

TUNNELWORKS

KS2 MATHS LESSON 1

TEACHERS' NOTES

Lesson overview

In this presentation led lesson about volume measurement, pupils are challenged to work out how much cargo a typical barge can carry. They do this by working out the cubic capacity of the hold. If you are planning to do the science lesson as well, we recommend you do that one first, as this lesson reveals the shape of barges, which is a key learning outcome in the science lesson.

The children begin by watching a short video where they meet a young engineer from the Thames Tideway Tunnel, who sets the scene and explains the task to the children, before they start the activity.

Pupils carry out a practical measurement activity in their classroom to understand how to measure volume. They then apply their learning in another context by working out the capacity of different sized cargo holds on typical Thames Tideway barges, so they can measure how much spoil can be loaded onto the various barges.

When they have finished their calculations, they watch a second video where the engineer explains to them how the capacity of a barge hold is measured and how that information is used to plan the removal of spoil from tunnelling sites.

As an extension, they can measure the volume of a school corridor and draw comparisons with the capacity of water that can be held in a tunnel, introducing children to the different ways of measuring capacity with solids and liquids. By the end of the lesson, children will have a better understanding of how a barge operator or construction logistics engineer uses maths to measure how much excavated spoil or water can be held or transported in a restricted space.

Alongside the presentation, in these teaching notes you can find the necessary resources to support the activity including relevant curriculum links, a structured lesson plan and assessment for learning questions to help guide the children's investigations. There are also optional extension discussion points and activities to challenge children, or for you to use in a follow-up lesson.

If you would like to find out more information about the Thames Tideway Tunnel project, you can visit the website at <http://www.thamestidewaytunnel.co.uk/>.

Curriculum links

- Maths
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Years five and six

Measurement

- Calculate, estimate and compare volumes of cubes and cuboids using standard units, including cubic centimetres and cubic metres, and extending to other units.
 - Convert between different units of metric measure, e.g. km and metre, cm and metre, gram and kilogram.
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Lesson objectives

- To compare the volumes of different sized barge holds by measuring the volume of cuboids.
 - To recognise that you can use different measurements to work out the volume of a shape including liquids.
 - To identify how liquids change to fit different shapes and can be used to measure the capacity of more difficult shapes like a tunnel.
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Prior learning

It would be helpful if children have some prior learning of how to measure the volume of solids and liquids and be familiar with different units of measurement including centimetres, metres, millilitres and litres.

The children may also find it helpful if they have done the science barge practical lesson first, as the science concepts they cover will help support their learning in this maths activity. That lesson can be found on the Tunnelworks primary science area, however it is not essential and this lesson may be taught as a stand-alone lesson.

Resources required:

- Whiteboard with internet access and sound
 - Rulers
 - Metre sticks
 - Scrap paper
 - Squared paper
 - Worksheets
 - Measuring cylinders (optional)
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Key words

Volume, capacity, spoil, barge, hold, estimate, measure, centimetres, metres, millilitres, litres, tonnes

Discussion questions

- What do you think the team at the Thames Tideway Tunnel need to think about when they're loading a boat up with spoil? (How much room they have on the boat, how much spoil needs to be transported on the boat, the weight of the spoil.)
- How can we find out how much cargo can be loaded onto a barge?
- How can we calculate the volume of the classroom?
- What equipment do you need to use to measure the classroom?
- What equipment do you need to use to measure the corridor?
- If we were measuring the capacity of a vase, how could we accurately measure the volume of this shape?
- How much orange juice do you think would be needed to fill up the classroom?
- Why is it sometimes easier to use liquid to help us measure volume?