Your notes

GCSE PE: revision notes

Lever systems

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Parts of a lever

- A lever has a **fulcrum** (the pivot), an **effort** (the force from the muscle) and a **load** (the weight being moved).
- In the body, the joint is the **fulcrum**, the muscle provides the **effort**, and the **load** is the weight of the body part plus anything being held.

The three classes of lever

- First class: the **fulcrum** is in the middle (**effort**, **fulcrum**, load). Example: extension of the neck when heading a ball.
- Second class: the **load** is in the middle (**fulcrum**, **load**, effort). Example: plantar flexion at the ankle when standing on tiptoes or jumping.
- Third class: the **effort** is in the middle (**fulcrum**, **effort**, load). Example: flexion at the elbow in a bicep curl, or extension of the knee when kicking.
- A way to remember which is in the middle: "1, 2, 3: F, L, E" (first class **fulcrum**, second class **load**, third class **effort**).

Mechanical advantage

- **Mechanical advantage** = **effort arm** ÷ **load arm**. The effort arm is the distance from the fulcrum to the effort; the load arm is the distance from the fulcrum to the load.
- Second class levers have a **mechanical advantage**: the **effort arm** is longer, so a large **load** can be moved with little effort.
- Third class levers have a mechanical disadvantage: they need more **effort**, but they give speed and a wide range of movement, which is why most levers in the body are third class.

Key terms

Fulcrum	The pivot point of a lever: the joint in the body.

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Effort	The force applied to a lever, provided by a muscle.
Load	The weight or resistance moved by a lever.
Effort arm	The distance from the fulcrum to the effort.
Load arm	The distance from the fulcrum to the load.
Mechanical advantage	Moving a large load with a small effort, when the effort arm is longer than the load arm.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. In a lever, what is the fulcrum?
2. What is in the middle of a second class lever?
3. What is in the middle of a third class lever?
4. What class of lever works at the elbow in a bicep curl?
5. What class of lever works when you stand on tiptoes?
6. What class of lever works at the neck when heading a ball?
7. What is the effort arm?
8. Which class of lever has a mechanical advantage?

Answers

1. The pivot point
2. The load
3. The effort
4. Third class
5. Second class
6. First class
7. The distance from the fulcrum to the effort
8. Second class

What to do next

Practise 11 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

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