More simple machines

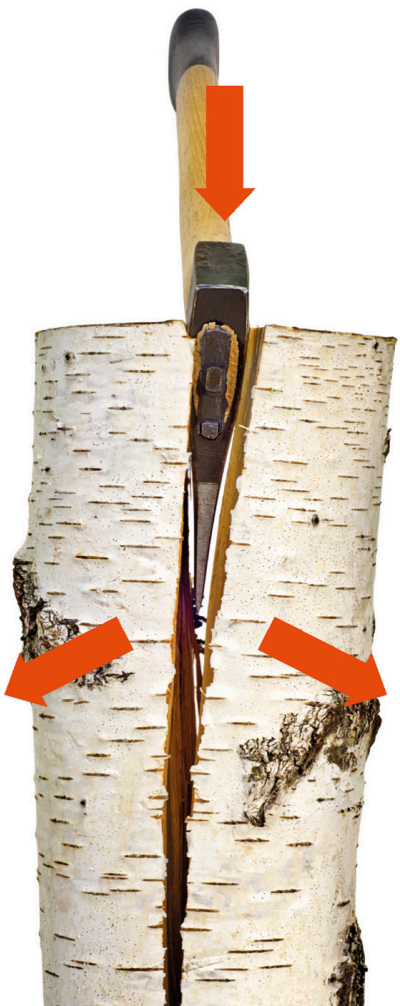
Levers and gears are not the only simple machines that can magnify or reduce forces. All the simple machines on this page make jobs easier by changing forces.

Key facts

- ✓ **Simple machines can magnify or reduce forces or change their direction, making jobs easier.**
- ✓ **Simple machines include levers, gears, ramps, wedges, screws, wheels, and pulleys.**

Wedges

A wedge is thick at one end and thin at the other. When you apply a force downward to the thick end, the thin end increases the force and drives it sideways, cutting or splitting an object.

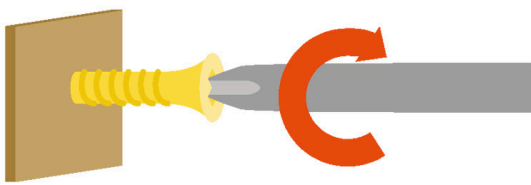


Ramps

The sloping surface of a ramp makes it easier to raise a heavy object. The shallower the slope, the lower the input force needed. However, the load has to travel a longer distance, so the work done to lift the object is the same.

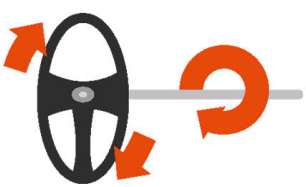
Screws

A screw is a ramp that has been coiled around a cylinder. Each twist of the screwdriver pushes the tip of the screw only a small amount forward but with greater force than the screwdriver exerts on the screw.



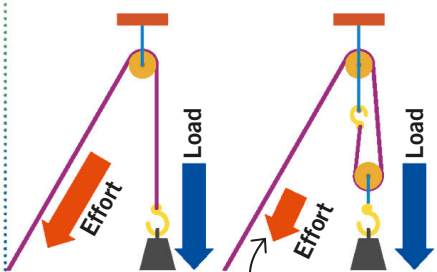
Wheels and axles

A wheel and axle work like a circular lever. Like levers, they can both increase or reduce forces. When the input force is applied to the rim, as with a steering wheel, the turning force around the circumference of the axle is magnified. When the input force is applied to the axle, the force at the rim is smaller but the rim moves faster than the circumference of the axle, as with a bicycle wheel.



Pulleys

A pulley is a rope or cable that runs around one or more wheels. If only one wheel is used, a pulley merely changes the direction of a force. However, if two wheels are arranged as shown below, the pulley doubles the lifting force. A three-wheel pulley can triple the lifting force.



A two-wheel pulley can halve the effort needed to lift a load.