Science 14

Unit B: Energy transfer technologies

Simple machines and work

A crowbar lifts a stuck board

- A long crowbar lets a small push on the handle produce a larger push on the board.
- Your hand travels farther than the board moves.

Work and the fulcrum

- Work is the force times the distance, and the unit is the joule.
- A fulcrum is the pivot on a lever, between the input force and the output force.

Key terms

work

Energy transferred when a force moves an object in the direction of the force. (W = Fd)

joule

The SI unit of work and energy. One joule equals one newton metre. (J)

newton

The SI unit of force. (N)

fulcrum

The pivot or turning point of a simple machine, such as the hinge of a lever or the axle of a doorknob.

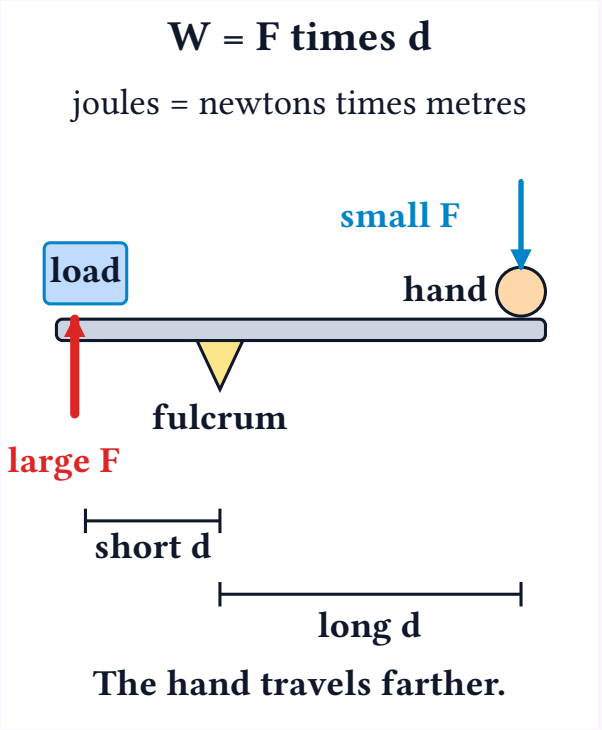
Key terms

force multiplier

A machine whose output force is larger than the input force, while the input moves farther than the load.

Work and mechanical advantage

- Work in joules is the force in newtons multiplied by the distance in metres.
- A lever can push harder than your hand, and your hand moves farther to do it.



30 newtons through 4 metres

- Multiply the force by the distance: 30 times 4.0.
- The work is 120 joules.

A small push on a crowbar

- The hand travels farther than the board moves.
- The board receives a larger force than the hand applied.

A teeter-totter

- A heavier rider sits closer to the fulcrum.
- A lighter rider sits farther out so the board can balance.

Force and distance on a lever

- The teeter-totter shows the force-and-distance balance with two masses.
- A crowbar, a pair of scissors, and a car jack each have an input, an output, and a fulcrum.