

Levers – The Basics

The human body is made up of, and these work together to create

There are three types of levers:

- class levers - In the middle
- class levers - In the middle
- class levers - In the middle

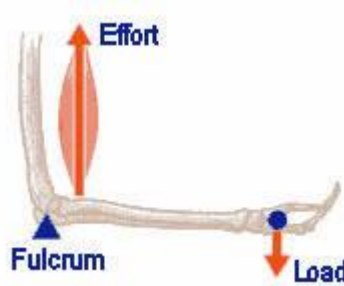
Every lever is made up of three parts:

1)

The fixed point or of the lever. This is where the lever **turns/** are fulcrums in the body

2)/.....

The or '.....' that the lever is moving.
E.g. Lifting a when doing a bicep curl



3).....

The applied to move the It can also be referred to as '.....'. In the body the effort is provided by the contracting.

Key terms!

Fulcrum, load and effort



Exam tip 1:

The **middle** component will determine whether a lever is 1st, 2nd or 3rd class!

Levers

1-2-3, F-L-E, T-A-B

First Class levers

- First class levers have the in the middle.

Example in the body

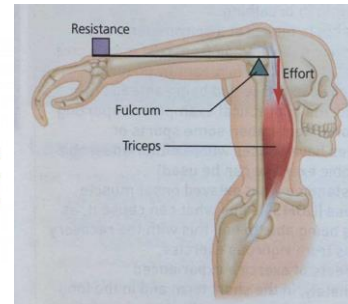
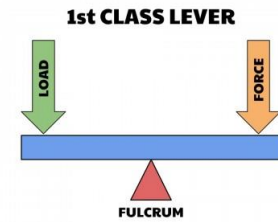
-..... causing at the

E.g.

- **Fulcrum** =

- **Effort** =

- **Load** =



Second Class levers

- Second class levers have the in the middle.

▪ This means a **large** can be moved with relatively low

Example in the body

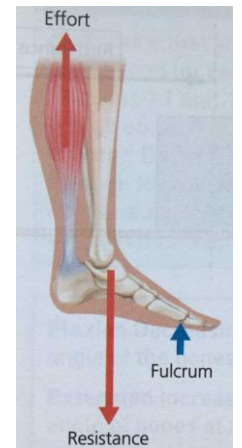
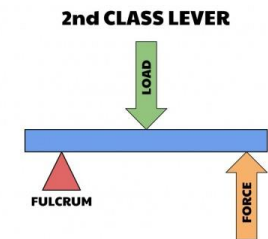
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E.g.

- **Fulcrum** =

- **Effort** =

- **Load** =



Third Class levers

- Third class levers have the in the middle.

- This means they can produce a large with relatively low

Example in the body

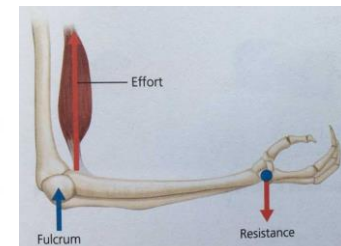
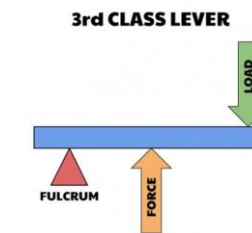
-..... causing at the

E.g.

- **Fulcrum** =

- **Effort** =

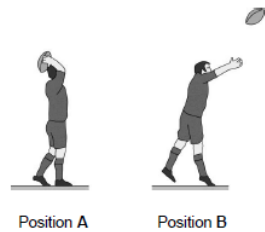
- **Load** =



Class	Order of Components	Line drawing	Sporting Example/ movement in the body
First is in the middle		
Second is in the middle		
Third is in the middle		

0 | 8 | Figure 1 shows a rugby player throwing the ball during a lineout.

Figure 1



0 | 8 | . 2 | Using **Figure 1**, name, sketch and label the lever system operating at the **elbow** during the movement from **Position A** to **Position B**.

