MOVEMENT ANALYSIS: LEVERS, PLANES & AXES

OCR GCSE PE • GRADE 9 KNOWLEDGE ORGANISER

SEATON VALLEY

KNOW IT • APPLY IT • EXPLAIN IT

LEVER SYSTEMS

The component in the middle determines the class

MEET EFL

E-F-L = THE PARTS



- **F — FULCRUM**: fixed pivot (usually a joint)
- **E — EFFORT**: force produced by muscle
- **L — LOAD**: load or resistance moved

NO FIXED ORDER — FIND THE MIDDLE

1ST CLASS



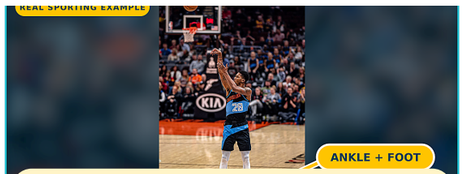
NECK DURING A HEADER

E — F — L

MIDDLE = FULCRUM

- F: neck joint (atlanto-occipital)
- E: posterior neck muscles
- L: weight of the head
- 1st class: MA varies

2ND CLASS



ANKLE PLANTAR FLEXION

F — L — E

MIDDLE = LOAD

- F: base of toes (MTP joint)
- L: body weight through ankle
- E: calf via Achilles tendon
- Effort arm longer: MA > 1

ONLY DURING GROUNDED PUSH-OFF

3RD CLASS



ELBOW FLEXION: CURL

F — E — L

MIDDLE = EFFORT

- F: elbow joint
- E: biceps pulls on radius
- L: forearm + hand + dumbbell
- MA < 1: speed + range

MECHANICAL ADVANTAGE

Ability of a lever to move a LARGE LOAD using a relatively SMALL EFFORT.

MA = effort arm ÷ load arm

= load ÷ effort



MA > 1 = ADVANTAGE

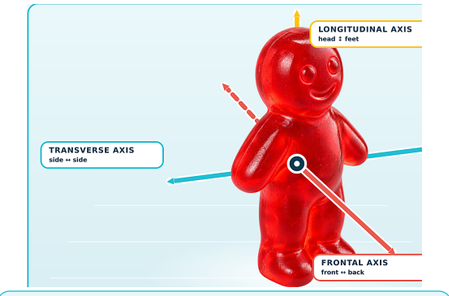
Measure each arm: fulcrum to force line (perpendicular).

2nd >1 • 3rd <1 • 1st varies

PLANES + MATCHING AXES

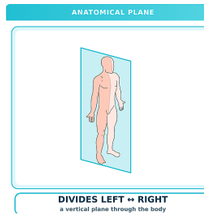
Movement occurs IN a plane and rotates ABOUT a perpendicular axis

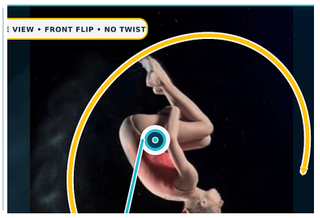
AXIS = IMAGINARY LINE



Whole-body axes may meet at the body centre. For a joint action, the axis passes through the joint.

SAGITTAL + TRANSVERSE AXIS





DIVIDES LEFT / RIGHT

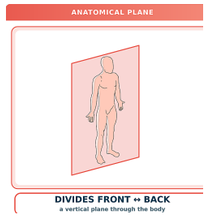
ACTION: flexion + extension

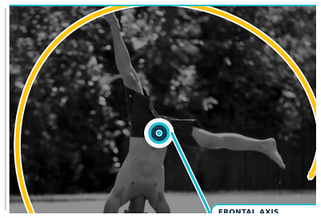
AXIS: side → side

Examples: front somersault; squat; running; biceps curl

PLANE + AXIS: PERPENDICULAR (90°)

FRONTAL + FRONTAL AXIS





DIVIDES FRONT / BACK

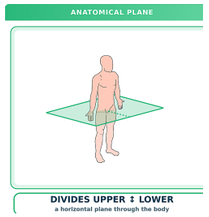
ACTION: abduction + adduction

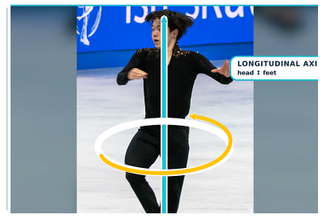
AXIS: front → back

Examples: cartwheel; star jump; lateral raise

PLANE + AXIS: PERPENDICULAR (90°)

TRANSVERSE + LONGITUDINAL AXIS





DIVIDES UPPER / LOWER

ACTION: rotation

AXIS: head → feet

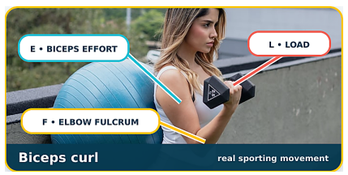
Examples: skating spin; pirouette; golf swing

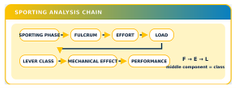
PLANE + AXIS: PERPENDICULAR (90°)

GRADE 9 EXAM APPLICATION

Predominant plane/axis • phase • joint action • performance effect

LEVER ANALYSIS: WRITE THE FULL CHAIN





During the ___ phase of ___, ___ occurs at the ___ joint. ___ = F; ___ = E; ___ = L. ___ is in the middle → ___ class. The ___ arm is longer, creating ___, improving performance by ___.

UPWARD BICEPS CURL

MODEL: Upward curl → elbow flexion. Elbow = F; biceps = E; forearm + dumbbell = L. E is in the middle → third class. Load arm longer → mechanical disadvantage but greater hand speed + range.

OCR GCSE PE • LOST-MARK ALERT — COMMON ERRORS TO ELIMINATE

9 COMMON TRAPS

Nine mistakes that cost marks in movement analysis—and exactly how to correct them

1. **PLANE ≠ AXIS** — IN a plane; ABOUT an axis.
2. **NAME THE PHASE** — Add joint + technical action.
3. **NOT ALL GIVE MA** — Compare effort and load arms.
4. **3RD = DISADVANTAGE** — It favours speed + range.
5. **EFFORT ≠ LOAD** — Muscle force vs resistance.
6. **FIND THE MIDDLE** — Do not learn one fixed order.
7. **NAME THE ARM** — Effort arm or load arm?
8. **CARTWHEEL** — Frontal plane + frontal axis.
9. **TECHNICAL TERMS** — Write flexion, extension, etc.

Sources: Alasdair Middleton, Erik Drost, PTPioneer, OpenStax, InjuryMap, Edoarado, FloweringDagwood, Wikimedia Commons; user-supplied sport images.