How water wheels powered the mills

TN
TEACHER'S NOTES

LEARNING ACTIVITIES

1. KS1 - Build your own water wheel

Divide your class into groups of up to five pupils to build their own water wheel under supervision (20 mins each). If you have two teachers you should be able to manage a class of 30 pupils in an hour. You may decide to split a large class into two and get one half to complete Task 1 whilst the other half do Task 2, and then swap over.

What you will need

- Teacher's slides: How water wheels work

What you will need to do

- Read Teacher's slides: How water wheels work

How long will it take: 20 minutes for reading

Task: Make an 18th century water wheel

Ideally the children will work together in small groups. Help them identify the parts they will need and follow our instructions below.

Items you will need:

- 2 x pieces of circular cardboard with a hole at the centre
- 40 x plastic cups – 20 small ones and 20 large ones
- Stapler (with staples!)
- Axle (dowel rod)

Step 1: Take one circular piece of cardboard. Staple a plastic cup to the edge so that the top of the cup is at the outer edge of the wheel.

Step 2: Staple the next plastic cup beside the first one. Repeat until all the cups have been used.

Step 3: Fix the second piece of circular card to the other side. Staple each of the cups securely.

Step 4: Push your dowel rod (axle) through the middle.

Now try out your water wheel. Hold it over a bucket and pour water from the bucket into a cup, two or three down from the top to start it turning. See what difference it makes if you use more or less water, or drop the water from a greater height. If you have time, you could experiment with making a wheel with bigger 'buckets' (cups). What difference does this make?

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2. KS1 – Draw a diagram of water wheel

What you will need

Teacher's slides: How water wheels work

What you will need to do

- Look at the drawing of the water wheel on Teacher's slides: Copy this and name all of the parts.
- Colour in your water wheel
- How long will it take: This task should take no more than 20-30 minutes

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3. KS2 – Write the instructions to build an 18th century water wheel

What you will need

- Teacher's slides: History of the water wheel
- Teacher's slides: How water wheels work

What you will need to do

- Read Teacher's slides: History of the water wheel
- Read Teacher's slides: How water wheels work
- How long will it take: 45 mins – reading and discussion 25 mins, writing time 20 mins

a) Discuss how instructions were passed down by word of mouth, from craftsman to apprentice, perhaps using simple drawings. How have computer programmes made it easier to design things?

b) Imagine you are an 18th century wheelwright. Draw a diagram of a water wheel that you plan to build. Decide whether you want it to be overshot, undershot or breast shot.

Explain which one is best for the location. Is it on a fast flowing river with varying water levels, or fed by a small dam which is sometimes dry? Or perhaps lots of water is available from a big reservoir?

Name the parts on your diagram and what they are made of.

Identify the materials you have used and explain why. Here are some tips:

- Wood: light, locally sourced (from Sherwood Forest)
- Part iron (i.e. for the axle): last long and won't catch fire
- All iron: more durable and less leakage, therefore more efficient, as parts can be more precisely shaped. More expensive.

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4. KS2 – Build your own water wheel

What you will need

- Teacher's slides: How water wheels work
- Wheel parts: using everyday materials

What you will need to do

- Read Teacher's slides: How water wheels work

How long will it take:

- 1 hour – 15 mins for reading background and instructions and talking through different parts in the tool kit; construction 30 mins,
- 15 minutes testing and refinement

In this task, pupils will put their engineering skills to the test with a hands-on activity.

Pupils should work in small groups of four to six.

Discuss with pupils how they are going to approach the task before setting them off.

You may need to provide assistance.