How People Make Things Rich Task Activity **Assembly**

This engaging rich task has been developed by the Education Department at the Children's Museum of Pittsburgh. Rich tasks are open-ended investigations designed for you to work alone or in a group and may be conducted during, before or after your visit to How People Make Things to enhance your experience.

Flashlight Game

Assembly is a part of manufacturing that completes a product before it is shipped. Assembly is when **two or more parts are fastened together to make a new shape**. Most manufactured products are made from several parts that are joined together to form a complete product. An **assembly line** is used in manufacturing where **interchangeable parts** are added to a product in a sequential manner to create a finished product.

In this activity, you will work in teams to assemble a flashlight using interchangeable parts.

Suggested Materials

- 4-6 identical flashlights
- 4-6 sets of appropriate batteries
- 24-36 bins for individual parts
- Stopwatch

Task Tools

- Time Tally (see Rich Task Tool Sheet)
- An inquiring mind!

Teacher Hints Before the Investigation Begins

- Disassemble all purchased flashlights and organize each separate part into its own bin – case, parabolic reflector, screw-top, battery holder, batteries, and switch (if possible) – for each team.
- Each team should have 6 bins of parts.
- Assign a recorder to each group.

Procedures/Investigation

- Re-assemble a flashlight on your own. Use the stopwatch to time yourself. Don't rely on any assistance from other team members to improve your time.
- Record your time on the Time Tally sheet.
- Assign each team member an individual part to be responsible for.
- Decide the order of assembly – determine which part to start with and end with, and all the steps in between.
- Reassemble the flashlight as a team. Use the stopwatch to time yourself. Each team member should ONLY work with the part they have been assigned. Complete your portion of the assembly and hand the flashlight to the next team member.
- Record your team time on the Time Tally sheet. Note the difference between individual and team times.
- Set the stopwatch for 5 minutes. See how many flashlights your team can assemble during that time using the assembly line.
- Record your tally on the Time Tally Sheet.
- Repeat the assembly line several more times, recording your time on the Tally sheet, as well as the total number of flashlights you have assembled.
- Consider any adjustments to your "assembly line" that are needed – do you need to change the order of assembled parts? Are there physical adjustments to make in your set up?

Teacher Hints

- Make sure the flashlights have removable parabolic reflectors. Most inexpensive flashlights do, but some of the more expensive styles do not.
- Review the following terms:
    - **Assembly** is a part of manufacturing that completes a product before it is shipped. Assembly is when two or more parts are fastened together to make a new shape.
    - **Temporary assembly** is when fasters are used that can be easily put together, taken apart or adjusted, usually by hand. These types of fasters are screws, bolts, staples, etc.
    - An **assembly line** is used in manufacturing where interchangeable parts are added to a product in a sequential manner to create a finished product.

Questions to Think About

- How did you improve your time by working together as a team?
- What are the implications for using interchangeable parts in product assembly?
- What were the challenges you faced in designing and redesigning your assembly line?

Ways to Extend Your Investigation

- Allow students to disassemble flashlights on their own before the activity to orient themselves with the different parts. Explore how easily it is to remove flashlight components, and discuss the flashlight design.
- Research the development of interchangeable parts and assembly lines. An **assembly line** is used in manufacturing where interchangeable parts are added to a product in a sequential manner to create a finished product. In the beginning of the 20th century, Henry Ford set out to build a construction method called the "assembly line" that would allow products to be made faster and cheaper. It was a line where parts were pieced together by individual workers. As a result, Henry Ford's cars came off the assembly line in three minute intervals, a speed much faster than before.

International Technology Education Association Standards

- ITEA STL The Nature of Technology – 3. Understanding the relationship between technologies and the connection between technology and other fields of study.
- ITEA STL Technology and Society – 6. Understanding the role of society in the development and use of technology.
- ITEA STL Technology and Society – 7. Understanding the influence of technology on history.
- ITEA STL Design – 9. Understanding troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- ITEA STL Abilities for a Technological World – 13. Assess the impact of products and systems.
- ITEA STL The Designed World – 19. Understanding and selection and use of manufacturing technologies.

National Academic Standards

- NSS-USH.K-4.3 The History of the United States: Demographic Principles and values and the People from many cultures who contributed to its cultural, economic, and political heritage.

Flashlight Assembly - Time Tally Sheet

1. Individual Assembly

Name _____ Time _____

Name _____ Time _____

Name _____ Time _____

Name _____ Time _____

Name _____ Time _____

Name _____ Time _____

2. Group Assembly

In what order will you be assembling your flashlight parts? _____

_____

First Assembly Line Time _____ Total assembled _____

Second Assembly Line Time _____ Total assembled _____

Third Assembly Line Time _____ Total assembled _____

Fourth Assembly Line Time _____ Total assembled _____

Have you gotten faster? Why or why not?

_____

_____

What changes could you make to your assembly line?

_____

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