

Paper Power: A design & technology lesson for ages 7 – 9

Teacher Guide



This design & technology lesson has been designed for use with children aged 7 – 9 but could be adapted to use with younger or older children. The PowerPoint presentation can be edited to suit the needs of your learners.

The Lesson's aims

- **To apply an understanding of how to strengthen, stiffen and reinforce more complex structures** – Children will explore ways to fold, layer, roll and reinforce paper then use these techniques to create a mini model shelter.
- **To test and evaluate the strength and stability of structures** – Children will investigate how strong and stable their model shelters are by testing whether they can withstand a 'breeze' (from a fan or hairdryer).

Background information

Sustainably managed forests

Children will be introduced to sustainably managed forests for paper production. Sustainably managed forests are crucial for paper production, providing a reliable and renewable source of wood fibre while ensuring ecological and social benefits.

Key facts about sustainably managed forests for paper production

Renewable resource

Paper production relies on a renewable resource, trees, which are replenished through sustainable forestry practices.

Biodiversity and ecosystem services

Well-managed forests preserve biodiversity and provide essential ecosystem services, such as carbon sequestration and clean water.

Growing forests

European forests are growing, with new growth exceeding harvested wood, ensuring a sustainable supply of timber for paper production. Between 2005 and 2020, European forests grew by 58,390 square kilometres – that's an area bigger than Switzerland and amounts to over 1,500 football pitches every day!

Certification

Certification programmes like FSC® and PEFC ensure responsible sourcing, traceability, and adherence to sustainable forestry standards.

Circular economy

The paper life cycle is a well-functioning system which minimises waste, with high paper recycling rates. The European paper recycling rate is 79% and 83% of paper packaging is recycled.

Low carbon intensity

Paper production, especially when utilising renewable energy and recycled fibre, has a surprisingly low carbon intensity. The print and paper industry is one of the lowest industrial greenhouse gas emitters in Europe, accounting for just 0.8% of emissions in 2022.

Reduced water consumption

The paper industry is constantly working to reduce water consumption and implement water management practices. In 2022, around 90% of the water used in the European paper industry was returned to its source (having been reused within the mill before being suitably treated), with the remainder either evaporated, staying within the product, or bound up in solid waste.

Environmental benefits

Sustainable forest management helps to mitigate climate change by absorbing carbon dioxide and preserving forest ecosystems.

Social and economic benefits

Well-managed forests support local livelihoods and contribute to the broader economy through the production of paper and paper-based products.

Sources

- FSC® [What Is Sustainable Forestry?](#)
- PEFC [What Is Sustainable Forest Management?](#)
- Two Sides [Myths & Facts Booklet](#)
- WWF [Why Forests Are So Important](#)
- Forest Europe [State of Europe's Forests 2020](#)
- Love Paper [The Paper Fact File](#)

The Lesson sequence

Use the PowerPoint presentation to guide children through the lesson. You can edit the slides to tailor the learning to your pupils. You'll find useful notes on each slide in the presentation which expand on ideas and suggest relevant explanations, questions and points for discussion.

Resources needed:

- Paper Power Presentation
- Sheets of A4 paper
- Rulers and pencils
- Scissors
- Sticky tape and/or glue sticks (biodegradable paper tape would be ideal)
- Paperclips and/or paper fasteners
- Small toys (figures, dolls, cars, etc) or items to represent people, such as counting cubes
- Small fan or hairdryer to test wind resistance

Slide 2	Introduce the lesson and tell the children that in this lesson, they will be learning about paper and using it to make a structure. Ask the children what they know about paper, its uses and its properties.
Slides 3 - 6	These slides provide children with a little background information on where paper comes from and how, when sourced responsibly, from sustainably managed forests, it is a renewable resource.
Slide 7	Use this slide to provide pupils with some key facts about paper. Explain that companies, scientists, inventors and designers have to think about a material's properties and the impact it has on the environment to source and produce that material.
Slides 8 - 10	Introduce the task by discussing the term 'eco-shelter' with the children. Ask them to look at and describe the images on the slide and tell them about some examples of eco-shelters.
Slides 11 - 16	<p>Use these slides to take children through the challenge and how the paper shelters will be tested for strength once built.</p> <p>Inform children of ways to strengthen paper by folding, rolling and layering it. Tell them that triangles are great for strong shapes and that making tabs or flaps can help join pieces of paper together, making the structure more secure.</p> <p>You may wish to demonstrate each technique and even set aside some time for pupils to try each one before they get started on their group project or you might prefer to let the children experiment with the techniques mentioned.</p> <p>Assign groups and remind children about successful group work and the importance of trying and testing different techniques and designs. Explain what resources each group will have and hand these out.</p>
Slide 17	Discuss the results from the investigation, using the questions on this slide. Ask children to consider what the investigation has revealed, and what they have learnt about strengthening paper. Ask children to consider what they would do differently if they were to build another paper structure.
Slide 18	Recap on what the children have learnt in this lesson about paper as a renewable, sustainable material that can be used in design and technology projects, and can be strengthened, stiffened and reinforced.