

## Knowledge

## Application

**Levers** help our bodies to produce movement.

A **lever** is a system which helps us to explain the relationship between the muscular and skeletal system to create a movement.

Levers are made up of **three** components:



**Fulcrum:**  
the joint around which the lever rotates.

Load

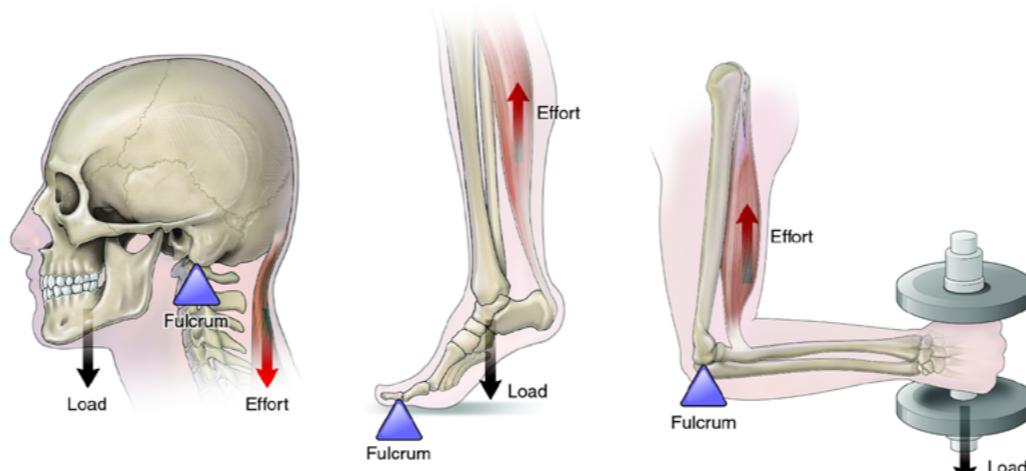


Effort

**Load:**  
the resistance, the weight or load that needs to be moved.

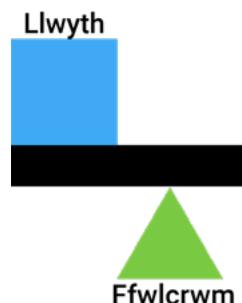
**Effort:**  
the force, this is generated by the muscles.

Each classification is found in the body. The most common lever found in the body is the 3<sup>rd</sup> class lever. Examples can be found at the elbow and knee.

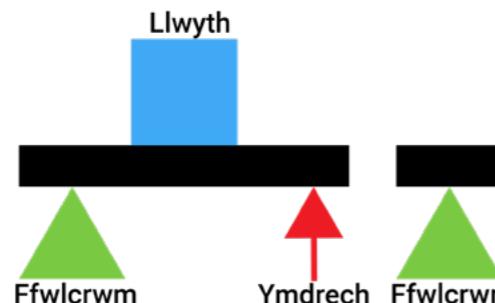


There are **three** classifications of **lever**. Each class of lever has a mechanical advantage and disadvantage based on the positioning of the three components.

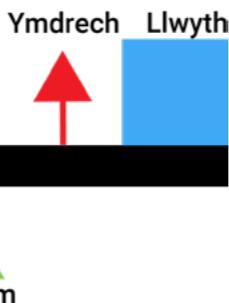
Lifer Dosbarth 1<sup>af</sup>



Lifer 2<sup>nd</sup> Dosbarth



Lifer 3<sup>rd</sup> Dosbarth



Remember 123FLEA

F	L	E
1	2	3

A way of remembering each classification of lever is to use **123FLEA**. Whichever component is in the middle will determine the class of lever.

All **three** of these levers are found in the body. The mechanical advantage and disadvantage of each lever depends on the efficiency of the levers ability to move the load. We can use examples from everyday use to help us explain this.



**Mechanical advantage**

The effort required for movement is less than the load.

This applies to the 1<sup>st</sup> and 2<sup>nd</sup> class lever with the 1<sup>st</sup> class lever being the most efficient.

**Mechanical disadvantage**

The effort required for movement is greater than the load.

The 3<sup>rd</sup> class lever being the least efficient.

A 1<sup>st</sup> class lever in tennis.

Example: a player attempts to keep an eye on the tennis ball during a serve.



The muscles (**effort**) in the back of the neck will move the head (**load**) at the neck joint (**fulcrum**) to follow the path of the ball.



A 2<sup>nd</sup> class lever in basketball.

Example: a player attempts to leave the ground.

The player would need to push off the ball of the foot (**fulcrum**) to drive the body (**load**) into the air. The effort to achieve this comes from the calf muscle (**effort**) contracting.



A 3<sup>rd</sup> class lever in football.

Example: a player kicks the ball during a penalty kick.

The quadriceps contract (**effort**) to straighten the knee (**fulcrum**) to kick the football (**load**) towards the goal.