EERIE ENGINEERING

University of the Built Environment EST. 1919

Royal Academy of Engineering

Eerie Engineering KS2 Lesson Plan

Poo, eww! How long is your loo? (long drop toilets)

Time	Learning objective	Abbreviations	Materials needed
1 hour 15 mins	To understand how engineering has changed over time.	• Chn: Children • TA: Teaching Assistant • CT: Class Teacher • TTYP: Talk to Your Partner	Soreen [check allergies - can use clay, plasticine, or playdoh], washing up bowls, scales, measuring jugs, yellow dye, meter rulers, range of construction material [tubing, cardboard, mini bricks etc]

Steps to success

- To understand some of the issues associated with toilets.
- To design your own long drop toilet and assess how efficient it is.
- To understand how the weight and height can affect the “splashback” and why.

Curriculum links

- Science: motion and forces, measuring and collecting evidence based on a comparison and fair testing.
- D & T: design of innovative, functional, appealing products that are fit for purpose.
- History: a study of changes over time.
- PSHE: health and sanitation, can link to water problems worldwide.

Lesson part	Activities		
Hook (5 mins)	Today we are going to talk about something that everybody loves…toilets!	On post-it notes get chn to write down everything they know about toilets - why we need them, what they do, any history, who has them, draw them, has anyone used a toilet in another country? How is it different? [set some expectations: school friendly language only please.]	Gather all post-its together on a big poster paper.

Intro (10 mins	Why on earth are we talking about toilets? Well toilets deal with one of the most important engineering questions in history: what do we do with our poo and wee?! As we can see from your post-its there are a million things to know about toilets - pick out some good examples and get chn to discuss [If there's anything about sanitation/international toilets/ any history, pick that out in particular]	Using the toilet is something that everyone does (even if they don't admit it…) but have you ever thought about what the very first toilets looked like? In medieval England people (understandably) were a bit disgusted by their poop so they began to invent clever structures to keep it away from them. Now just how far away from poop can you actually get? It turns out very far! Without flushes or any modern technology, people had to poo in what was basically a hole in the ground. Now, if you were unlucky, the distance between you and the ground was not very far - I'm sure you get the gist of why this wasn't very fun.	If you were lucky and lived in a castle, then your poo and wee would have a very looooooong drop down to the hole in the ground [show website image Eerie Engineering]! What is the key the difference? TTYP Feedback - hopefully chn identify "splashback" element.
New learning (10 mins)	So we know what was happening but let's think about some of those more eerie details of having a long drop loo. If anyone has ever been camping or stayed slightly off the grid, you might have already thought about probably the most gruesome element of this kind of toilet… what do you do when the pit or hole is full? [take answers]	To keep it sanitary, it has to be emptied and the medieval solution was to employ some lucky people to take all the waste away. To make them sound a bit more polite, they referred to these people as the "gong famers". The word "gong" comes from old English "to go" basically referring to the toilets that they were collecting waste from. These people would go to the cesspits in the middle of the night (sometimes called nightmen) and collect up all the poo and wee and take it away in carts [gong farmer image on web]. Do you want to know what they did with the tonnes of it?… some of it they dumped at the edges of town, and some of it they turned it into manure, which basically means that they spread it as fertiliser on all the crops that people ate! The toilets themselves weren't like the bathrooms that we have now. The long drops would lead up to what was known as the "garderobe" which was a very small room/large cupboard that tended to outcrop over the building. This is where you would sit to do your business. They had some funny ideas about smells in the middle ages, and thought that all the smells from the toilet would protect their clothes from material-eating moths and mites!	

Design and construct task (20mins)	Now what you are going to do today is design and build your own desk-drop toilet. In this task you'll be engineering from scratch, so you need to think about different aspects of the toilet, including splashback and sanitation.	Considerations [write these on whiteboard to refer to]: How wide does the hole need to be? No one wants to fall down any long drops! The structure? What material will suit it? Think about weather/waterproof - how can you make sure that "wee" stays in it? How wide should the tube be? Can it bend? Do you need a seat? Do you need to cover it? How do you stop the toilet from smelling?	Chn to get into pairs [CT to organise] and make their long drop toilet. No testing yet - just build and create your ideal long drop toilet. Help the chn make their toilets - target groups needing support.
Assessment (10mins)	To see how successful your toilets are we are going to measure the splashback. Ask chn what they think has an effect on the height of splashback? volume/weight/height.	Chn to have a washing up bowl to test their toilet. Use a ruler to measure the splashback for each "poo"- record in a table [handout 1] - weight of poop, height, and splashback. What gets you the biggest splashback? What gets the smallest? Think about how you could design it differently to achieve.	Teams to share their highest and lowest scores - who has achieved the lowest?
[**Optional Extension** (15 mins) *task is dependent on school having a certain number of laptops for each group - if not can do as a whole class with chn doing maths on whiteboard?* use the animation for brick circumference and design in pairs at desks.]			
Plenary	chn are now experts in the built environment and can think of new ways for toilets to develop over time. What might toilets look like in the future? You may very well be designing them yourself in your career! Can link to website Eerie Engineering for more info.	Remind chn that whatever lessons they love or are good at that there are careers in the built environment for them, and that they can access the resources online at home to share with siblings, carers or pets!	