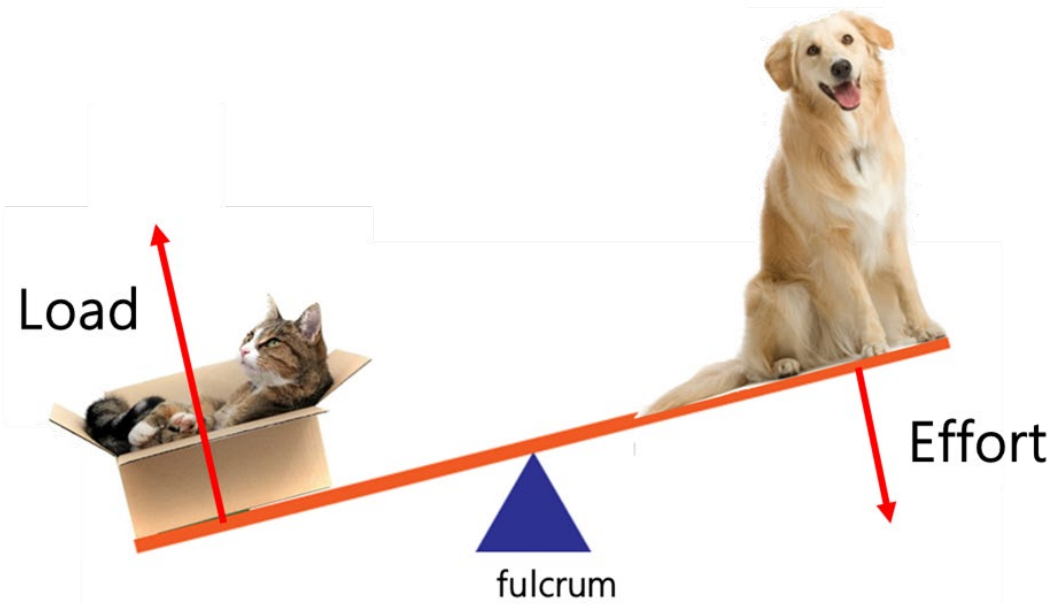
Levers

Simple machines can change the direction or size of a force by using 'mechanical advantage' to multiply force. A lever is balanced on a fulcrum, which allows it to pivot. A load is lifted by placing effort on another part of the lever. A lever involves moving a **load** around a pivot using effort (or a **force)**.

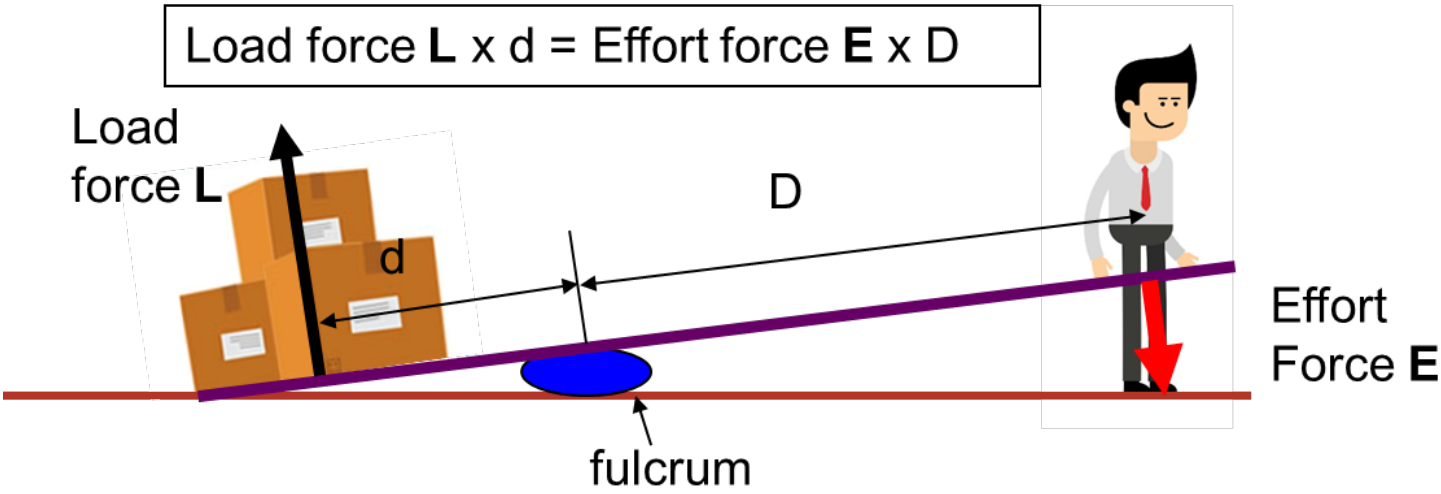
Examples of tools that are classified as levers include **scissors**, pliers, hammer claws and tongs.



