

Levers, pulleys and gears

**Change the force.
Notice the trade-off.**

Name mechanisms, find a pivot and explain a gain and a cost.



Find the turning point

01

Supported: point to where scissors turn.

02

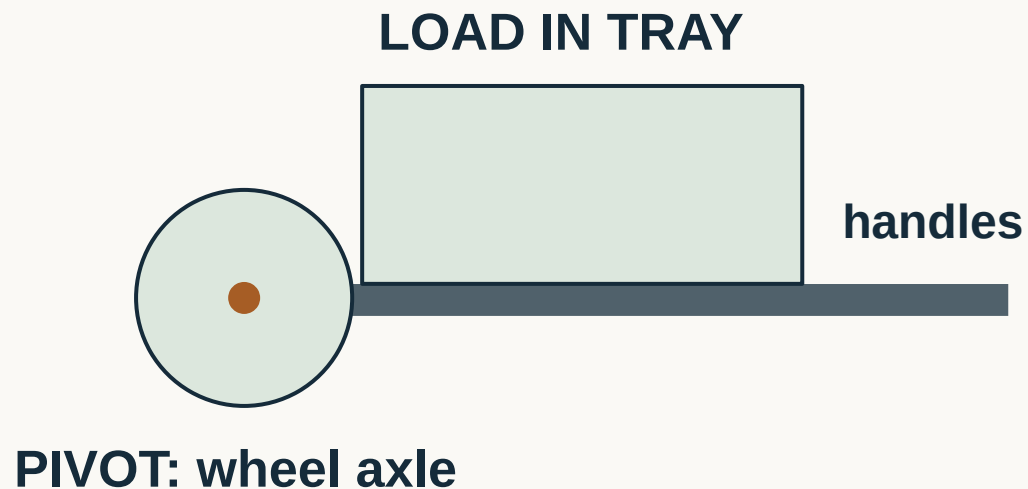
Standard: name that turning point.

03

Stretch: find it on a wheelbarrow drawing too.

Look, point, describe or draw.

Check the wheelbarrow's pivot



The wheel axle is the turning point when you lift the handles.

A wheelbarrow is a lever. The load sits between pivot and effort.

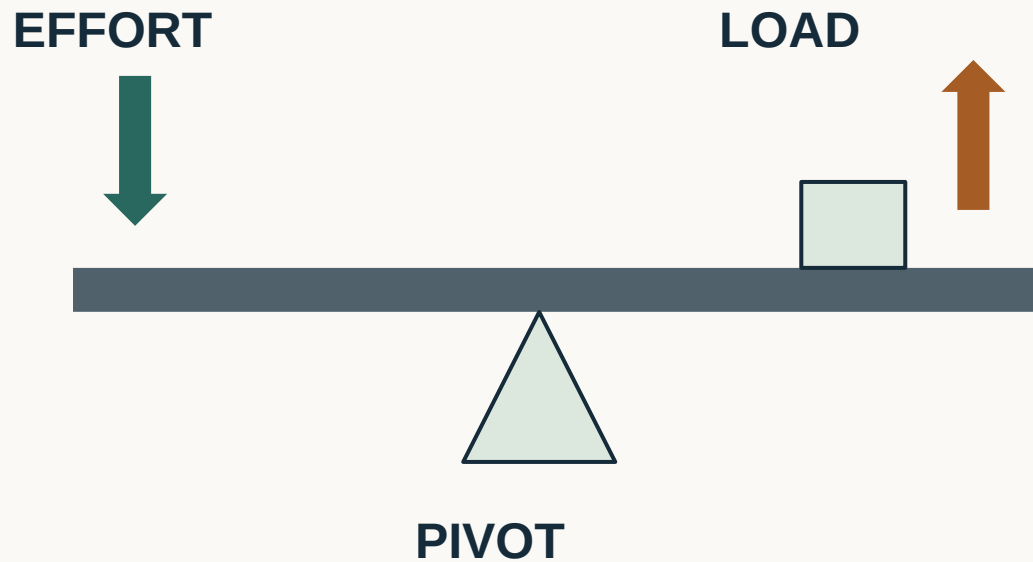
Three things to notice

1 Find the pivot.

2 Move it and compare the effort.

3 Explain what you gain and what it costs.

A lever turns about a pivot



The effort pushes one end. The load rises at the other end.

The pivot is the turning point.

Move the pivot, keep the load

- 01 Watch the adult use the middle pivot.
- 02 Predict what changes when it moves near the load.
- 03 Keep the effort point and small load rise the same.
- 04 Compare the effort and the hand's travel.

Which objects are levers?

01

Wheelbarrow

02

Scissors

03

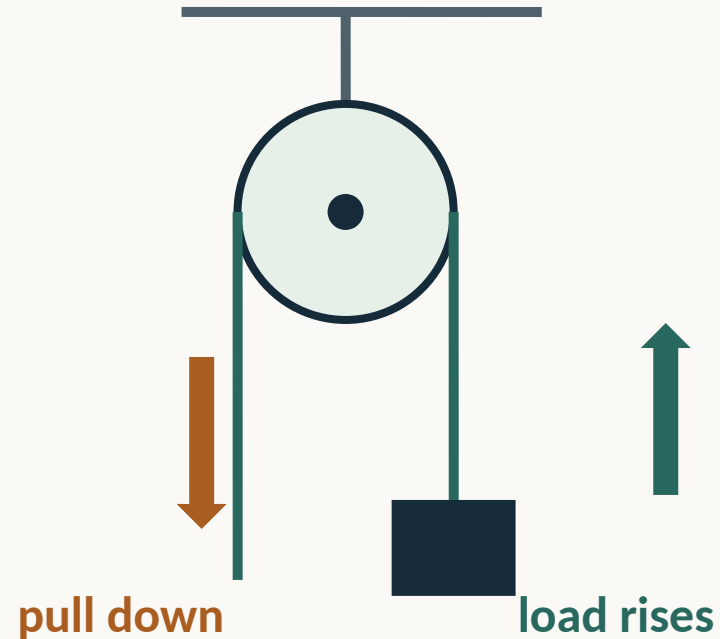
Spanner on a bolt

Point to a turning point before naming it.

A fixed pulley changes direction

At a flagpole, pull the rope down and the flag goes up.

One fixed pulley changes the pull's direction. It does not give free lifting force.



Gears trade speed for turning effect

01

Gears have teeth and pass on turning movement.

02

A bicycle uses chainrings, a chain and sprockets.

03

A lower gear can help turn the wheel against a load.

04

The wheel turns fewer times per pedal turn.

Check the mechanism and its job

MECHANISM

Lever
Fixed pulley
Geared chain drive

EVERYDAY EXAMPLE

Scissors, wheelbarrow, spanner
Flagpole rope over top wheel
Bicycle chain and cogs

Explain the gain and the cost

This is a ____ because _____. It helps by _____, but you have to _____.

Name the mechanism, its job and the trade-off.

Sort the gain and the cost

- 01 Less effort force needed

- 02 Hand travels farther

- 03 Pull down instead of up

- 04 Mechanism creates extra energy

- 05 Slower turning, greater turning effect

Check your choices

GAIN OR GAIN + COST

Less effort: gain
Pull down: direction benefit
Slower + stronger turn: both

COST OR FALSE CLAIM

Farther hand travel: cost
Extra energy created: false

Keep both halves of the explanation

Moving the pivot nearer the load can reduce the effort force needed.

For the same small load rise, the effort end must travel farther.

