacks of a system or process that is TOO rigid. Does this make creativity more or less likely? Is that good or bad?



## Career Exploration and Extension

Prompt students to think about and research what a career as a production technician might entail.

- What does a production technician do all day? What does Sarah do?
- What kind of training would a student need to become a production technician? What other types of technicians are there?
- Are jobs like Sarah's in high demand? Will more people be hired to manufacture medical devices by hand in the future?
- What kind of education is needed to be a production technician? Where could a student be trained locally for this career? What types of classes are important?





Name: \_\_\_\_\_

# Can You Draw it?

Student Drawing Sheet

1	2	3
4	5	6
7	8	9

# ACKNOWLEDGEMENTS

Activities developed and written for Regional Opportunity Initiatives by

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**Tara Weisheit**  
4th Grade Teacher  
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## IMAGE AND CONTENT CREDITS

### Images

Stock photography courtesy of Canva.com

Still video images from "Sarah - Team Assembler Trainer,"  
available at <http://www.regionalopportunityinc.org/sarah>

### Content

Lesson adapted from The Standard Fish Game (2021, April 15).  
Retrieved from <https://leansixsigmalearningacademy.com/lean-game-the-standard-fish-game/>



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