Levers are a simple machine that increase force

For a tool to be classed as a lever there must be:

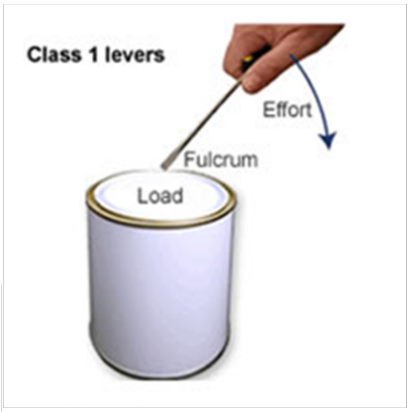
- a rigid handle
- a fulcrum (or pivot) around which the handle rotates
- a force increase – caused by the distance from the effort force to the fulcrum being larger than the load force to the fulcrum

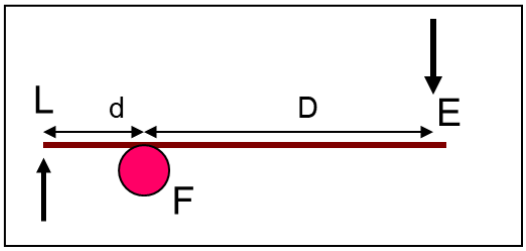


Levers are a simple machine that increase force

Levers are classified in classes depending on the position of the effort and load in relation to the fulcrum.

- **Seesaw type Lever (Class 1):** A lever where the load force acts on the **opposite** side of the fulcrum to the effort force. Examples include a Crowbar, Hammer and Tyre iron





- **Wheelbarrow type lever (class 2):** A lever where the load force acts on the **same** side of the fulcrum as the effort force. Examples include a Wheelbarrow, a Spanner and a Ratchet /tiedown
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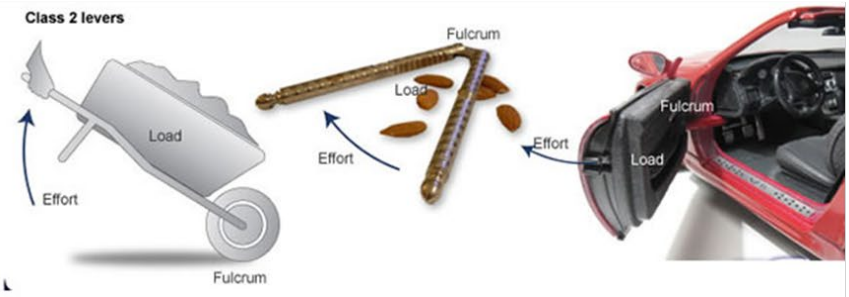
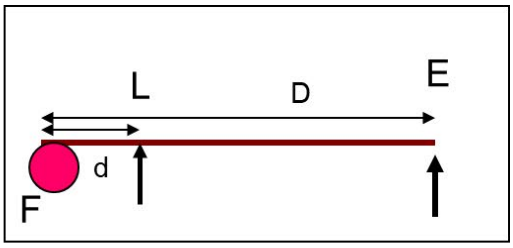
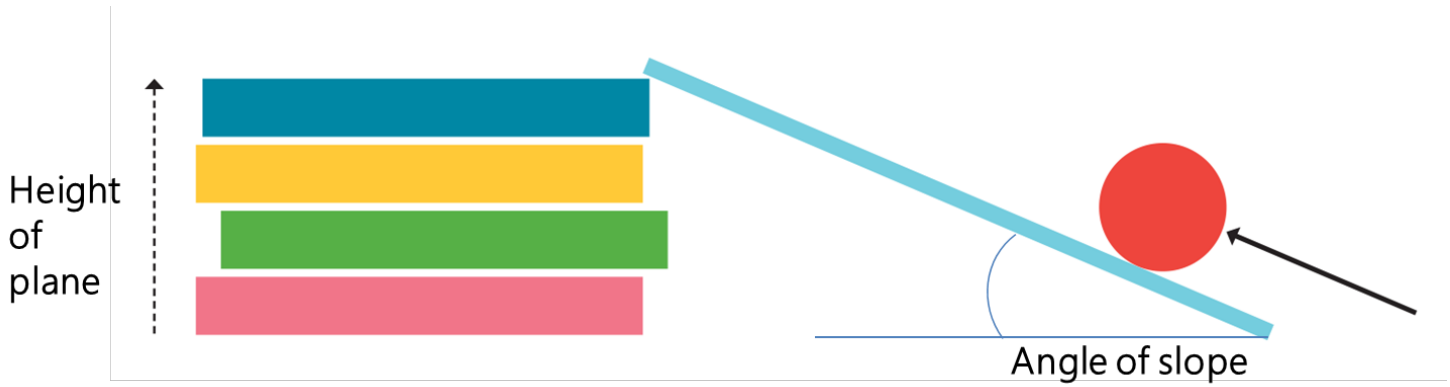


