Sewer stoppers

A do-at-home civil engineering activity for ages 4-18.

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Sewer stoppers

Can you imagine living with no toilet in your house? I thought not! These contraptions are essential for modern daily life as they safely get rid of our waste. In the history of big cities like London or in the developing world where waste wasn't/isn't flushed away then diseases like cholera can spread fast. This is one of the reasons that the work of civil engineers saves more lives than doctors.

During the COVID-19 lockdown period, sewer blockages have been up by 20 percent! This is because people have been flushing kitchen roll and wet wipes as a replacement for toilet roll, not knowing the problems this causes for our sewer system.

Toilet roll is made so that it breaks up when it comes into contact with water. Then it can easily move through the sewer system. Other disposable products like kitchen roll and wet wipes do not: wet wipes are really bad because they have a plastic sheet in them that can get blocked in the sewer tunnel and start collecting other wet wipes, bits of kitchen roll and grease that people pour down the sink.

This is a big problem because the left-over fat from cooking a fry up is only liquid because it is still hot – when you pour it down the sink it cools down and becomes solid. This fat gets collected by the blockage of wet wipes and kitchen roll and can become what civil engineers call a **fatberg** – a large solid lump of nastiness!

Fatbergs can get so big that they block an entire section of sewer and it needs to be dug up and removed. The biggest one in the world was 250m long and weighed a huge 130 tonnes. That's the **same weight as 11 double-decker buses** and the **same length as two Wembley football pitches**.

Your challenge today is record and document how different materials that go down your toilet break down (degrade) over time.

What you'll need

- 6 bowls or containers such as cups
- Toilet roll
- Roll of kitchen towel
- Wet wipes
- Salt
- Sugar
- An empty plastic container – like an old icecream tub
- Sharp pair of scissors or craft knife

Activity instructions

1. Add 500ml of water into each bowl and then add the following to each, remembering to label them.
2. Use four sheets of toilet roll and two sheets of kitchen roll, for the sugar and the salt use two tablespoons each.

Bowl 1	**Bowl 2**
• Kitchen Roll • Water	• Toilet Paper • Water
Bowl 3	**Bowl 4**
• Kitchen Roll • Water • Salt	• Toilet Paper • Water • Salt
Bowl 5	**Bowl 6**
• Kitchen Roll • Water • White Sugar	• Toilet Paper • Water • White Sugar

3. Take a photo of each bowl once a day at the same time for a week and take notes on what is happening in each bowl.
4. The salt represents the chemical treatment that raw sewage receives at a sewage processing plant before being released and the sugar represents the organic waste found in sewage.

Now we are going to test how well the contents of different bowls drain through holes, just like in a sewer in real life!

5. Get a 2p coin and draw a ring around it in the middle of an old icecream tub, now two other holes around it so that there is the space of a 2p coin in between them and use a sharp pair of scissors or craft knife (please be very careful, ideally a job for a grown-up this bit!) to cut them out.
6. Now place another empty tub below it and pour each one of the bowls into the container with the drainage holes in it and time on a phone or with a stopwatch how long it takes for the water to drain through. Which one drained the fastest?

Remember to put the contents of the waste into the correct bins after – not into your toilet or down the sink!

Send us the photos of your experiments and their outcomes on Twitter!

For 11-16 year olds

For an extra challenge add a bowl with a tablespoon of butter or lard and two wet wipes, one with sugar and salt and one without, for the best demonstration of how fatbergs can form in sewage pipes and cause blockages. If your tub gets blocked give it a shake to allow the water to pass through.
Once you have the timings for these calculate the average time it takes the water to drain through with all the bowls.

For 16-18 year olds

Civil engineers design sewers to have a certain amount of capacity so they can meet the demand of a city as it grows. Now that you know how long it takes for 500ml to drain through the ice cream tub, see if you can calculate how long it would take for 100 litres to pass through the tub.

Tell us what you thought!

Email us at **careers@ice.org.uk** or write a comment or post on the **@ICE_schools Twitter.**

To find out more about fatbergs – head to our virtual Civil Engineering Water exhibition: **ice.org.uk/events/exhibitions/water-exhibition**

More resources on civil engineering

Careers advice for becoming a civil engineer: **ice.org.uk/beacivilengineer**

Careers and activity resources on our website: **ice.org.uk/educationresources**

Civil engineering project case studies: **ice.org.uk/what-is-civil-engineering/what-do-civil-engineers-do**

Civil engineer (people) case studies: **ice.org.uk/what-is-civil-engineering/who-are-civil-engineers**

Info about all types of engineering careers (not just civil)**:** Tomorrow's Engineers **tomorrowsengineers.org.uk**