

Stack'em Up, an Introduction to Engineering

(written for use with youth)

Goal: To involve the group in an activity that requires team work, cooperation, creativity and problem solving.

Summary: Participants are introduced to engineering by working in teams of 4-6 to solve a problem. They create a tool using a string and a rubber band that could be used to stack a group of cups into a pyramid. Team members must work cooperatively to:

- Pull their strings to expand the rubber band
- Lower the rubber band around a cup
- Release the string so that the rubber band grabs the cup
- Pick up the cup to stack it



Teams will have two timed rounds to stack their cups, once without talking to each other and once with the ability to communicate. The participants should find the second round is easier because they can talk to each other.

Start off by saying something like: *Engineers are problem solvers and we are going to start by asking you to solve a problem by working in a team to stack cups into a pyramid shape. Does it sound easy? The trick is that you cannot touch the cups with your hands once the competition begins.*

Step 1: Give an Overview of the Activity

Invite participants to move into teams of equal sizes and stand around a table. Each team should have 4-6 members, depending on the size of your group. At each table, put a rubber band and 6 plastic cups, and one piece of string for each team member. Explain the goal of the activity is to make a tool with the strings and the rubber band to stack the cups into a pyramid shape. You could ask a team to build a pyramid with the cups so they know what the finished product should look like. Note all team members have to help in stacking the cups so they must create a tool that involves all team members.



Step 2: Teams Make the Tool and Stack

Allow 10 minutes for teams to make their tools and practice stacking the cups. At first, most girls won't know what to do but eventually someone will figure out that you can stretch the rubber band to pick up a cup. You might have to ask questions to encourage their thinking like, "Since you cannot touch the cup, how can the strings help with the task?" If one group figures out that you have to tie the strings to the rubber band, you can call attention to this design and say that the other groups might want to learn from this design.





During the practice time, tell the girls that they will have two timed tries at stacking their cups, once **without talking to each other and once with the ability to communicate**. Also, they can't have their arms over the table during the competition.

Step 3: The Challenge

Ask everyone to stop working and then visit each table and scatter their cups around the table. Explain that the first round will be timed with no communication and remind them that arms must not extend over the table. Then, signal the beginning and start the timer.



Walk around and monitor the action, encouraging groups to keep trying. As each team finishes, check the timer and tell them their time. When all are finished, tell them that in the next round they will be able to communicate. Signal the start and begin the timer. Walk around once again offering encouragement and reminding the participants to talk to each other. Again, as each team finishes, tell them their time.

Step 4: Discussion

Congratulate all the teams on their creativity and problem solving ability and give them a round of applause. Get their attention and point out how this activity is like the work of an engineer.

You might ask the group:

- How well did your team work together to stack the cups? Was there a difference when you could communicate?
- At what point did you feel like everyone was working together?
- What would you do differently for the next time around? How did you come up with the design of your device?
- How might this be like the work of an engineer who designs cars, airplanes or cell phones?

Explain how this activity is like the work of an engineer.

- Engineers must be creative as they work to find solutions to problems that will make our lives easier.
- They also work in teams and communicate with each other to design and try out their solutions.

The same process used to successfully build a pyramid of cups would be used to design a box to ship Pringles potato chips or to build an airplane.

Adapted from http://pbskids.org/fetch/games/activities/pdf/FETCH_StackEmUp.pdf