

# STEAM WITH THE PROGRAM TEAM

## Graham Cracker Structures *Engineering*

### MATERIALS NEEDED:

- Graham crackers (enough to build with, allowing for breakage and snacking)
- Icing/Frosting (royal, homemade, or store bought)
- Sandwich Ziploc bags
- Serrated knife (butter knife should work)
- Flat surface to build (plate, cookie sheet, cardboard covered with foil/wax paper)
- Candy to decorate

### THE SCIENCE:

#### Let's review the Engineering Design Process

- Define: What is the problem that needs a solution?
- Identify: the constraints on your solution (time, money, materials) and criteria for success.
- Brainstorm: multiple solutions for the problem.
- Select: the most promising solution.
- Prototype: your solution, build a model, 3D design, or detailed drawing.
- Test: and evaluate your prototype, how is it working.
- Iterate: to improve your prototype, take what you have learned and make adjustments, test again.

## Badge Steps

*Take a look at the requirements and see if the activities will help you complete the following badge steps.*

Daisy: Think Like an Engineer Journey – Step 1

Brownie: Think Like an Engineer Journey – Step 1

Junior: Think Like an Engineer Journey – Step 1

Cadette: Think Like an Engineer Journey – Step 1

Senior: Think Like an Engineer Journey – Step 1

Ambassador: Think Like an Engineer Journey – Step 1

### PA Education Standards

The content of all Girl Scout national proficiency Badges and Journeys have been correlated by grade level to national and state learning objectives.

Visit <https://www.girlscouts.org/en/adults/educators/curriculum-standards.html> for more information about how badges support the standards.

Finished with your badge? Now buy it for your uniform. Order online at <https://www.girlscoutshop.com/HEART-OF-PENNSYLVANIA-COUNCIL>.

We would love to see you in action! Snap a photo and sent it to [marcomm@gshpa.org](mailto:marcomm@gshpa.org) Please include name, troop #, and what she is working on.

## ACTIVITY ONE: Design and Build

Step one, Define and Identify: You need to create a structure that can stand on its own and looks cool. You need to use the materials you gathered, graham crackers and icing to build your design.

Step two, Brainstorm and Select: Look at the materials you have, what can you design? Use your imagination and creativity to design a house or bridge. It can be as simple or as complicated as you want. Make a list of all the things you could build. 2 min. Now take a look at your list and pick your favorite.

Step three, Design: Draw it out. Make a plan. What material are you going for each part, where are you going to place your decorations, will you need extra support anywhere? Start with something simple and see what you can add on, porch, garage, second story, etc.

Step four, Prototype and Test: Build your design using the materials you have, as you build test out the structures? Is there a way it can be improved, strengthened? Make sure your structure is secured to your plate and able to stand on its own.

Basic shapes: graham crackers come in standard shapes, squares or rectangles. We can use our knives to create triangles and smaller squares and rectangles. When cutting use a **gentle sawing motion with the serrated knife. Don't press to hard, you will crush your cracker.** Try sawing a line, and then snapping the cracker on the score.

Step five, Evaluate and Improve: **Evaluate your design, what is working, what isn't? Make changes and test them out.** Repeat this process until you are happy with your design.

## REVIEW:

1. What was a way your design failed? What did you learn from that?
2. What is your favorite part of the process?
3. Does your structure look like your original design? Why or why not?

# THE ENGINEERING DESIGN PROCESS

