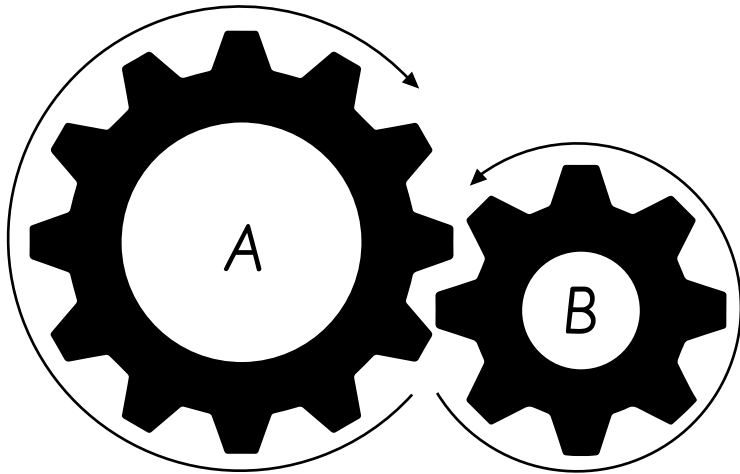


Gears

- A **gear** is a wheel with teeth.
- A gear system is multiple gears working together to **transfer** force and motion from one part of a **mechanical system** to another.
- Gears are used to change the speed, direction or force of movement.



An **input** like pedalling a bike causes gear A to rotate.

The teeth of gear A and gear B mesh together. If gear A is turned, it causes gear B to turn.

Gear B causes an **output** like the wheels on a bike spinning.

- **Speed:** larger gears (A) turn more slowly than smaller gears (B).
- **Direction:** gears (A and B) turn in opposite directions.
- **Force:** a larger gear (A) turning a smaller gear (B) requires less force while a smaller gear (B) turning a larger gear (A) increases the force output.

A **problem statement** describes a problem in detail, including who is affected and why it is important to solve it.

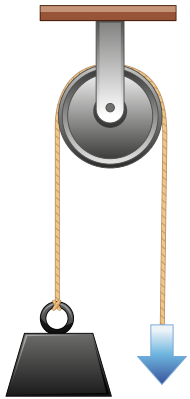
The class wants to **make smoothies** without using **electricity**, which will **save energy**, promote **physical activity** and increase awareness of **sustainable practices**.



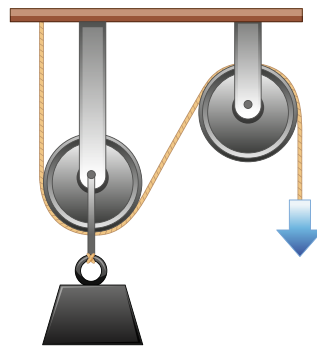
Pulleys

A **pulley** is a wheel with a groove and a rope or belt that fits into the groove.

A single pulley changes the direction of the input force, making lifting easier.



Multiple pulleys distribute effort over a longer distance, reducing the input force needed.



Examples

- Escalators.
- Conveyor belts.
- Treadmills.
- Theatre curtain systems.
- Sailboat rigging.
- Cranes.
- Blinds.

Market research gathers relevant **data** from potential users of the **product** to inform decision making during the **design** process.

Questions should be designed to find out about user likes, dislikes and needs.

Competitor research on the usability, aesthetics, innovation, cost and sustainability of existing products helps to differentiate the new product.

