**Biomechanics**

* The study of the human body and forces that act on it to cause movement
* Ie. the physics of human movement

Why do we study it?

* To prevent injuries
* To improve technique and performance
* To improve sport equipment

Who uses it?

* Athletes
* Trainers
* Coaches
* Equipment makers
* Ergonomists

**Types of Biomechanical Analysis**

1. Quantitative
* Pattern of forces using force plates
* Muscle activity using EMG
* 3D movements of each body segment using high speed cinematography
1. Qualitative
* Framework within which skill performances can be observed
* Set of principles with which movement can be analyszed
* Checklists to identify errors
* Techniques for error detection and correction

**Seven Principles of Biomechanics**

1. Stability
* The lower the centre of mass, the larger the base of support, the closer the centre of mass to the base of support, and the greater the mass, the more stability increases.
1. Maximum effort
* The production of maximum force requires the use of all possible joint movements that contribute to the task’s objective
1. Maximum velocity
* The production of maximum velocity requires the use of joints in order – from largest to smallest
1. Linear motion
* Is motion is a straight line. It can be broken down into several aspects
1. Linear Motion
* The greater the applied force, the greater the increase in velocity
1. Angular Motion
* Is produced by the application of a force acting at some distance from an axis, that is, by torque
1. Angular Momentum
* Is constant when an athlete or object is free in the air

**Newton’s Laws of Motion**

First Law of Motion

Definition:

Example

Second Law of Motion

Definition:

Formula:

Example:

Third Law of Motion

Definition:

Example:

**Definitions:**

**Centre of Mass:**

**Linear Motion:**

**Acceleration:**

**Impulse:**

**Impact:**

**Rotational Motion:**

**Angular Acceleration:**

**Moment of Torque:**

**Moment of Inertia:**

**Radius of Gyration:**

**Include Table 15.1 on page 229 to your notes.**

**Also make a formula list from page 234.**