

# Engaging Youth in Engineering and Changing Their World



# ENGINEERING DESIGN PROCESS



# The Engineering Design Process in Action



# Seeing the Skill in Action

1. What elements of the engineering design process does the engineer seem to emphasize? Why?
2. What do you notice as youth interact with the engineers?
3. What would your next step be after a visit like this?
4. How could you provide an experience kind of like this if you don't have an engineering group or school of engineering nearby?

**Real-World Modeling of the Engineering Process**

2 COMMENTS 0 LIKES BOOKMARK

Do Engineers really go through the engineering process when they are on the job? In this video, youth are guided through an engineering challenge with real engineers, modeling the engineering process. Watch as the lead engineer encourages the youth to work through the challenge by using a design thinking process that includes brainstorming, making predictions, testing and re-testing. Listen as youth are asking questions and problem solving along with the engineers.

Research suggests: Frontline staff and volunteers encourage children to emulate scientists through methodical procedures such as scientific inquiry and observation, or the engineering design process. (Next Generation Science Standards)

Step 1

**As you watch the skill video below, think about these questions:**

How does the engineer model the engineering process? (1:00 - 1:35)

What key element of the engineering process does the engineer keep referring to? (1:46 - 1:53)

What do you notice about this youth when interacting with the engineers regarding their design challenge? (2:23)

Step 2

**Watch the skill video**



**Featured Activity**



**Designing Circuits**

Youth design simple circuits and learn the differences between parallel and serial circuit design and the difference between each.

45 minutes

Download the activity

**Related learning modules**



# Making Design Challenges Work

**ON THE MOON**

NASA AND DESIGN SQUAD TEAM UP TO INSPIRE A NEW GENERATION OF ENGINEERS

DESIGN SQUAD  
as built on TV

In collaboration with the  
National Aeronautics and  
Space Administration

NASA

ENGINEERING  
CHALLENGES  
FOR SCHOOL AND  
AFTERSCHOOL  
PROGRAMS  
GRADES 3-12

What adults need to know  
and be able to do

What youth need to  
know and be able to do

# Helping Youth Develop Identity



# Apply it in Real Life

## ON TARGET

### LEADER NOTES

FOR GRADES 6-8

#### The Challenge

Modify a paper cup so it can zip down a line and drop a marble onto a target.

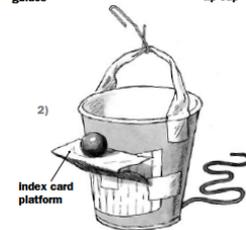
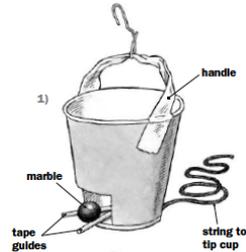
In this challenge, kids follow the engineering design process to: (1) modify a cup to carry a marble down a zip line; (2) attach a string to tip the cup; (3) test their cup by sliding it down the zip line, releasing the marble, and trying to hit a target on the floor; and (4) improve their system based on testing results.

#### 1 Prepare ahead of time

- Read the challenge sheet and leader notes to become familiar with the activity.
- Gather the materials listed on the challenge sheet.
- Set up a sample zip line.
- Put a handle and paper clip on a cup (In other words, don't make a door or platform for the marble.)
- Optional: print a picture of the Lunar Crater Observation and Sensing Satellite (LCROSS) from the LCROSS Web site ([lcross.arc.nasa.gov](http://lcross.arc.nasa.gov)).

#### 2 Introduce the challenge (5 minutes)

- Tell kids how NASA will use the LCROSS spacecraft to search for water on the moon.  
*To see if there's water on the moon, NASA is sending the Lunar Crater Observation and Sensing Satellite (LCROSS) hurtling into a crater near the moon's South Pole. The collision will send up a plume of dust and gas over 6 miles (10 km) high. Scientists will study this plume to see if there are any signs of water in it.*
- Show kids your zip line. Hang the cup on the zip line, using a hook made of a paper clip. Show kids how the cup travels down the zip line.  
**Tell them:**  
*Today you'll turn a paper cup into something that can zip down a line and drop a marble onto a target. Just as the success of LCROSS depends on hitting the crater exactly, success in today's activity depends on being able to hit the target accurately and consistently. As you test your design, you'll find ways to make it work better. Improving a design based on testing is called the engineering design process.*



Sample marble carriers showing parts and two possible solutions: 1) an opening; 2) a platform

1. At your table, review the *On Target* activity.
2. Brainstorm three strategies for using the engineering design process to develop critical thinking or problem solving.
3. Brainstorm three strategies for using the activity to develop an engineering identity.

# We Can Make a Difference

- Getting young people involved in STEM topics and professions
- Develop a sense of competence and confidence
- See themselves as contributors and participants in STEM
- Collaborate with others to solve problems

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