

# WOW sheet

# Wedge

A wedge is one of the six types of **simple machines**.

A machine is a device that does a physical task. **Simple machines** are the most basic devices that allow work to be done with less effort. A simple machine can change the direction or the magnitude of a force, or the point where the force is applied.

## What is a wedge?

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A wedge is an object with at least one slanting side, which ends in a sharp edge. A wedge is a modified inclined plane which moves.

The wedge is a simple machine which reduces the force needed to cut material apart by spreading the force needed over a longer distance.

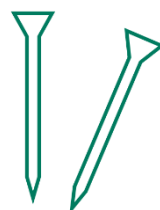
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A wedge can have a single sloping surface, or two sloping surfaces. A wedge with two sloping surfaces, known as a double wedge, is two inclined planes put back-to-back.

A wedge is similar to an inclined plane, but they are used differently. An inclined plane remains in one place but a wedge moves. The effort is also applied to the vertical edge of a wedge rather than parallel to the slope of the plane.

Common examples of wedges include:

- axes
- nails
- teeth



## Why use a wedge?

The most common reason to use a wedge is to split or separate some other object or material into two pieces.

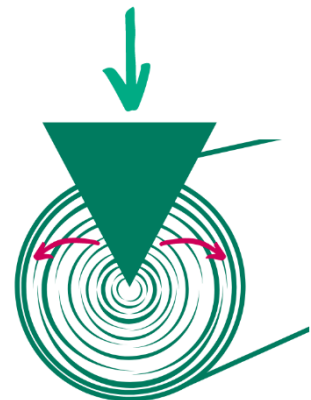
A wedge is wider at one end than the other end. This design allows the wedge to transfer force along the length of the wedge, from the wide end to the thin end. This concentrates the force into the thin tip of the wedge and allows the wedge to change the direction of the force.

### Here's an example

An axe is often used to split large logs into smaller pieces.

The axe is swung into the log. This swing is what gives the axe its energy.

The thin part of the wedge hits the log. The downward force from the swing is pushed into the wood, and splits the log apart.



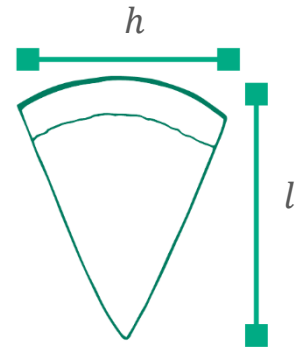
Wedges can also be used to stop motion.

### Here's an example

Door stops and wheel chocks are examples of wedges that hold an object in place, spreading the force from the thin part of the wedge up the full length of it.

## Mechanical advantage of a wedge

The ideal **mechanical advantage** (MA) for a wedge is determined by dividing the length of the incline by the width (also called the height) of the wedge at its thickest point.



This is equal to the length of the incline ( $l$ ) divided by the height of the plane ( $h$ ).

$$MA = \frac{l}{h}$$

### Here's an example

Your incisors are the flat teeth at the front of your mouth which help you bite into food. They are also little wedges!

Let's say your incisor tooth has a length of 6.5mm ( $l$ ) and at its thickest part, up near your gum, it has a height of 5mm ( $h$ ). That means the mechanical advantage of using this in-built wedge is:

$$\frac{6.5\text{mm}}{5\text{mm}} = 1.3$$

What does that '1.3' mean? It means that the wedge multiplies your input force by 1.3 times. In other words, it makes the impact of your bite 1.3 times more powerful!

You can think of it the opposite way too: however hard you work to bite into something, you would have to work 1.3 times harder to bite it without your tooth!