10 Taster PE Biomechanics

LAWIS of Stability

- L lower the C of G the more stable
- A bigger the area of B of S the more stable
- W B of S should be widened in the direction of force application / force reception
- I closer the line of gravity intersects middle of B of S the more stable
- S when an external weight is added to the body (except directly above/ below C of G) the line of gravity shifts towards the weight and compensatory movements are required to realign C of G over the base of support

Mass of Body – heavier the body the more stable

Newton’s Laws

1st. Law of Inertia
A body will continue in its state of rest or uniform motion unless acted upon by a force sufficiently large enough to change that state

2nd. Law of Acceleration
The acceleration of a body is proportional to the force imparted to it and inversely proportional to its mass

\[
\text{Force} = \text{Mass} \times \text{Acceleration} \\
\text{Acceleration} = \frac{\text{Force}}{\text{Mass}}
\]

3rd. Law Action Reaction
For every action force there is an equal and opposite reaction

Revision Questions

(i) In wet conditions, a wet, heavy ball cannot be kicked as far as a dry ball in dry conditions. This is an example of the application of:

(a) Newton's first law of motion
(b) Newton's second law of motion
(c) Newton's third law of motion
(d) poor kicking technique

(ii) Which of the following is an example of Newton's third law of motion?

(a) as a gymnast jumps off a mat on a slippery floor, the mat moves away behind him/her
(b) as a basketballer shoots for goal with a jump shot, the feet swing up
(c) a swimmer moving forward as he/she pulls his/her hand through the water
(d) all of the above

True (T) or False (F)?

(iii) When starting a running race from blocks, driving the feet backwards against the blocks to push off, is an example of Newton's law of Acceleration.
(iv) The closer the centre of gravity of an object is to its base of support, the more stable that object is.

(v) **State the Principle of Stability that applies in the following situations**
    (i.e. do not explain it, merely state the relevant Principle).

(a) A gymnast notices that maintaining her balance in the arabesque position is more difficult than in the normal standing position.

(b) A rugby league player doing a front-on tackle should bend over at the waist and not stand upright.

(c) Whenever you are throwing, catching or hitting an object you should always have one foot forward.

(d) Bushwalkers tend to lean forward when carrying a heavy knapsack.

(e) In a sprint start position, as soon as you lift your hands off the ground, you fall flat on your face.