2.1 Types of levers

All movements made by the body are produced by a series of levers working together. Without levers we would not be able to throw or kick a ball, run or jump. A lever is a rigid bar that turns about an axis to create movement.

There are three types of levers – first class levers, second class levers and third class levers – and they all make use of a fulcrum, load and effort. The fulcrum is the point at which a lever turns or is supported. The load is the weight or ‘resistance’ that the lever must move. The effort is the force required to move the load and, in the human body, the effort comes from the muscles.

First class levers

First class levers have the fulcrum midway between the effort and the load. Also, the fulcrum is quite close to both the effort and the load.

Key terms

- Lever: A rigid bar that turns about an axis to create movement. All levers contain a fulcrum, load and effort.
- Fulcrum: The fixed point at which a lever turns or is supported. It can also be referred to as the ‘axis’.
- Load: The weight or ‘resistance’ that the lever must move.
- Effort: The force required to move the load. It can also be referred to as ‘force’.

Activity

1a) Take part in, or watch a video of, the take-off phase of a long jump. What sort of lever is being used at the ankle?
1b) Using a small hand-weight, or a similar object, perform a bicep curl. What sort of lever is being used by the elbow?
1c) Draw a simple diagram of each action. Label the load, effort and fulcrum.

Second class levers

Second class levers have the load between the fulcrum and the effort. This means that a large load can be moved by a relatively small effort.

Figure 2.1 A first class lever

Figure 2.2 When an athlete throws a javelin, the way the arm moves is a good example of a first class lever in action. The elbow is the fulcrum. The effort is supplied by the biceps and triceps, which are both contracted to keep the arm straight, and the javelin is the load.

Figure 2.3 A second class lever

Figure 2.4 When you do a press up, your whole body acts as a second class lever. The balls of the feet are the fulcrum. The load is the total body weight, with the abdominals contracted to provide core stability, and the effort is supplied by the biceps and triceps.