

New Scots Connect

YOUTH GROUP ACTIVITY BOOKLET

PART I



Scan for more free resources
or visit:
scienceceilidh.com/resources



New Scots Connect

How can we explore engineering through play and creativity in youth work?

These resources were developed as part of a long term project funded by the Royal Academy of Engineering connecting young New Scots with engineers to support wellbeing, confidence and wider skills as well as understanding engineering. For the engineers involved it was an opportunity to develop their confidence in a youth-work setting, build relationships and share their engineering in a more responsive way that wasn't delivering a workshop.



"After the sessions around creating things, the kids will say they want to go into that field and design their own cars etc. The sessions inspire them to think about their future careers."

~ D, Youth Worker

Working in partnership with Multicultural Family Base (MCFB) in Edinburgh, we worked with their Safe Haven group consisting of young people with diverse migration backgrounds and support needs between 2021 - 2022. This included two three-day summer "Connect Camps" with the science centre Dynamic Earth which ended in a celebration with young people sharing their learning with their families. With other partners, we focused on engineering behind space (Royal Observatory of Edinburgh), plants (Edinburgh Botanical Gardens) and sports (Napier University).

This resource booklet collates some of the groups favourite activities from our sessions together, highlighting some tips for running the activities as well as how they can support social outcomes. We suggest using the instructions as a guide and for groups to take ownership and get creative with the tasks!

"I'm now looking for the next time that I can go and volunteer and do things and try and get more people to do the same things well."

~ R, Engineer

As part of this project, we also worked with a men's New Scots group connecting them with local engineers to share ideas, culture and knowledge through making together and developing transferable skills. We are developing a toolkit from these sessions to share our learning and offer advice to others hoping to run similar sessions.



Scan me to sign up for the Science Ceilidh mailing list to be updated when the full resource booklet and evaluation report is available.

Spaghetti Towers



Creating spaghetti structures are a great insight into the engineering design process. The key things to keep in mind when designing the towers is that they should be strong and stable to withstand strong winds and earthquakes. The bottom of the tower is particularly important when designing the tower to stabilise the structure and to be able to build up height. The shapes used to create the structure are also really important in the design and stability of the tower - think about the shape of the Eiffel Tower!

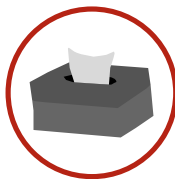
What do you need?



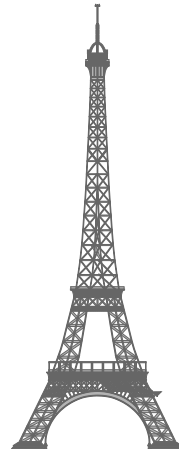
Spaghetti



Marshmallows



Hand Wipes



TIPS

1. This activity can get quite messy so we recommend having wipes on hand for cleaning up!
2. Consider halal or vegan marshmallows depending on your group.

What to do

1. Split the group into smaller groups of 3-4 young people.
2. Task the groups with using only the spaghetti and marshmallows to see who can build the tallest tower in 20 minutes.
3. Set a timer to keep track of the time - when the timer goes everyone has to stop building and take their hands off their tower!
4. If there is a tie between any groups use a tiebreaker to see who has made the most stable tower, will the tower survive an earthquake for example (shaking the table).
5. You can scale this up by restricting the amount of spaghetti and marshmallows given to the groups.
6. You could also task the groups with creating a bridge that spans across two tables to see how this structure differs from the towers.



Practitioner reflections

While on the surface this activity seems really simple, there are a lot of different factors for the young people to consider and manage, such as how easily the spaghetti breaks, the marshmallows becoming sticky when overhandled and creating shapes that add stability to their structures. This makes the activity a great way for them to develop their communication, teamwork skills and critical thinking.



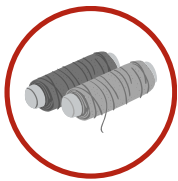
Scan me for more
free resources!

Twig Rafts



Buoyancy is an objects ability to float - in water and air. Typically for something to float it has to be less dense* than water but objects that are more dense can also float if their shape is right. Something flat with a larger surface area can float if its weight is spread out rather than concentrated. For example, a ball of blutac will sink while a flat sheet of the same material may float. *Density describes how closely packed together a substance's particles, oil is less dense than water so if you add oil and water into a glass, the oil will float on the water.

What do you need?



String



Scissors



Twigs



Leaves



TIP

Make sure to tie the twigs together really tightly. Adding twigs perpendicularly to the main body will give the raft extra support and make it less likely to bend or tip into the water.

What to do

1. If you're able to, take the group out foraging beforehand to collect natural materials to make their rafts. Otherwise, these materials will need to be collected beforehand and brought to the session.
2. Task each group with making a raft design that will float in water, using the materials that they have collected/have been brought in for them, in addition to string and scissors.
3. They can be as creative as they like with this, for example, using pinecones on the under side to help their rafts float and adding leaves as sails - be careful though, adding too big a sail can cause the raft to topple over!
4. This can be turned into a competition with different categories such as the most creative, which one could go the furthest, which could hold the most weight without sinking etc.



