

Subject: DT

Year group: 5

Term: Autumn

Unit name: Mechanical Systems- Pulleys or gears

National curriculum-

- DESIGN- generate, develop, model and communicate their ideas through discussion, annotated sketches, prototypes and pattern pieces
- MAKE- select from and use a wider range of tools and equipment to perform practical tasks.
- EVALUATE- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- TECHNICAL KNOWLEDGE- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]

Key vocabulary

| | |
|----------------------|--------------------|
| Pulley | switch |
| drive belt | circuit diagram |
| gear | annotated drawings |
| rotation | exploded diagrams |
| spindle | mechanical system |
| driver | electrical system |
| follower | input |
| ratio | process |
| transmit | output |
| axle | design decisions |
| motor | functionality |
| circuit | innovation |
| design specification | authentic |
| design brief | user |
| | purpose |

Spiritual Development

DT Gives children the opportunity to work creatively and explore ways to make lives better for those around us. Exodus 34:35 He has filled them with skill to do all kinds of work as engravers, designers, embroiderers in blue, purple and scarlet yarn and fine linen, and weavers—all of them skilled workers and designers.

Prior Knowledge –

- 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.

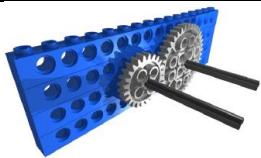
Design Process

Investigative and Evaluative Activities (IEAs)

Focused Tasks (FTs) *To include a prototype*

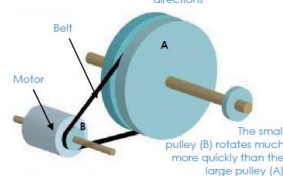
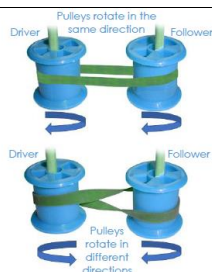
Design, Make and Evaluate Assignment (DMEA)

Gears and pulleys



Using construction kits, ask children to explore gear ratio using combinations of two gears e.g.

| No. teeth | Ratio |
|-----------|-------|
| 8, 16 | 2:1 |
| 8, 40 | 5:1 |
| 8, 24 | 3:1 |
| 40, 40 | 1:1 |



The small pulley (B) rotates much more quickly than the large pulley (A)

Building gears or pulleys into children's products

Pulley driven vehicle

Motor held with elastic band

Motor driven gears

An example of a handmade reversing switch

Two card discs

Paper fasteners as contacts

Paper fastener

Construct a chassis using wooden strips (frame) or corrugated plastic. Add a pulley and/or wheels and an electric motor with battery housing. The chassis can be used for a vehicle or to drive machines such as fairground rides.

Key Learning Assessment Statements- what will the children know by the end of the unit?

Through first-hand experience and secondary sources, to be able to analyse and evaluate toys that incorporate gear or pulley systems.

To make observational drawings and create questions to develop understanding of each product.

To gain an understanding of the work of engineering and manufacturing companies.

To investigate combinations of two different sized pulleys to learn about direction and speed of rotation.

AND/OR – To use a construction kit to explore combinations of two different size gears meshed together, focusing on the direction and speed of rotation and 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)

To be able to build a working circuit that incorporates a battery, a motor and a handmade switch, such as a reversing switch.

To demonstrate skills in measuring, marking, cutting, shaping and joining skills using:

- junior hacksaws
- G-clamps
- bench hooks
- square section wood
- card triangles
- hand drills

To evaluate their own ideas and products against their own design criteria.