**Year 6 Design and Technology Curriculum – Autumn Term**

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| **Theme: Gears and pulleys (construction skills)** |
| **Curriculum objectives** | **Vocabulary** | **Links across the curriculum** |
| Experience of axles, axle holders and wheels that are fixed or free moving. • Basic understanding of electrical circuits, simple switches and components. • Experience of cutting and joining techniques with a range of materials including card, plastic and wood. • An understanding of how to strengthen and stiffen structures. Designing • Generate innovative ideas by carrying out research using surveys, interviews, questionnaires and web-based resources. • Develop a simple design specification to guide their thinking. • Develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views. Making • Produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team. • Select from and use a range of tools and equipment to make products that that are accurately assembled and well finished. Work within the constraints of time, resources and cost. Evaluating • Compare the final product to the original design specification. • Test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose. • Consider the views of others to improve their work. • Investigate famous manufacturing and engineering companies relevant to the project. | **Keyword** | Definition  | **Keyword** | Definition  | • Spoken language – ask relevant questions, formulate and express opinions, give well-structured descriptions and explanations. Use relevant strategies to build their vocabulary. Science –Recognise that some mechanisms, including pulleys and gears, allow a smaller force to have a greater effect.• Art and design – use and apply drawing skills. Use techniques with colour, pattern, texture, line and shape.• Mathematics – understand ratios. Apply understanding and skill to carry out accurate measuring using standard units i.e. cm/mm. |
| Pulley | A wheel with a grooved rim that changes the direction and point of application of a pulling force. | Driver  | A wheel or other part in a mechanism that receives power directly and transmits motion to other parts. |
| Drive belt | A flexible loop that is used to connect multiple pulleys within a mechanical system. | Follower | The followers are used to transfer the movement to the required machine part. |
| Gear  |  A toothed wheel that works with others to alter the relation between the speed of a driving mechanism (such as the engine of a vehicle) and the speed of the driven parts (the wheels): | Ratio | The relationship between two groups or amounts that expresses how much bigger one is than the other |
| Rotation | The action of rotating about an axis or centre: | Input | What is put in, taken in, or operated on by any process or system: |
| Spindle | A rod or pin serving as an axis that revolves or on which something revolves. | Output | The amount of something produced by a machine. |
| **Prior knowledge:** *What specifically have pupils learned that is relevant to this unit that they are building upon?* | **Future knowledge:** *What specifically will pupils learn in the future that is relevant to this unit?* |
| Experience of axles, axle holders and wheels that are fixed or free moving. •(Year 2) Basic understanding of electrical circuits, simple switches and components. (Year 4) • Experience of cutting and joining techniques with a range of materials including card, plastic and wood. • An understanding of how to strengthen and stiffen structures. (Year 3, 4 and 5) |  |
| **Lesson Sequence** | **Key Knowledge** | **Key Skills** |
| 1. To investigate gears and pulleys.
 | * • Investigate, analyse and evaluate existing everyday products and existing or pre-made toys that incorporate gear or pulley systems. Use videos and photographs of products that cannot be explored through first-hand experience. • Ask questions to develop understanding of each product in the collection e.g. How innovative is the product? What design decisions have been made? What type of movement can be seen? What types of mechanical components are used and where are they positioned? What are the input, process and output of the system??
 | * Investigational/research skills
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| 1. To construct gear systems, draw and label diagrams
 | * • Using a construction kit, explore combinations of two different size gears meshed together. Investigate the direction and speed of rotation focusing on how the size of the driver gear affects the speed of the follower gear. Ask the children to use the number of teeth on each gear to decide upon the gear ratios e.g. 10 tooth driver gear meshed with a 20 tooth follower gear produces a ratio of 2:1.
 | * Construction skills/ evaluation skills/ drawing skills
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| 1. To construct pulley systems, draw and label diagrams.
 | * Using a construction kit, investigate combinations of two different sized pulleys to learn about direction and speed of rotation e.g. How many times does the smaller pulley turn each time the larger pulley turns once? Do the pulleys move in the same direction? How can you reverse the direction of rotation?
 | * Construction skills/ evaluation skills/ drawing skills
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| **Themes and links** |
| **Themes** | **Where these are covered:** |
| **Investigate** | Lesson 1  |
| **Design** | * Lesson 2 and 3. Detailed drawings/diagrams of constructions.
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| **Make**  | * Lesson 2 and 3
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| **Evaluate** | * Lesson 2 and 3. How effective is the system that was constructed?
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