Design your own toilet

Stage: 2-3

Time: 1-2 hours

Summary: As part of World Toilet Day, we invite pupils to explore current methods to reduce water use in toilets. We then challenge pupils to design a toilet of the future that uses as little water as possible.

Curricular links

EXA 2-3-02a, 2-3-03a, 2-3-06a, **MNU** 2-3-01a, 2-3-03a, 2-3-03b, 2-3-07a, 2-07b, 2-11b 2-11c, 3-11a, **TCH** 2-06a, 2-07a, 2-3-09a, 2-3-12a

Introduction

According to a report from the Energy Saving Trust, flushing toilets accounts for 22% of household water consumption (this is water that has been treated and is safe for drinking). Therefore, saving water from flushing toilets is an important way of reducing water consumption overall. Current ways of reducing water consumption from toilets include dual flush systems, which give an option for a smaller volume flush, or adding space occupying devices to toilet cisterns, such as toilet hippos. In this activity, pupils will calculate the amount of water saved using these devices, and then design a toilet for the future, which will save as much water as possible.

Step 1: how much water used – volume calculations

Ask pupils to work through the questions below to find out how much water is saved during toilet flushes using current water saving techniques.

1. What percentage of water is saved using the small flush in a modern dual flush toilet?
Information:
Dual flush toilet full flush = 6 litres
Dual flush toilet small flush = 4 litres
Answer: 33.3%
Calculation
Water saved = 6 litres – 4 litres = 2 litres

$$\text{Percentage saved} = \frac{\text{Volume of water saved}}{\text{Total full flush volume}} \times 100 = \frac{2 \text{ litres}}{6 \text{ litres}} \times 100 = \mathbf{33.3\%}$$

2. What percentage of water is saved by adding a toilet hippo to an old toilet cistern?
Information:
Original toilet volume = 9 litres
Dimensions of toilet hippo = 10 cm wide by 19 cm long by 19 cm high
1000 cm^3 = 1 litre
Answer: 40.1%
Calculation
Volume of hippo in cm^3 = 10 cm x 19 cm x 19 cm = 3610 cm^3
Volume of hippo in litres = 3610 cm^3 / 1000 cm^3 = 3.61 litres

$$\text{Percentage saved} = \frac{\text{Volume of hippo}}{\text{Total full flush volume}} \times 100 = \frac{3.61 \text{ litres}}{9 \text{ litres}} \times 100 = \mathbf{40.1\%}$$

Step 2: design a toilet

Based on the calculations in Step 1, current methods allow us to save up to 40% of water used to flush a toilet.
Now, we invite pupils to get creative and invent a new toilet design for the future that minimises water use as much as possible.
Some ideas to reduce water use include

1. Less or no water to flush e.g. composting toilet
2. Use rainwater to flush the toilet instead of drinking water
3. Harvest water that has already been used to flush the toilet e.g. water from showers / baths / sinks

Designs can be 2D or 3D, they can be as colourful and incorporate as many extra features as pupils would like. The overall design should be accessible to everyone, including people with disabilities.

Designs should be labelled to show where water is coming from, how it's use is being minimised and what happens to the waste when it is flushed.

Invite pupils to share their designs with their classmates, or at an assembly.