

IRISH GIRL GUIDES ENGINEERING BADGE CHALLENGEBOOK



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Engineering Challenge Instructions for Brownies & Guides

Who are engineers?

Engineers bring dreams to life! Engineers are from diverse backgrounds and they take ideas and turn them into reality, using science, maths and imagination. Engineers are a lot like you! Engineers share many similar skill sets with Brownies and Guides, including teamwork, innovation, resourcefulness, thinking outside the box and practical application.

Instructions

We want you to think about your Unit or imagine you are attending a Girl Guide camp. Pick out something in your Unit or at camp that you would like to improve! This could be something that would help your Unit, an individual Brownie or Guide member, or it could be something that would help the whole Girl Guide community.

Engineers are a lot like you! Engineers share many similar skill sets with Brownies and Guides, including teamwork, innovation, resourcefulness, thinking outside the box and practical application.

Complete your Details and each of the five STEPS in this Challenge Book using pencil, pen, crayons or felt tip.



Prizes

There are fantastic prizes, including:

- Bricks 4 Kidz STEM Voucher - workshop for your Unit (30 children).
- Winning certificate.

Deadline for Entry

Entries should be submitted by post by 30th April to STEPS Engineers Ireland, 22 Clyde Road, Ballsbridge, Dublin 4.



Engineering Design Process - you are an engineer!

The engineering design process is a series of steps that engineers follow to come up with a solution to a problem. Many times, the solution involves designing a prototype.

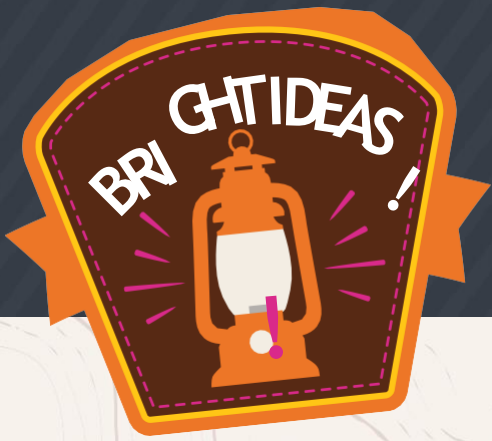
The basic STEPS in the Engineering Design Process are:

- Identify the problem.
- Brainstorm solutions.
- Design, build and test a model.
- Use results to improve the model.

We hope you are excited about the engineering challenge ahead of you, you are about to follow the steps of a real engineer on a real engineering project.

Engineering Design Process





STEPS

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Your Details

Complete all the fields below.



Your name: _____

Project title: _____

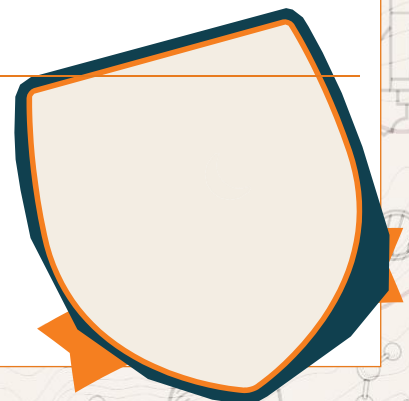
Unit name: _____ Unit location: _____

Branch: Brownie/ Guide (Please Circle) _____

Leader name: _____

Leader email address: _____

Leader contact number: _____





ASK!



STEP 1: ASK What's the problem?

Your task is to identify problems that are affecting the Girl Guide Community.

Every day, engineers design prototypes that can do something new or solve a problem.

We want you to look around your Unit or imagine you are attending a Girl Guide camp. Pick out three problems in your Unit or at camp that you would like to improve!

	Write down 3 examples of things (problems) you would like to improve in your Unit or at Camp	Reason
Example	Dirty riverwater	Need access to clean water
1.		
2.		
3.		





IMAGINE!



STEP 2: IMAGINE

Brainstorm! Choose a solution

Engineers brainstorm many solutions to problems e.g. how do we get from place to place. Bikes, skateboards, planes, trains, boats and cars are all engineering solutions.

