| Willerby Carr Lane Primary School – Design and Technology | | |
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| **Topic: Victorians** | **Year: 6** | **Strand: Structures** |

| What should I already know? |
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| What will I know / be able to do by the end of the unit? | |
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| Which structures are used in renewable energy? | • Children will learn different ways of creating renewable energy:<br>- Wind power<br>- Solar energy<br>- Hydropower<br>• Focus will be placed on Hydropower, learning and researching:<br>- Hydropower refers to the conversion of energy from flowing water into electricity.<br>- It is considered a renewable energy source because the water cycle is constantly renewed by the sun.<br>- Hydropower is the largest contributor of all renewable energy sources.<br>- Giant water wheels would sit next to the factory and drive production through the flowing over water over the machine. The water would be powered downstream in a river to turn the machinery. |
| What is the best design for creating renewable energy using hydropower? | • Children will research different water wheels – annotating, analyzing and critiquing designs.<br>• A water wheel is a machine for converting the energy of flowing or falling water into useful forms of power, often in a watermill.<br>• A water wheel consists of a wheel (usually constructed from wood or metal), with a number of blades or buckets arranged on the outside rim forming the driving surface.<br>• There are two common vertical water wheel designs: 'undershot' and 'overshot'.<br>• An undershot wheel has the bottom of the wheel in the water. The flowing water strikes the paddles or blades and turns the wheel. The faster the water is flowing the faster the wheel will turn. |
| | • In an overshot water wheel, the water to the top of the wheel, where it strikes the paddles or buckets, turns the wheel. |
| How can I make sure I create an effective water wheel? | • Children will be shown a model example of a water wheel and how a structure can be made.<br>• Using prior knowledge, children will design, plan and make prototypes of their water wheel (from cardboard), potentially varying:<br>- Size of wheel<br>- Size of buckets/blades<br>- Size/orientation of mill race |
| How can I apply my knowledge to create a structure based on renewable energy? | • Children will transfer prototype experience to create their own water wheel structure.<br>• The criteria will be:<br>- A working structure which harnesses hydropower (speed of wheel)<br>- As efficient as possible<br>- Well-made and durable<br>- Aesthetically pleasing |

| Vocabulary | |
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| **Design** | |
| Aesthetics | Based on beauty or the appreciation of beauty. |
| Axle | a rod or spindle (either fixed or rotating) passing through the centre of a wheel or group of wheels. |
| Buckets | Catch and hold water – the weight of the filled buckets enables the wheel to rotate. |
| Mill race | the channel carrying the swift current of water that drives a mill wheel. |
| Paddles | Boards fixed to the wheel, enabling water to rotate the wheel – generally used for undershot wheels |
| **Making** | |
| Adhesive | able to stick to a surface or object; sticky. |
| Durable | able to withstand wear, pressure, or damage; hard-wearing. |
| Glue Gun | electric tool used for melting and applying sticks of glue. |
| Hacksaw | a saw with a narrow fine-toothed blade set in a frame. |
| Vice | device consisting of two parallel jaws for holding a workpiece |
| **Knowledge and Understanding** | |
| Hydropower | power that is generated from moving water such as rivers. |
| Mill | a building equipped with machinery for grinding grain into flour. |
| Non-renewable | **energy that is not naturally replenished, such as oil and coal.** |
| Overshot | (of a waterwheel) turned by water falling on to it from a channel. |
| Renewable | energy from a source which can be replenished, such as wind or solar power. |
| Solar energy | **power** generated directly from sunlight. |
| Sustainable energy | a form of **energy** that meet our today's demand of **energy** without putting them in danger of getting expired or depleted. |
| Turbine | a machine for producing continuous power in which a wheel or rotor. |
| Undershot | (of a waterwheel) turned by water flowing under it. |
| Water mill | a mill worked by a waterwheel. |
| Wind Power | power obtained by harnessing the energy of the wind. |

| Key Design Decisions & Skills |
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| • Children will learn and analyse what structures are currently used in renewable energy.<br>• Children will learn about **Overshot** and **Undershot** water wheels – building up an understanding of key criteria and relevant components.<br>• They will use this knowledge to design and make their own water wheel prototypes, specifically focusing on different wheel designs which they could use for their final product.<br>• Using what they have learnt from their prototypes, they will create a final structure.<br>• Their ultimate task is to create a model water wheel (without a generator/alternator to produce electricity) but still demonstrating a capacity for effective water energy.<br>• The criteria will be:<br>A working structure which harnesses hydropower (speed of wheel)<br>As efficient as possible<br>Well-made and durable<br>Aesthetically pleasing<br>• Skills children will develop: measuring, cutting, joining materials (hot glue with appropriate supervision / or wood glue), shaping materials, strengthening materials.<br>• Children will improve evaluative skills through reflecting on their structure, particularly the process of researching through to creation. |

| Tools and Resources |
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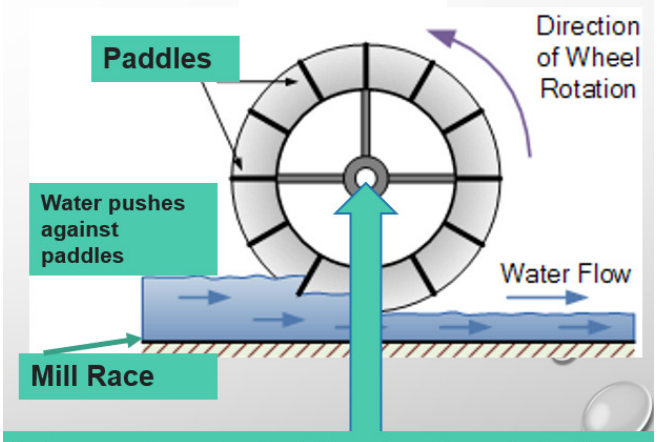
| • Cardboard sheets (thick and thin)<br>• Measuring equipment<br>• Cutting equipment (sharp scissors)<br>• Wood glue / glue gun (hot glue with appropriate supervision)<br>• Wood (lolly sticks / small wooden sticks)<br>• Hacksaws (if using wooden sticks)<br>• Vices (if using wooden sticks)<br>• Bottle lids (if required)<br>• Dowel (for axle)<br>• Straws (for axle/wheel) |

**Pictures**


## Undershot

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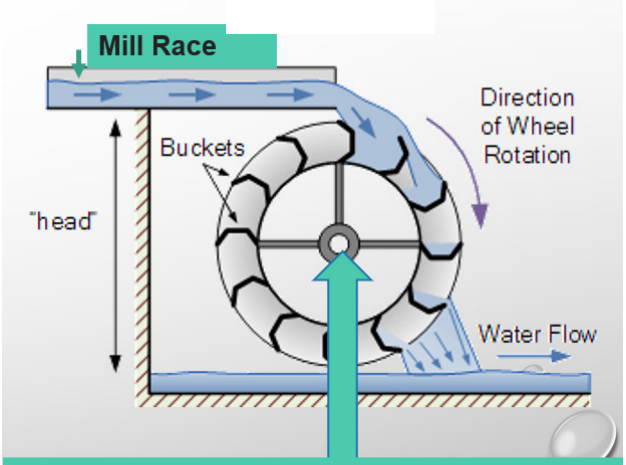
## Overshot

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