KEMPTON STEAM MUSEUM

Clean Water for Life
Learning Resources

Puff, Push, Power!
Educator's Notes

KS1

Keywords

Energy, steam, gravity

Topic Overview

Children will begin to think about why we use engines. They will be introduced to the amazing triple expansion steam engines at Kempton Steam Museum and how they were used to pump water uphill to a reservoir. The lesson breaks the parts of an engine down into components with fun physical action for each.

Key Stage One Curriculum Links

Science

- **Everyday materials** e.g. Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- **Working scientifically** e.g. performing simple tests and gathering and recording data to help in answering questions.

Mathematics

- **Measurement** e.g. sequence events in chronological order using language.
- **Geometry – properties of shapes** e.g. recognise and name common 2-D and 3-D shapes, including:

Prior Learning

- Pupils should be familiar 2D and 3D shapes, in particular cylinders.

Presentation slides

Look out for the speech symbol throughout the presentation — it marks moments for discussion, questions and shared ideas.

1. **Title slide:** Puff, Push, Power!
2. **Engines:** Discuss what children think we might use engines for.
3. **Push, pull, spin!** Explain that engines make a push, a pull or a spin. If there is room ask children to do a 'push' action, a 'pull' action and a spin action. Then ask what is helping us to move - talk about muscles, bones, bodies, food/energy. Encourage children to think about their own bodies as an engine.
4. **The Sir William Prescott Engine** is enormous - 19 metres tall. Taller than 4 double-decker buses.
5. **What were the engines at Kempton used for:** Engines are usually needed to do a job. After showing children pictures and videos of the William Prescott Engine what job do they think it might do? There are no right or wrong answers.

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Educator's Notes – Continued

6. **Water flows downhill:** Explain, or even demonstrate that water flows downhill because of gravity - just like solid objects are pulled down to earth, so are liquids. It can't go uphill on its own.
7. **Pump power!** Describe how the steam engines were once used for pumping water to a reservoir. Explain that a reservoir is a huge storage place for water - sometimes reservoirs are like lakes, other times they are massive underground tanks.
8. **It starts with steam:** Ask – 'What do steam engines need to make them work?' Historically the steam was made in coal fired boilers, today they are powered by gas. This is more controllable and efficient than coal.
9. **Here's how the steam engine worked:** Prepare the children to do some physical actions to the different part of an engine.
10. **Step 1:** Get children to wave their arms in the air to represent flames heating the water.
    Step 2: Get children to drum their hands quickly on their knees like powerful, energetic steam, representing particles bouncing around. Fun fact - it takes us 3 days to fire up the engine, check pressures etc.
11. **Step 3:** Get children to do a turning action with their hands, pretending to open a stiff valve to release the steam. Talk about how a valve acts like a door, you can open or close it, to keep steam in or let it out.
    Step 4: Get children to put their hands together and snake them around like steam travelling through the pipes.
12. **Step 5:** Get children to stand up and push their arms down by their sides in slow powerful action like the first move of the piston.
    Step 6: Now children can pump their arms up and down quite quickly like the powerful reciprocating motion (straight line motion, back and forth or up and down) of the piston.
13. **Step 7:** Get children to use their lungs and breath to suck in air and blow it out in a big breath. Liken the pump to a medicine syringe. You could demonstrate this with a syringe and a bowl of water.
    Step 8: The crank is a way to turn straight-line motion into round and round motion (reciprocal to rotary). If possible, get children to stand on one leg and act like they are pedalling a bike. Point out that their knee is going up and down and their ankle is going round and round. Repeat the steps again if you have time.
14. **Cylinders:** Check children's understanding. Talk about the properties of a cylinder. Show children a cylinder shape in the form of a toilet roll, glue stick etc. Cylinders have two identical flat circular faces (top and bottom), one curved surface connecting them, and two curved edges. It has no vertices (sharp corners).
15. **Can you remember the engine process?** Encourage children to recall the steps in the engine process.
16. **Design your own engine:** Discuss the advantages and disadvantages of each material. Get children to think about strength, durability, moisture and recylability.
17. **Design your own engine:** Use the printable sheet or just plain paper to encourage children to design their own engine - what will it be used for, what will it be made from?