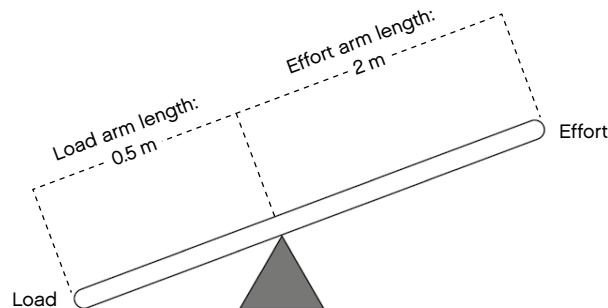


## The mechanical advantage of a lever

The mechanical advantage of a lever is the ratio of the length of the effort arm to the length of the load arm.

It can be calculated using the following formula:

$$\text{Mechanical advantage} = \frac{\text{Length of effort arm}}{\text{Length of load arm}}$$



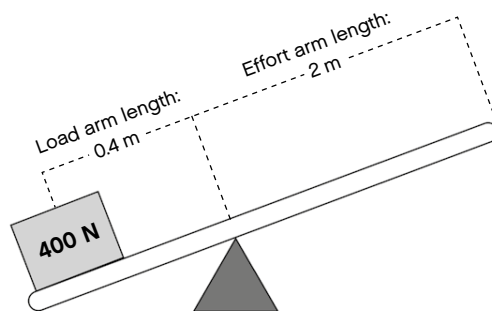
The mechanical advantage of this 1st class lever is:

$$\text{Mechanical advantage} = \frac{2 \text{ m}}{0.5 \text{ m}}$$

$$\text{Mechanical advantage} = 4$$

The amount of effort needed to lift a given load with any class of lever can be calculated using this formula:

$$\text{Effort force} \times \text{length of effort arm} = \text{Load force} \times \text{length of load arm}$$



$$\text{Effort} \times 2 \text{ m} = 400 \text{ N} \times 0.4 \text{ m}$$

$$\text{Effort} = \frac{400 \text{ N} \times 0.4 \text{ m}}{2 \text{ m}}$$

$$\text{Effort} = 80 \text{ N}$$

Using this 1st class lever to lift a 400 N load would only need an effort of 80 N. However, the effort end of the lever must move five times the distance of the load.