

TOPIC: LEVERS

- Muscles generate force using **lever systems**: rigid rod (_____) and a pivot point (_____).
- **Load:** weight — *body weight*. ■ **Fulcrum:** _____ point — *joint*. ■ **Effort:** force — *applied at _____*.

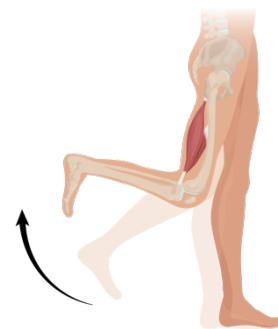
First-Class Lever	Second-Class Lever	Third-Class Lever
 <p><i>The EFL tower.</i></p>	 <p><i>Had an ELF.</i></p>	 <p><i>But he FEL.</i></p>
 <p>Advantage _____ on the location of the fulcrum.</p>	 <p>Mechanical _____.</p>	 <p>Mechanical _____.</p>

- Advantage is determined by the location of fulcrum: closer to the load = _____.
- Mechanical _____ advantage: more effort but provides greater _____ of motion.

EXAMPLE: Origins for the three hamstring muscles are located on the ischial tuberosity. The insertions are on the proximal end of the tibia and fibula. Knowing this, what type of lever system is the hamstring a part of when it performs the movement of flexing the knee? Would you expect the hamstring to work at a mechanical advantage or disadvantage when it performs this movement?

a) Lever system: _____

b) Mechanical advantage or disadvantage: _____



PRACTICE: In what type of lever is the force applied between the fulcrum and the load?

- a) First-class.
- c) Second-class.
- b) Third-class.
- d) Force cannot be applied between the fulcrum and the load.

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PRACTICE: The majority of the lever systems in the arms and legs are third-class levers; there are few second-class levers. Knowing this which of the following statements is correct?

- a) The muscles of the arms and legs usually work at a mechanical disadvantage.
- b) These joints will have relatively small range of motion.
- c) Most movements of the arms and legs prioritize power over speed.
- d) The fulcrum will most often be placed between the effort and the load.