Practitioner reflections

This activity allows for the young people to take ownership of the activity from foraging for the materials to designing and making their rafts. There is also a lot of room for creativity within the activity, with our group they used their foraged materials as well as some other materials we had available including lego to create 'hybrid' rafts. The young people we worked with highlighted this as one of their favourite activities from a 3 day summer club.



Scan me for more
free resources!

Space Landers



Engineers use shock-absorbing systems to protect spacecrafts and their contents during landing. For example, the Mars rovers used a complex set of mechanisms to land safely and absorb the shock of landing on a rough and rocky surface. Some of these mechanisms include a parachute descent to slow down how quickly the rover falls, cushioning from airbags that surround the rover during landing and suspension to stabilise the rover without it tipping over.

This activity has been adapted from [Vivify STEM](#).

What do you need?



A Paper Cup



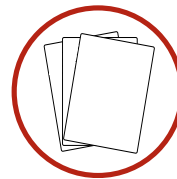
3 Rubber Bands



Tape



2 Marshmallows



6 Index Cards



6 Straws



Cardboard



Mini
Marshmallows

TIPS

1. Having a countdown on the board was helpful for keeping the group on task and adding further excitement.
2. We used chocolate eggs which worked well (or if you're looking for a challenge, real eggs!)

What to do

1. Give each group Of 2-3 a set of the materials (you can substitute craft materials with what you have available and give the groups creative freedom to pick their materials together).
2. The groups task is to design and build a shock-absorbing lander to protect two alien 'eggs' on board an alien spacecraft as they land on Earth (the marshmallows in the cup). The cup containing the two alien eggs has to stay open, covering the top is not allowed!
3. Encourage the group to first discuss and draw ideas thinking about the shock-absorbing system as they design their landers (you could show the group how to make a spring by folding the index card with an accordion fold as an option for their shock-absorbing system).

Practitioner reflections

Creating space landers in groups was a great activity for developing the young people's teamwork and communication skills as they voice their ideas and listen to ideas from others in their group. The activity encourages the groups to get creative with their lander and to experiment with new ideas as well as building up their resilience to failure if their ideas don't work out how they expected.



Scan me for more
free resources!



Pinecone Parachutes

Parachutes have been around for centuries and used for various purposes including in the military, sports and space exploration. Parachutes can be made from a variety of materials with various different shapes, each with their own strengths and weaknesses. A key part of the design process for parachutes is testing to ensure it's safety and effectiveness for the function it is being used for. This process can be mimicked by trying out various household materials with string and a pinecone and comparing the different materials and shapes used.



What do you need?



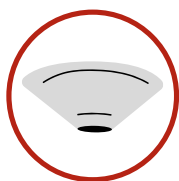
Tape



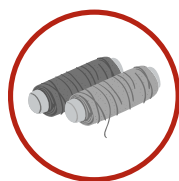
Napkins



Plastic Bags

Coffee
Filters

Pinecones



String



Holepunch

What to do

1. Pick a material to be your main parachute (the canopy) and cut out the shape you'd like your parachute to be.
2. Using the hole punch make a hole in each corner of your canopy. (if you've made a round parachute make 4 holes as if they are the corners of a square).
3. Tie a piece of string to each corner through the holes - add tape around the holes if it looks like the canopy fabric might tear.
4. Tie the loose ends of string to the pinecone.
5. Test your parachute! Drop it and see how it falls.
6. Encourage the group to try out different materials, shapes, and string lengths to see what happens.

TIP

Adding a small hole to the middle of your parachute can release the air trapped under the canopy in a controlled way so that the parachute won't drag to the side.



Practitioner reflections

This activity required the young people to experiment with different materials, shapes, and string lengths to improve the performance of their parachute encouraging the development of their problem-solving skills. It was also particularly good for building their confidence and sense of achievement when their idea works out and their parachute works. We made sure to repurpose materials we already had or get in more sustainable ones where possible encouraging the group to think about their own social commitment to climate change.



Scan me for more
free resources!

Practitioner highlights

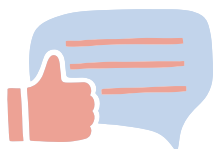


"I further developed my experience of working with diverse young people and engaging people of different ability and confidence levels in STEM activities. Also learnt some Arabic words, and learnt more about the diverse career paths in Engineering!"
~ R, Dynamic Earth Learning Officer

"Spaghetti and Marshmallow towers, how it provided a much better connection between the kids involved. They started to help each other and not just build the towers themselves, giving each other some tips."
~ C, Engineer

"When there is a competition and the kids come together and engage a lot with the activity"
~ D, Youth Worker

"Making things that can be then used to do something else rather than making something static. I will make an effort doing that moving forward in my own practice."
~ E, Youth Worker



If you have any feedback for us we would love to hear it! Similarly, if you try out any of the activities, please let us know (we especially love seeing photos of the activities in action). Get in touch at: lewis@scienceceilidh.com