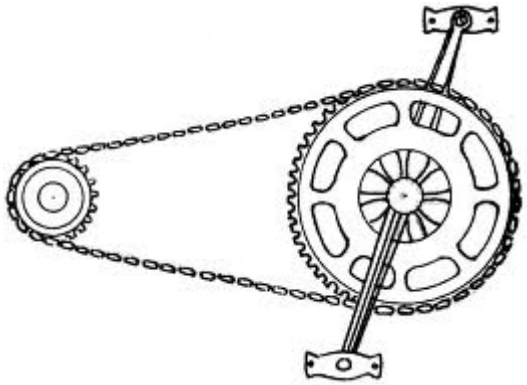
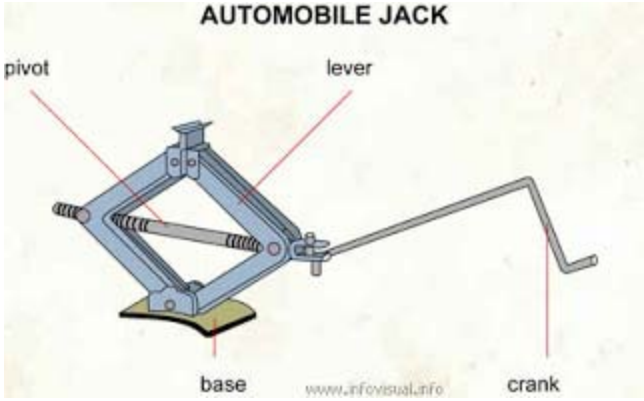
Simple Machines

What is a machine?

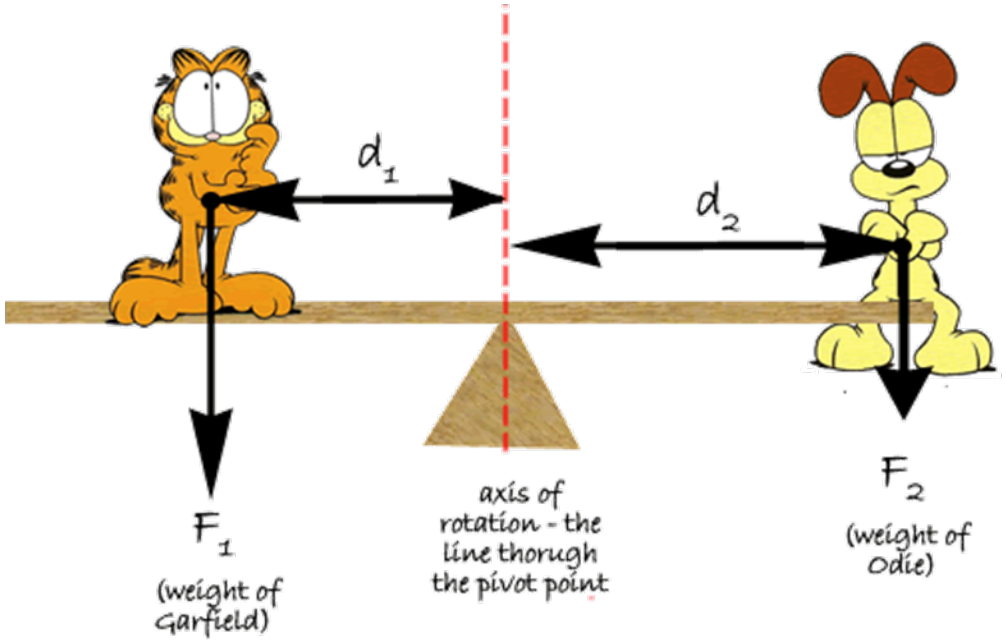
- It is a device that allows us to complete a task with less effort.





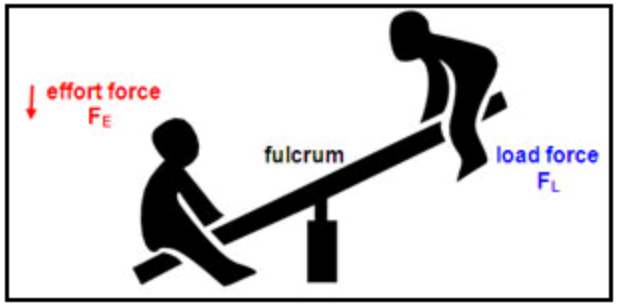
The Lever Family of Machines

- A **lever** consists of a rigid bar that rotates around a fixed pivot point known as a **fulcrum**.



