

Brough Primary School – Curriculum Intention Plan 2024 - 2025



Subject: Design and Technology Year Group: Year 5/6		Area of learning: Mechanical Systems - Pulleys and Gears
Links to previous work/Remember when	<p>All children should have lots of previous experiences with mechanisms and mechanical systems and understand that mechanisms are parts of machines that enable them to perform their function more easily.</p> <ul style="list-style-type: none"> • KS1 - Mechanisms - Sliders and Levers, Wheels and axles • LKS2 - Mechanical Systems - Levers and Linkages, Mechanicals Systems - Pneumatics 	
Term	Key Skills to be taught	
Summer 2024 What the children should know at the end of this series of lessons	<ul style="list-style-type: none"> - Investigate and analyse a range of existing products. - Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups - generate, develop, model and communicate their ideas through discussion, annotated sketches, exploded diagrams and prototypes - Select from and use a wider range of tools and equipment to cut, shape, join and finish their model accurately. - understand and use mechanical systems in their products [for example, gears and pulleys. - Evaluate their ideas and products against their own design criteria. 	

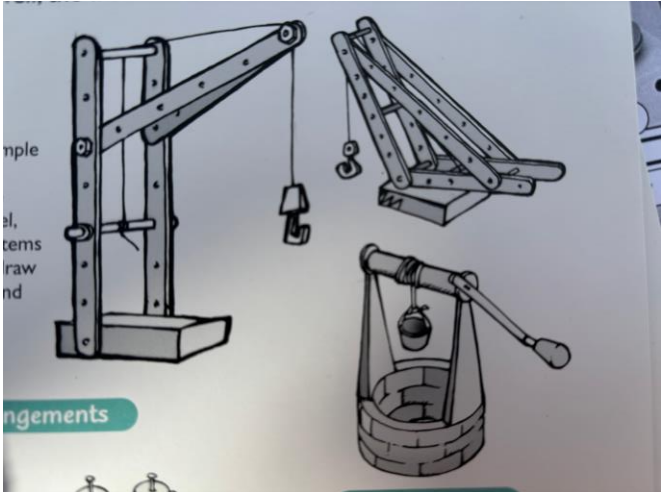
Vocabulary

Gear, Pulley, Drive belt, Gearing up, Gearing down, Mechanical system, Driver, Follower, Mesh, Motor, Motor spindle, Fixed pulley, Movable pulley, Gear ratio, Rotation, Rotary motion

Sequence of learning	Learning Objectives/Outcomes	suggested Lesson Outline
1	<p>Learning Objective: To investigate and evaluate existing fairground rides.</p> <p>Key Knowledge:</p> <p>Health and safety</p>	<p>Recap – Recap with the children - what is a mechanism? Why do we use mechanisms?</p> <p>Children record</p> <p><i>Use videos or photographs of rides that have rotating parts. Discuss the children's experience of such rides.</i></p> <ul style="list-style-type: none"> -How does the ride turn? -Can you see the mechanism which turns the ride? -What type of motion is used?

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	<p><i>Explain to children that they should not experiment with mains electricity and should only use batteries in commercially available appliances unless supervised by an adult</i></p> <p><i>It is inadvisable to use rechargeable batteries for home-made circuits - in the event of a short circuit they could get very hot and cause injury</i></p> <p><i>Children should not investigate the rotating parts of mechanisms in machines without adult supervision and only when there is no chance of a sudden rotation</i></p>	<p>- How many use rotary motion?</p> <p><i>Investigate a range of different mechanisms where belts and pulleys are used, e.g. a sewing machine or a vacuum cleaner.</i></p> <p><i>Try and model some of these ideas using a construction kit, e.g, Lego, if possible.</i></p>  <p><i>Explain to the children that they are going to make a fairground ride or a fairground sign to attract people to visit a fairground, e.g. Hull Fair.</i></p> <p><i>Look at the patterns, colours and lettering used for fairground decoration - draw some of the repeating motifs.</i></p>
2	<p>Learning Objective: To find out how pulleys work and their use</p> <p>Key Knowledge: A pulley is a wheel on a fixed axle with a groove in it to guide a rope or cable. The rope or cable is attached to the object you want to lift and looped over the pulley so that the end of the rope is hanging down on the other side. The</p>	<p>Recap – Recap with the children what type of motion was used in the fairground rides that they looked at last week - rotary motion.</p> <p>Recap what the word mechanism means and introduce the idea of pulley and gear mechanisms. Today we are going to focus on pulleys.</p> <p>Watch videos and explanations about what pulleys and gears are. E.g. https://nustem.uk/activity/levers-pulleys-and-gears-key-stages-1-2/</p> <p>https://www.bbc.co.uk/bitesize/articles/zwn2s82#zjsmfdm</p> <p>Children record <i>Use the 'Investigating pulleys' activities to find out more about pulleys and how they work.</i></p>

