

Topics covered

A The effects of exercise and sports performance on the skeletal system

A1 Structure of skeletal system

Understand how the bones of the skeleton are used in sporting techniques and actions.

- Major bones to include cranium, clavicle, ribs, sternum, scapula, humerus, radius, ulna, carpals, metacarpals, phalanges, pelvis, vertebral column (cervical, thoracic, lumbar, sacrum, coccyx), femur, patella, tibia, fibula, tarsals, metatarsals
- Type of bone - long, short, flat, sesamoid, irregular
- Areas of the skeleton to include axial skeleton, appendicular skeleton, spine, curves of the spine, neutral spine alignment, postural deviations (kyphosis, scoliosis)
- Process of bone growth - osteoblasts, osteoclasts, epiphyseal plate.

A2 Function of skeletal system

Understand how the functions of the skeleton and bone types are used in sporting actions and exercise.

- Functions of the skeleton when performing sporting techniques and actions:
 - supporting framework, protection, attachment for skeletal muscle, source of blood cell production, store of minerals, leverage, weight bearing, reduce friction across a joint.
- Main function of different bone types when performing sporting techniques and actions:
 - long bones – provides leverage, red blood cell production
 - short bones – weight bearing
 - flat bones – protection
 - sesamoid bones – reduce friction across a joint.

A3 Joints

Understand how joints of the upper and lower skeleton are used in sporting techniques and actions.

- Joints of the upper skeleton (shoulder, elbow, wrist, cervical and thoracic vertebrae).
- Joints of the lower skeleton (hip, knee, ankle, lumbar, sacrum, coccyx vertebrae).
- Classification of joints fibrous (fixed), cartilaginous (slightly moveable), synovial (freely moveable).
- Types of synovial joints (ball and socket, condyloid, gliding, saddle, hinge, pivot).
- The bones forming the following joints (shoulder, elbow, wrist, hip, knee, ankle, and their use in sporting techniques and actions).
- Structure and function of components of synovial joints and their use in sporting techniques and actions (joint capsule, bursa, articular cartilage, synovial membrane, synovial fluid, ligaments).
- Range of movement at synovial joints due to shape of articulating bones and use in sporting actions (flexion, extension, dorsiflexion, plantarflexion, lateral flexion, horizontal flexion and horizontal extension, hyperextension, abduction, adduction, horizontal abduction and adduction, rotation, circumduction).

A4 Responses of the skeletal system to a single sport or exercise session

- Simulated increase of mineral uptake within bones due to weight bearing exercise.

A5 Adaptations of the skeletal system to exercise

The impact of long term effects of exercise on sports performance.

- Skeletal adaptations - increased bone strength, increased ligament strength.

A6 Additional factors affecting the skeletal system

Understand the impact of the skeletal system on exercise and sports performance and the impact of exercise and performance on the skeletal system.

- Skeletal disease – arthritis, osteoporosis, and the effect of exercise in offsetting these conditions.
- Age – young children and resistance training issues stunting bone growth.

B The effects of exercise and sports performance on the muscular system

B1 Characteristics and function of different types of muscles

Understand different types of muscles and their use in sport.

- Cardiac – non fatiguing, involuntary
- Skeletal – fatiguing, voluntary
- Smooth – involuntary, slow contraction.

B2 Major skeletal muscles of the muscular system

Major skeletal muscles and their combined use in a range of sporting actions.

- Deltoids, biceps, triceps, wrist flexors, wrist extensors, supinators and pronators, pectorals, abdominals, obliques, quadriceps, hip flexors, tibialis anterior; erector spinae, trapezius, latissimus dorsi, gluteals, hamstrings, gastrocnemius, soleus.

B3 Antagonistic muscle pairs

Movement of muscles in antagonistic pairs and their use in a variety of sporting actions.

- Agonist.
- Antagonist.
- Synergist.
- Fixator.

B4 Types of skeletal muscle contraction

Understand skeletal muscle contraction in different sporting actions.

- Isometric.
- Concentric.
- Eccentric.

B5 Fibre types

Understand fibre type recruitment during exercise and sports performance.

- Characteristics of each muscle fibre type:
 - type I
 - type IIa
 - type IIb.
- Nervous control of muscle contraction (all or none law).

B6 Responses of the muscular system to a single sport or exercise session

- Increased blood supply.
- Increased muscle temperature.
- Increased muscle pliability.
- Lactate (high intensity exercise).
- Microtears (resistance exercise).

B7 Adaptations of the muscular system to exercise

- The impact of adaptation of the system on exercise and sports performance.
 - Hypertrophy.
 - Increased tendon strength.
 - Increase in myoglobin stores.
 - Increase in number and size of mitochondria.
 - Increase in storage of glycogen.
 - Increase in storage of fat.
 - Increased tolerance to lactate.

B8 Additional factors affecting the muscular system

Understand additional factors affecting the muscular system and their impact on exercise and sports performance.

- Age – effect of the aging process on loss of muscle mass.
- Cramp – involuntary sustained skeletal muscle contraction.



Revision Materials –

All students have their books and their revision booklets to revise from.

They can also access some revision material from the following places:

Youtube.com – Search PLANETPE. linds taverner

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