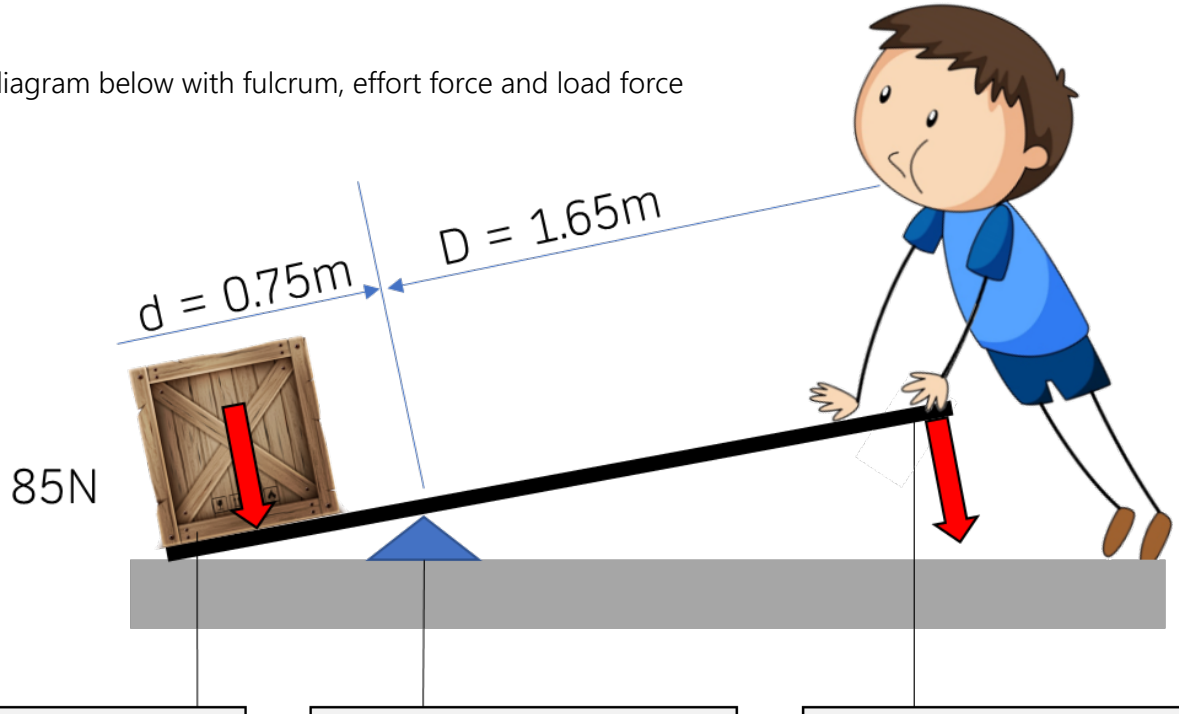


Inclined Planes

An inclined plane is a simple machine and it can be used to reduce the effort required to move a load. If the slope has a small angle, then a person has to push or pull the object over a longer distance to reach a height, but with very little effort. If the slope is steep, with a greater angle, a person must push or pull the object over a very short distance to reach the same height, but with more effort. Mechanical advantage is calculated by length of slope divided by height of the slope. There is a greater mechanical advantage if the slope is gentle because then less force will be needed to move an object up (or down) the slope.



1. Label the diagram below with fulcrum, effort force and load force



2. Using the information above – how much force (N) does the boy need to use to lift the box? **EXTENSION**

Load force (L) x d = Effort force (E) x D

3. List as many examples as you can for each of the classes of levers

Seesaw type lever (class 1)	Wheelbarrow type lever (class 2)