

Desert Island Drinks

Filtering water challenge



For details of all routes into engineering go to www.tomorrowsengineers.org.uk

Desert Island Drinks

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What do you need to know? Organiser's notes

This activity helps students to understand the principles of filtration, and enables them to discuss how the composition of different materials enables them to filter different particles.

Guidance

- Read through the instructions and familiarise yourself with the procedure
- Use the discussion topics below to introduce, summarise and provide context to the activity
- Make sure that students have had sufficient time to read and understand the directions

Discussion topics

- Why do different materials filter out different particles?
- What is the most effective way of filtering particles of differing sizes? What makes a good filter?
- What domestic, commercial, industrial or other processes might require filtration, either now or in the future?

Curriculum links

KS3 – 3.2	Chemical + Material Behaviour
KS4 – 2.2	Chemical + Material Behaviour
KS3 SC 2.2 a, b	(Critical understanding of evidence)
KS3 SC 1.1	(Scientific thinking)
KS3 SC 1.2	(Application and implication of science)
KS3 SC 2.1	(Practical enquiry)
KS3 Ma 2.3 a-e	(Interpret and evaluate)



Get involved

Further reading and resources

If you've enjoyed this activity try '[Water for the World](#)' workshops developed by Engineers Without Borders and the Arup Cause. These aim to help teachers educate young people about the challenges of sustainability, development and securing safe drinking water.

Meet some [Thames Water](#) apprentice engineers (case studies)

Tomorrow's Engineers

A water engineer is part of our Green Crew. [Do the whose Crew Are You?](#) quiz to find out which crew you're in!

Find out more about careers in engineering

Tomorrow's Engineers provides engineering careers materials for young people aged 11-14, and other resources for teachers.

For more information visit the Tomorrow's Engineers website.

For lots more hands-on science and engineering activities visit the [National Science & Engineering Week](#) website.



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Are you ready for an engineering challenge?

Desert Island Drinks

Whilst on your way to a once-in-a-lifetime holiday, the plane runs out of fuel and is forced to ditch in the middle of the Pacific Ocean. You are stranded on a desert island with only your crate of homesickness-busting British household supplies for company. It's going to be a week until rescue arrives, and although you can happily eat coconut soup, coconut curry and coconut bolognese day and night, you'll need water. The only fresh water on the island, however, is in a muddy, pea-infested pond. You're going to have to become a water engineer if you're going to last long enough to be rescued.

Your Task

...is to apply water treatment principles to create a device that will remove solid particles of different sizes from dirty water, leaving water that is clean enough for you to survive on whilst stranded on the desert island.

Get involved

Without a regular supply of fresh water you will become dehydrated, and your body will do some funny things. Lose just 5% of your body's water and you'll feel sleepy and nauseous. Lose 15% and your skin will wrinkle, your vision will fade and you'll become delirious. Lose more than 15% of your body's water and you'll probably die. OK, so we're talking funny "weird" rather than funny "ha ha".

Although it's possible to survive on unfiltered water, the risk of disease is far higher, so when faced with dirty water the best approach is to make it as clean as possible. People have been filtering water for over 3,000 years, with ancient Greek, Egyptian and Sanskrit texts describing processes for filtering water using gravel and sand. Hippocrates, known as the "father of medicine", invented a cloth filter bag to remove sediments from water that was to be used in medicine.

In the future demand for water is likely to become a more and more important issue, affecting entire nations. For example, if Sudan were to dam the Nile, then Egypt could face water shortages and alternative sources of water would need to be found, and made fit for human use. One of the things that water engineers will need to do in the future is develop practical technical solutions to problems caused by climate change and demographic pressures. This includes clean water provision, wastewater treatment, sewerage and flood defences.

Find out how you can become an engineer

If you have enjoyed this activity and would like to find out more about careers in engineering Tomorrow's Engineers can help.

To learn more visit the Tomorrow's Engineers website.

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Get engineering...

Activity Materials List

An empty plastic bottle (1L or 2L)
Scissors
A high-sided tray or dish
Water (in a container!)
A selection of 'contaminants'
(such as sand, glitter, different size beads)
Cardboard
Glue
A pint glass
A selection of filtration materials
(such as satsuma bags, cardboard, tissue paper, cotton wool, cloth)



Instructions

First, make some dirty water:

Place a layer of each of the contaminants into the pint glass.
Add water and stir so that the contaminants are well mixed. Note how the different contaminants mingle together (this is the easy bit!).

Next make a water filtration device:

Cut the bottom off of an empty bottle. Cut a horizontal slit into the side.
Cut two pieces of cardboard to the shape of the bottle and cut a large circle in the centre of each piece. Between each piece place a layer of filtration material. Next glue the pieces of cardboard together.
Turn the bottle upside down and place in the first of your filtration materials.
Repeat this process down the bottle.



Finally, filter the water:

Place the water filtration device into the tray or dish, hold it steady and then pour the dirty water in at the top. Marvel at science in action, then grab a coconut and prepare to defend your precious technology from thirsty castaways.

Tips

- Does the order in which you place the filters make a difference?
- What makes a good filtration material?
- When you're finished the water will be filtered but not purified, so don't drink it. You're not *really* dying of thirst on a desert island.

Follow on activities

- There is likely to be some particles left in your filtration device, you can test you water to see how clear it is?
- Examine your filtered water – can you see any particles? Shine a torch through it – does it look clear and colourless, or tinted?
- Pour some of the unfiltered water through a coffee filter paper. Examine the paper, count the number of particles and note it down. Pour some of the resulting filtered water onto another coffee filter paper, count the number of particles and compare it with the first result.
- Could you clean the filters in your filtration device and filter the water through your device again? What happens when you do this a second time?



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