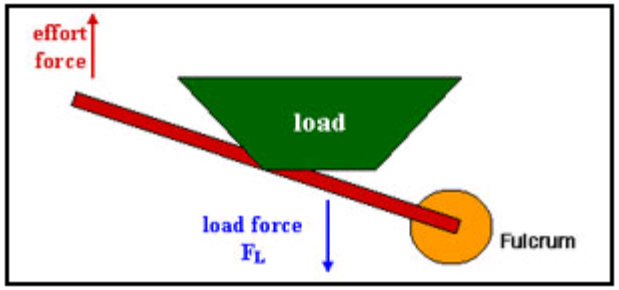
First Class Levers

- The fulcrum is between the load and the effort force.
- This lever can allow the effort force to be greater or smaller than the load force depending on distance from the fulcrum to each force. Smaller children can balance heavier children by leaning back (moving away from the fulcrum).



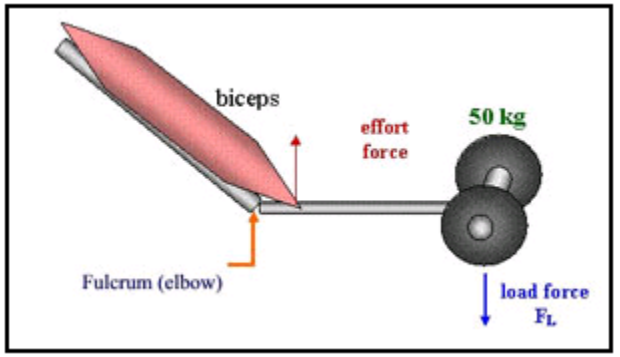
Second Class Levers

- the load is between the fulcrum and the effort force.
- This lever always **lowers** the effort force compared to the load force. i.e. A worker in a meat packing plant can lift up the handles of a stainless steel wheel barrow containing over 400 kg of animal products.



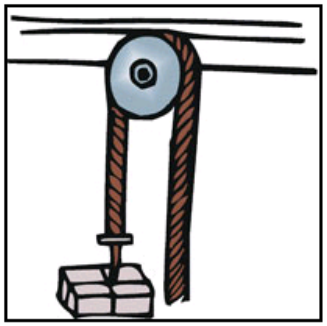
Third Class Levers

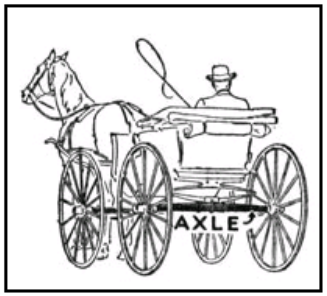
- the effort force is between the fulcrum and the load (e.g., human forearm).
- This type of lever always requires an effort force greater than the load force.
  In power lifting competitors, this extreme tension has actually snapped the tendon attaching the biceps to the forearm bones.

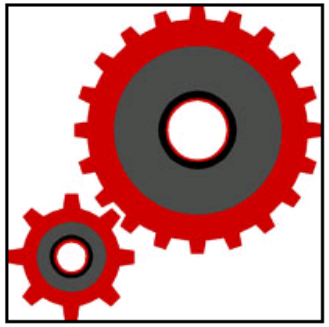


Circular Levers

- A **pulley** is a wheel that rotates around its fulcrum. It has a grooved rim that a rope runs through.
- A **wheel and axle** consists of a large-diameter circular disk connected to a small diameter rod, referred to as an axle. The wheel and the axle also rotate around a fulcrum.
- **Gears** are toothed wheels of varied diameters that rotate around fulcrums. They serve the purpose of either increasing or decreasing speed or changing direction.







The Inclined Plane Family - Ramps

- **Ramps:** allows us to change the heights of objects without having to exert as much effort as would be required to raise or lower the object to the new height without assistance.

The Inclined Plane Family - Wedges

- A **wedge** is a machine that consists of a double-inclined plane that increases the applied force in the area over which contact is made.

The Inclined Plane Family - Screws

- A **screw** consists of an inclined plane wrapped around a central shaft.

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