Now that you have chosen your problems, we would like you to choose one of the problems from STEP 1 and brainstorm engineering solutions for that problem.

Which problem from STEP 1 will you brainstorm solutions for?

Example: Dirty river water

Engineering solution - Based on your chosen problem, now describe your engineering solutions below

The solutions could be something that would help a Brownie or Guide or Unit or the whole Girl Guides Community, or it could be something that would help will be helpful in a camp setting.

Example solution (Dirty river water)

- Create a waterfilter
- Build infrastructure to block bacteria
- Remove pollutant source

Solution 1.

Solution 2

Solution 3

Solution 4

Solution 5





PLAN!



STEP 3: PLAN

Draw it! Make a materials list

When engineers have an idea for a solution, they must figure out how to make it in the real world. Engineers make models (digital or physical) when they are creating something new. A prototype is a simple model that lets you test out your idea. Decide which of your solutions you would like to design and complete. You will be creating a prototype of this solution.



Which of your solutions from STEP 2 will you design?

Example: create a water filter _____

Engineering solution - Based on your chosen problem, now describe your engineering solutions below

What does your prototype do?

Example: *cleans the dirty water*





How does your prototype work?

Example: *removes larger particles of dirt from your water.*

Who will use your prototype and where?

Example: *Brownies & Guides at camp.*

How does it benefit your community?

(a Brownie or Guide or Unit or the whole Girl Guides Community)?

Example: *Brownies & Guides at camp will now have clean water.*





STEPS

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What will your prototype look like?

Draw your engineers drawing on this sheet. Point out with labels what it does.
Don't forget to write the materials you will need in the materials section!

Materials list

Write a list of materials you will need for your prototype. Use the materials you have on hand.

Here are some things you could use:

- Shoe boxes or boxes
- Paper cups or bowls
- Spaghetti
- Toilet paper tubes
- Ziploc or sandwich bags
- Marshmallows

LOOKS
GREAT!



WELL
DONE!



CREATE!



STEP 4: CREATE

Make it! Try it out!

Engineers make things people use every day like computers, phones, roads, bridges, and cars. Now, bring your design to life and make your prototype using household materials. Collect all the materials you need and get started! Start to make your prototype using your plans on your drawing from STEPS 3. You may need to make lots of changes so don't worry!





EVALUATE!



STEP 5: EVALUATE Test your prototype!

Engineers test their inventions to find out what works and what doesn't. Some engineers spend years trying to get their ideas to work! An important part is learning from what didn't work. Test your prototype, check what works and what doesn't work. Make recommendations on what can be improved.

Your Prototype

We would love to see a photo of your prototype. Add your photo to the space below and add labels to tell us about it. If it's not possible to include a photo, please draw a picture of your prototype.

- What part of your prototype worked best?

Example: The plastic bottle because it kept its shape

Paste or stick a photo in this box



- What changes did you make to your prototype and why? Think of one example.

Example: used sand to filter the water instead of pebbles as sand is finer and better at capturing material stuck in the water

Has participating in this Challenge made you any more interested in becoming an engineer than you were before?

1= Yes

2= feel the same

3= No

4= Don't know





SHARE!



OPTIONAL STEP: SHARE

Present your prototypes!

After engineers test a new prototype, they like to share the results of their tests with others. It helps them get ideas to make their products better. If you have time, you can show off your engineering prototypes! Showcase your prototypes to your families, or virtually to a friend. Talking to the others about your prototype may help you better understand why a prototype performed the way it did! Three questions to prepare in advance before giving your presentation:

A. What was the problem you worked on?

B. What is your prototype and what will your prototype do?

C. What was the most difficult part of your project?

Top tips for making your presentations

- 5 minutes per presentation
- Speak loudly and clearly
- Show your prototype

Now that you know how engineers imagine, plan, create, and evaluate their inventions, you'll be able to come up with all kinds of cool problem-solving solutions!

