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| **Marine engineering** |
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| Learn about marine engineering and build a model of a sail boat |
| **Subject(s):** Design and Technology, Engineering**Approx time:** 50-80 minutes |  | **Key words / Topics:** * aerodynamics
* adhesives
* assembly techniques
* history of engineering
* modelling and prototyping
* sail boats
* wood and timber-based materials
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| **Stay safe** Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for: • ensuring that any equipment used for this activity is in good working condition• behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others  Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ |
| **Suggested Learning Outcomes**  |  |  |
| * To be able to make a sail boat using craft sticks
* To be able to test their sail boat to check how well it works
* To understand the marine engineering history of the United Kingdom
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| **Introduction** |  |  |
| This is one of a series of resources designed to allow learners to use the theme of significant turning points in British history to develop their knowledge and skills in Design & Technology and Engineering. This resource focusses on making and testing a model of a sail boat.As an island nation the United Kingdom has a huge history and tradition in the field of marine engineering. This includes building sailing ships like HMS Victory, famously commanded by Admiral Nelson at the Battle of Trafalgar. Can you make a working model of a sail boat? |
| **Purpose of this activity**In this activity learners use of the theme of significant turning points in British history, specifically their achievements in marine engineering, to make a model of a sail boat from craft sticks. They will then test their model to see if it floats.This activity could be used as a main lesson activity to teach about making models and assembly techniques. It could also be used as part of a wider scheme of learning to support focussed practical skills within Design and Technology and Engineering, or about the history of Engineering achievements in the United Kingdom. |
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| **Activity** |  | **Teacher notes** |
| **Introduction and safety (10-20 minutes)**Teacher to explain the task to learners and hand out tools, equipment and resources required. Teacher to explain potential safety issues when using tools and equipment.**Making the sail boat (30-40 minutes)**Teacher to demonstrate steps shown below and on the presentation. Learners to then follow these steps to make their own sail boat.* Step 1 – Lay twelve craft sticks down in a straight row. This forms the base. Glue three sticks to the base - one on the left side, one on the right and one in the middle ⚠
* Step 2 - Build up the side layers of the boat by gluing sticks across the corners. Keep layering sticks on the sides until you have about five layers ⚠
* Step 3 - Cut a triangular shape out of card or paper for the sail. Glue a craft stick halfway up and in the middle as shown. Fold the card over to create the sail ⚠
* Step 4 - Use a glue gun to join the stick holding the sail to the base of the boat. Use enough glue so that it will not move. Allow the glue to dry ⚠

**Testing the sail boat (10-20 minutes)**Learners to place their boat in water and see if it floats. Teacher to discuss how successful the making of each boat has been with learners.  |  | **Making**Step 1 - Use a glue spreader to get an even spread of glue. The craft sticks used are the same as standard lollipop sticks. The three sticks glued on top of the first line of sticks will hold them together and give stability to the boat.Step 2 - Although five layers are recommended, more could be added – however, too many may make the boat too heavy to float.Step 3 - Learners could use coloured card or paper for improved visual appeal. As an extension they could design different sail shapes and see which works best when testing.Step 4 - The end of the craft stick to be glued may need to be cut so it is straight. Teacher could discuss with learners the best position for the sail. What effect would moving it have? Note: as specified in BS4163:2021, safety glasses should be worn when using the glue gun.**Example**An example of a completed boat to aid learners is shown on slide 9 of the teacher presentation. As an extension learners could colour the boat or redesign it to a more aerodynamic shape.**Testing**A half full washing up bowl could be used for testing. Learners could blow on the sail to see if it makes the boat move.As an extension learners could make different sail shapes to see which works best. |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Pre-measure and cut the sail shapes for learners to use.
* Produce a simpler boat that does not have the side layers, for easier construction.
* Pre-cut straight ends on the sticks for the sail.
 |  | * Design and make a sail boat with a more aerodynamic shape.
* Use paints to colour the boat and/or sail to make them more visually appealing.
* Design and test different shapes of sail to see which works the best.
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * PVA glue
* Glue spreader
* Craft sticks
* Highlighter pens or paints
* Material for the sail e.g. paper or card
 |  |  Marine engineering presentation |
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| **Additional websites** |  |  |
| * **Britannica – Battle of Trafalgar:** An account of the famous British navy victory achieved by Admiral Nelson:<https://www.britannica.com/event/Battle-of-Trafalgar-European-history>
* **18 Boat crafts for kids to make**: 18 different ways to make a sail boat model: <https://kidsactivitiesblog.com/56539/boat-crafts-kids-make/>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Discuss the history of British marine engineering achievements and accomplishments.
* Analyse examples of sail boats from the UK’s past.
 | **Extension** (Options)* Design and make a sail boat with a more aerodynamic shape.
* Use paints to colour the boat and/or sail to make them more visually appealing.
* Design and test different shapes of sail to see which works the best.

**Plenary*** Evaluation of sail boats produced and practical skills used.
* Discuss the importance of boatbuilding in the history of the United Kingdom.
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| **The Engineering Context** film |
| * The United Kingdom has a huge maritime and marine engineering tradition. As an island nation the importance of naval power remains to this day. There are a wide range of career opportunities in the marine engineering sector including materials, design, manufacturing, mechanical and electronic engineers.
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| **Curriculum links** |
| **England: National Curriculum**Design and technology* KS2 1b
* KS2 2a, 2b
 | **Northern Ireland Curriculum**Personal development and mutual understanding* Mutual Understanding in the Local and Wider Community: being aware of their own cultural heritage, its traditions and celebrations; recognising and valuing the culture and traditions of one other group who shares their community.
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| **Scotland: Curriculum for Excellence**Technological developments in society and business* TCH 1-05a

Craft, design, engineering and graphics* TCH 1-09a
* TCH 2-12a
 | **Wales: National Curriculum** D&T* KS2 Skills: Designing 1, 5
* KS2 Skills: Making 1, 2, 3, 5
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| **Assessment opportunities** |
| * Formal teacher assessment of completed sail boats and practical skills used.
* Peer and/or self-assessment of completed sail boats.
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