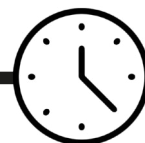


5. Sinking pipelines



1.5
hours

Exploration of materials which could be used to keep a pipe on the sea bed.

OBJECTIVES

- To investigate a range of materials that could be used to hold down a pipeline.
- To know that the greater the mass of the material, the lower the pipe will be in the water.

RESOURCES

(Per group of 4 children unless otherwise stated)

- Pair of pop socks (or tights)
- Funnel
- Scissors
- 100g (approx.) of each of sand, gravel and salt
- 10g masses¹ in a variety of materials
- 500g (approx.) compost
- 50-100ml measuring cylinders
- Scales
- 330-500ml plastic bottle and lid
- 3-5 litre tank or similar container
- [Activity sheet 8](#)
- Camera (optional)

INTRODUCING THE ACTIVITY

Remind the children of the previous activity looking at the shape of the pipes. Use [Activity sheet 8](#) to introduce the email from a company explaining they are having problems with their pipeline; it is floating up from the sea bed.

Ask the children in their groups to discuss how solutions to this problem could be investigated in the classroom. Each Communications Manager ([Appendix 1](#)) reports their group's ideas to the class.

1 These are not used as measuring equipment, but as alternative materials to fill the pop socks.

MAIN ACTIVITY

This activity offers children the opportunity to investigate materials that could be used to hold the pipe on the seabed. Other solutions suggested by the children can also be explored. Note: The children may suggest that they use something inside the pipe to hold it down. However, debris inside the pipe can cause damage, so is not a solution the company would consider. Activity 6 looks at this problem in more detail.

Pop socks are filled with the test material (e.g. 10g or 10ml), and placed over the horizontal 'pipe' (sealed plastic bottle) on a table. Adjust the length of the pop socks so they do not touch the table on either side. The loaded pipe is placed in a tank of water to observe whether it sinks or floats. If it does not sink, the amount of material in the pop socks is increased incrementally.

The children can record both mass and volume to appreciate the relationship between the two when evaluating successful quantities.

Each group tabulates their results, and decides whether the data could also be represented in a bar chart or line graph. Additional evidence can be provided in photographs and/or diagrams.

PLENARY

The class data are collated on the whiteboard to produce a set of repeated results, looking for patterns in the data, and identifying and discussing anomalous results. Each group can also prepare an email response to the company, which could include a PowerPoint or photo story presentation of their investigation, results and conclusions.

The children should appreciate that the greater the mass of the material added to the pipe, the lower in the water the pipe will be. The volume of some materials (e.g. compost) needed to achieve this will be very high. Some children may be able to understand that the materials that have the greatest mass in the smallest volume (e.g. sand) will be the most appropriate for the task.

Visit www.roughguidetogas.org.uk for interactive learning about gas pipe laying on the seabed.

AMBASSADOR ROLE

The pipelines that transport natural gas are covered in concrete, and an ambassador could bring photographs showing these pipes in construction and on the seabed.

An ambassador could describe the construction of the longest undersea pipeline, which is over 725 miles long and runs through the North Sea from Norway to Easington Gas Terminal in the UK. Construction started in 2004, and took three years to complete. The annual capacity of the pipeline is 25.5 billion cubic metres, which is 20% of Britain's peak gas demand.

An ambassador could provide details and photographs of sea life living on and around the gas pipes which can interfere with their operation, e.g. crustaceans inside the pipes, corals living on the structures. The pipelines are checked regularly for damage.

Appendix 1: Role Badges

All of the classroom sessions involve children working together in groups of four.

Each child is responsible for a different job or role within the group and wears a badge to identify this. The images below may be photocopied onto card and made into badges, by slipping them in to plastic badge sleeves. Keep sets of badges in 'group' wallets, to be used on a regular basis in your own science lessons.

Children should be encouraged to swap badges in subsequent lessons; this will enable every child to experience the responsibilities of each role.

Administration Officer - keeps a written and pictorial record for the group.

Resources Manager - collects, sets up and returns all equipment used by the group.

Communications Officer - collects the group's ideas and reports back to the rest of the class.

Health and Safety Manager - takes responsibility for the safety of the group, making sure everyone is working sensibly with the equipment.

Where groups of 5 are necessary, the following role can be used:

Personnel Manager - takes responsibility for resolving disputes within the group and ensuring the team works cooperatively.