[3 marks]

Lever system: _____

0 | 8 | . 1 | Complete **Table 1** to identify:

- the type of joint operating at the **elbow**
- the agonist muscle causing the movement at the **elbow** from **Position A** to **Position B**
- the type of contraction occurring in the agonist muscle at the **elbow** to cause this movement.

[3 marks]

Table 1

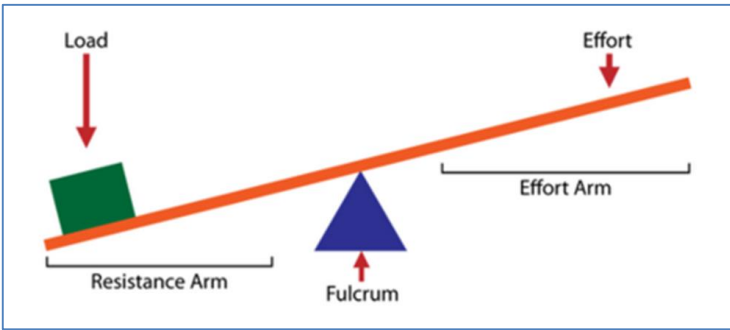
Type of joint	Agonist muscle	Type of contraction

Mechanical Advantage

-Mechanical advantage measures the of a lever (how it is to lift the load).

Mechanical advantage =
..... ÷

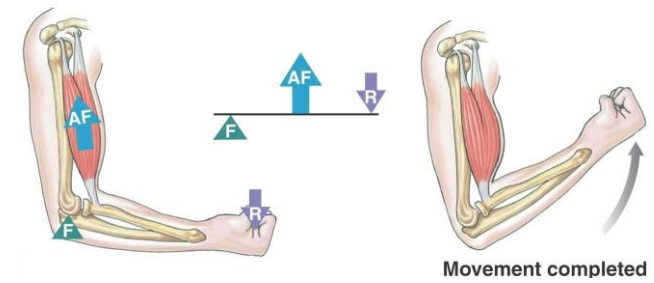
- The advantage depends on the distance between the and the (.....) **compared** with the distance between the (resistance) and the (.....).



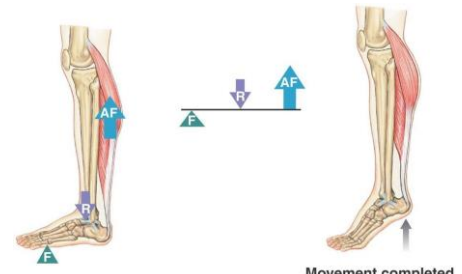
Key term: Effort arm
Distance between the and the

Key term: Resistance/load arm
Distance between the and the

Rule 1
-When the arm is than it's arm it has a mechanical advantage.
- A effort arm allows movement of the load over a large
- class levers always have a mechanical advantage
E.g.



Rule 2
-When the arm is than it's arm it has a mechanical advantage.
-This means loads can be lifted with little
- class levers always have a mechanical advantage
-E.g.



Draw and label a diagram to show the **1st** class lever system operates at the **elbow**.

Note: Think about the position of the fulcrum and the length of the effort arm and resistance arm.

Draw and label a diagram to show how the **second** class lever system operates at the **ankle**.

Note: Think about the position of the fulcrum and the length of the effort arm and resistance arm.

1st class – high mechanical advantage if fulcrum is closer to the _____.
- Low mechanical advantage is the fulcrum is closer to the _____.

2nd class – _____ mechanical advantage – less force to move a greater resistance

3rd class – _____ mechanical advantage – but greater range of movement and speed of movements

0 3

Which one of these shows how to calculate the mechanical advantage of a lever?

A Effort arm x weight (resistance) arm

B Effort arm ÷ weight (resistance) arm

C Effort arm + weight (resistance) arm

D Effort arm - weight (resistance) arm

[1 mark]

1 6 . 3 Figure 4 shows a basketball player jumping to execute a shot.

Figure 4



Draw the lever system which operates at the ankle joint in the space below. Label the fulcrum, effort and load.

[1 mark]