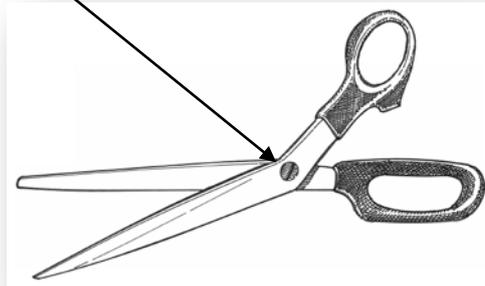


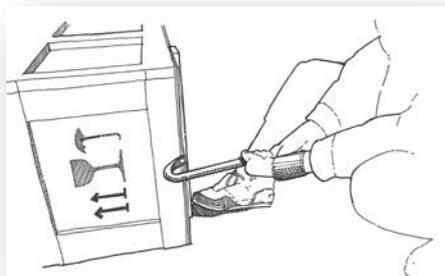
Levers

1st class levers

This type of lever has the **fulcrum** positioned between the effort and the load. The effort force can be magnified or diminished depending on the position of the fulcrum between the effort and the load.



A Pair of Scissors is an example of a First Class lever (Double lever) The Fulcrum is the pivot in the middle and the Force is applied with your hand at the end. The item being cut has a “Shear” force applied to it by the blades. It is easier to cut through a material when it is placed near to the pivot in the middle because the force exerted by your hand is increased due to the mechanical advantage of the lever.



A crowbar is another example. To increase the mechanical advantage of a class 1 lever the fulcrum must be moved closer to the load.

2nd class levers

This type of lever has the load positioned between the effort and the fulcrum. A Class 2 lever always magnifies the **effort force** because it is always positioned at the opposite end of the lever from the fulcrum.



The bottle opener and nail clippers are examples of class 2 levers. The nail clippers are an example of two levers working together to increase the Mechanical advantage.

Pneumatic tyres need to be kept at the correct pressure, and a foot pump is one way of inflating them to the correct pressure. A look at the pump will show you that it works by using a Class 2 lever. Your foot provides the input motion and force at one end of the lever and the **pivot** is at the other end. The load, in this case the pneumatic pump, is connected to the lever quite close to the fulcrum.



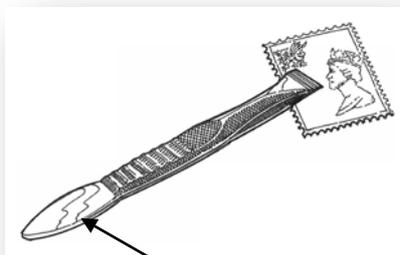
3rd class levers

A class 3 lever has a mechanical disadvantage. The input force (the effort) is greater than the force produced at the load. However, the distance moved by the load is greater than the distance moved by the effort.

When a mechanical system requires a large output movement for a small input movement, we have to 'pay' by providing a large effort.



The hydraulic engine hoist shown here has to be able to lift a car engine out of the car body. Most car engines are made of cast iron and can weigh up to half a ton. In order to keep clear of the car body work, the lifting arm has to stick out a long way from the vertical frame. The pivot at the top of that vertical frame is the **fulcrum** for the lifting arm. The engine is lifted by the force produced by the hydraulic piston pushing upwards. So, with the effort between the fulcrum and the load, this is a Class 3 lever.



A Pair of tweezers is also an example of a Third Class lever. The force is applied in the middle of the tweezers which causes a force at the tips of the tweezers. The **fulcrum** is where the two halves of the tweezers are joined together.