



Year group: Year 5
Term: Spring
Subject: Design Technology – Mechanisms –
Pulleys or Gears – Egyptian Shaduf

Key vocabulary
Gears Pulleys Drive Belt Spindle

Developing understanding of 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)

Prior learning

EYFS

Early experiences of working with paper and card to make simple flaps and hinges. Experience of simple cutting, shaping and joining skills using scissors, glue and masking tape

Year 4 - Pneumatics

The children will be taught how to assemble the systems using syringes, tubing, balloons and plastic bottles. They will be introduced to ways in which pneumatic systems can be used to operate levers. They will be taught the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques..

What comes next?

Year 6 – Sliders Pulley Gears Levers and Linkages

The children will use a combination of skills previously to create a Mechanics project.

Notes and guidance

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? AND/OR

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

Develop measuring, marking, cutting, shaping and joining skills using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate. Demonstrate the accurate use of tools and equipment.

Substantive Knowledge

To know and understand that mechanical and electrical systems have an input, process and an output.

I know and understand how gears and pulleys can be used to speed up, slow down or change the direction of movement.

Disciplinary Knowledge

To know that designers develop and communicate ideas through discussion, annotated drawings, exploded drawings and drawings from different views.

To know that designers compare the final product to the original design specification, and test products with intended user and critically evaluate the quality of the design, manufacture, functionality and fitness for purpose.

Procedural Knowledge

I know how to produce detailed lists of tools, equipment and materials. Formulate step-by-step plans and, if appropriate, allocate tasks within a team.

I can select from and use a range of tools and equipment to make products that are accurately assembled and well finished.

I know how to work within the constraints of time, resources and cost.

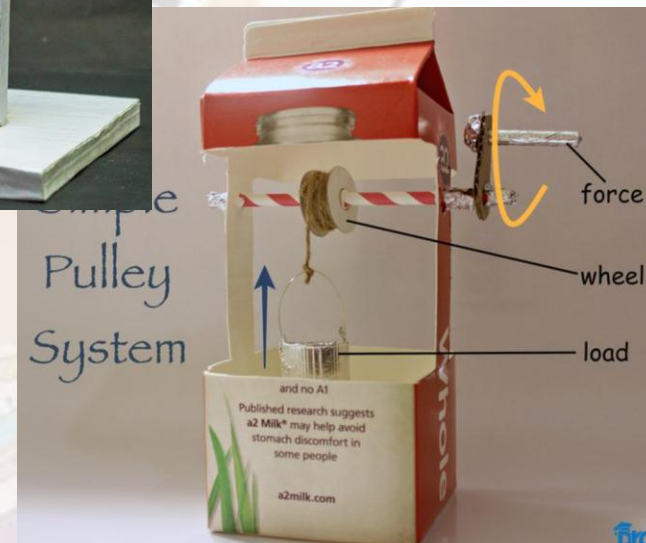
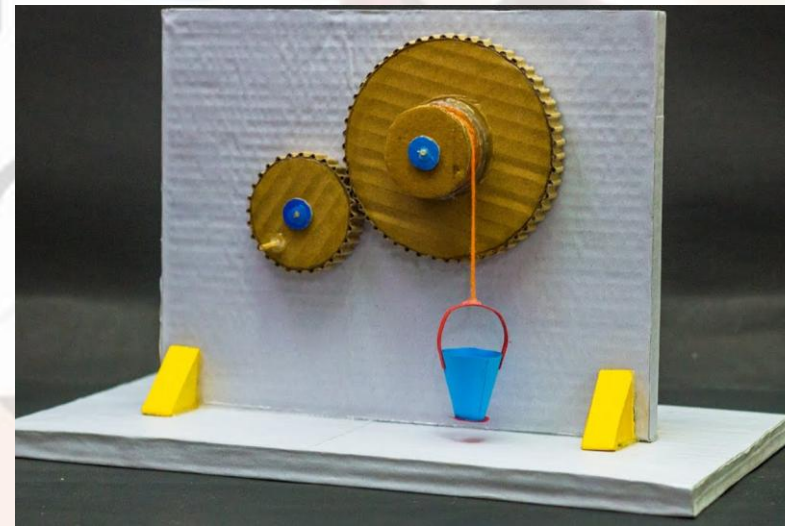
Links to other curriculum areas

Science – Materials

History – Egyptian Shaduf – pulley water system

End Points

- To be able to use creativity and imagination to create high quality products.
- To master the use of a range of design technology tools and techniques.
- To be able to design, make and evaluate their products referring to whether it is fit for purpose and meets the design criteria.



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Key vocabulary definitions

- Gears — Gears are wheels with teeth that fit together to make things move. When one gear turns, it makes the other gear turn too — sometimes faster or in the opposite direction.
- Pulleys — A pulley uses a wheel and a rope or belt to lift or move heavy things more easily, like on a flagpole or a crane.
- Drive Belt — A drive belt is a loop of flexible material (like rubber) that connects two or more wheels or pulleys, making them turn together.
- Spindle — A spindle is a thin rod or axle that holds and turns wheels, gears, or pulleys to help them move smoothly.

Resources

Pulley activities:

- Pulleys of different sizes (plastic or wooden)
 - Drive belts (elastic bands, string, or rubber bands)
 - Axles or spindles (dowels or thin rods)
 - Supports or wooden frames to mount the pulleys
 - Paper clips or hooks (to attach string or weights)
 - Small weights (to test lifting or speed)
- Gear activities:
- Plastic or wooden gears of different sizes and tooth counts
 - Axles or spindles (dowels, rods, or metal bars)
 - Gear boards or wooden frames (for mounting gears securely)
 - Measuring tape or ruler (to measure distances and gear sizes)

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