4. Pipeline shapes

1.5 hours

Investigating the effects of pressure on a range of pipe shapes.

OBJECTIVES

- To understand that pipes are cylindrical because the forces applied by gases under pressure are more evenly distributed than in other shapes.
- To be able to use observations to draw conclusions.

RESOURCES

(Per group of 4 children unless otherwise stated)

- Adhesive tape
- 3 long balloons
- Balloon pump
- A4 paper
- Activity Sheet 7
- Camera (optional)

INTRODUCING THE ACTIVITY

Refer to the display to discuss what the children have learned so far. Ask the children how they think the gas gets to shore when we need to use it. Ideas may include use of ships and pipelines. Discuss their ideas by comparing efficiency, cost, time, etc.

Explain that long pipes are laid along the seabed to transfer the gas efficiently. Visit www.roughguidetogas.org.uk for activities exploring how pipes are laid on the sea floor.

Ask the children what shape pipes are, ensuring the term cylindrical is used rather than 'round'. Tell the children they are now going to explore other shapes of pipes, to find out if they might be better than cylinders.

MAIN ACTIVITY

The children test three or more different shapes of 'pipes'. Children can be given Activity Sheet 7 that offers a guide to the three nets required to produce their paper pipes. Approximate dimensions are given, but this will vary with the size of balloons used, so some exploration of 'pipe-size' may be needed.

Explain that the gas is 'under pressure' or 'squeezed' inside the pipe. Therefore, when testing their own pipes, the children use long balloons to represent the pressurised gas inside the pipe.

The children should observe what happens to their 'pipes' as they blow the balloon up inside each one. They can record their observations in drawings, photographs and/or writing.

The cylindrical pipes should not really change but those with a triangular or square section should distort and become more cylindrical.

PLENARY

Once the children have completed their investigations, they report their findings by using envoying or A-B Talk discussion strategies, as outlined in Appendix 2. They should be able to explain which shape would be the best for a pipe and why, using their findings as evidence.

This is a good opportunity to assess the children's ability to use their observations to draw conclusions.

BACKGROUND INFORMATION

Storage containers for gases are cylindrical or spherical as gas under pressure is naturally trying to expand and push out in all directions. Corners on a container are weak points. The same principles apply to pipes; the pressure pushing outwards is evenly distributed around a cylinder.

Appendix 2: Discussion Strategies

The following strategies are used extensively as part of the Discussions in Primary Science (DiPS[1]) project, and have been proven to be successful when developing children's independent thinking and discussion skills.

Use of these strategies is strongly recommended during the activities in this resource. A description of each strategy is provided below, suggesting the type of discussions best suited to each activity.

Talk cards

Talk cards support the teacher in facilitating these discussions, with the letters, numbers, pictures and shapes enabling the teacher to group children in a variety of ways. The role badges described in Appendix 1 can also be used for this purpose.

The example provided here shows one set for use with four children. The set can be copied onto a different colour of card and talk groups are formed by children joining with others who have the same coloured card.

Children can then pair up by finding a partner with the same animal or a different letter eg. elephant, rhino or a + b pair. Each TALK pair would then have a card with a different number or shape.

The numbers or shapes may then similarly be used to form alternative groupings and pairings.

ITT (Individual Think Time)

Each child is given time to think about the task individually before moving into paired or group work.

Talk Partners

Each child has a partner with whom she/he can share ideas and express opinions or plan. This increases confidence and is particularly useful where children have had little experience of talk in groups.

1 For more information go to www.azteachscience.co.uk