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	<p>pulley changes the direction of the force needed to lift the object or the amount of force that is needed to lift an object.</p>	<p><i>Complete the 'Things I have found out about Pulleys' activity sheet to record the learning. Photographs could also be put into books to record learning.</i></p>
3	<p>Learning Objective:</p> <p>To find out how gears work and their use</p> <p>Key Knowledge: Gears are wheels with teeth that slot together. When one turns, the other turns too.</p> <p>Gears allow a small force to have a greater effect. They work in 3 ways:</p> <p>1. To increase the turning force. Small gears turn quickly but with a smaller force, whereas large gears turn slowly with a greater force.</p> <p>2. To increase the speed. If you connect a larger gear to a smaller gear, the smaller gear turns much more quickly to keep up. So on our diagram, the blue gear will be turning faster than the yellow gear, and the red gear will</p>	<p>Recap – Recap with the children what type of motion was used in the fairground rides that they looked at last week - rotary motion.</p> <p>Recap what the word mechanism means and introduce the idea of pulley and gear mechanisms. Today we are going to focus on pulleys.</p> <p>Watch videos and explanations about what pulleys and gears are. E.g. https://nustem.uk/activity/levers-pulleys-and-gears-key-stages-1-2/</p> <p>https://www.bbc.co.uk/bitesize/articles/zwn2s82#zismfdm</p> <p>Children record Have a go with the children at investigating gear systems -</p> <ol style="list-style-type: none"> 1. Children could work together to make the gear system on the BBC Bitesize page listed above. 2. Get the children to investigate what happens when a large gear is the driver and a small gear is the follower. 3. Get the children to investigate what happens when a small gear is the driver and the large gear is the follower. 4. Get the children to note down the direction the gears turn - they should notice that the second gear will always turn in the opposite direction to the first gear. <p>Children to draw and label what they have found out about gear systems.</p>



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	<p>be turning faster than the blue one.</p> <p>3. To change direction. When you join two gears together, the second one will always turn in the opposite direction.</p>	
4	<p>Learning Objective: To create design criteria and design a fairground ride that uses a pulley or a gear system</p> <p>Key Knowledge:</p>	<p>Recap –</p> <p>Children record Discuss which type of ride the children will make <i>eg roundabout type (horizontal rotation) or Ferris wheel type (vertical rotation)</i>. Restrict the children's choices to one of these for simplicity and manageability; explain to the children the aspects of the design that are set (<i>eg according to materials available</i>) and those aspects about which they have free choice (<i>eg colour, finish, style</i>).</p> <p><i>Create design criteria with the children for their fairground ride:</i> <i>To be successful our fairground ride must:</i></p> <ul style="list-style-type: none"> - Rotate freely without the motor - Have a motor that drives the ride at the right speed - Be an interesting fairground ride - Have a strong and stable framework - Have a gear or a pulley system <p>Discuss how they will finish their model.</p> <p>If possible, children to make a simple mock-up of their design to show them how they will go about making it and to see if it will work. If not, create a design drawing with labels to show the rotating parts, the finishing, where the pulley system will be and how these will attach to a motor.</p> <p>E.g</p>

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		  <p><i>Examples about how to make this type of fairground ride are available here:</i> https://www.tts-group.co.uk/blog/2018/12/07/ks2-merry-go-round.html</p>
5	<p>Learning Objective: To make a fairground ride with a working pulley and gear system</p>	<p>Recap: Remind children of their designs, what gear and pulley systems are and show them how to make a pulley and a gear system that attaches to a simple electrical system.</p> <p>Children record: Children to make their fairground ride using either a gear or a pulley system.</p> <p>Ideas of how to make a fairground ride as shown in lesson 4 is available on this website: https://www.tts-group.co.uk/blog/2018/12/07/ks2-merry-go-round.html</p> <p>Children to select the appropriate equipment to make and to finish their design.</p>

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		<p>Remind the children of the health and safety requirements for using any of the equipment that you choose to use with them, e.g. scissors, saws, glue guns, etc.</p> <p>Add a photograph of the child's finished fairground ride to their DT book as evidence of outcomes.</p>
6	<p>Learning Objective: To evaluate the fairground ride against the design criteria</p>	<p>Children record: Evaluation of the model against the design criteria and improvements suggested.</p>

Learning Outcome/product

To design, make and evaluate a fairground ride that uses a pulley or a gear system.

Assessment records	List only those children who have not achieved the expected outcomes.