Glossopdale
School & Sixth Form

BTEC Sport Unit 1 Anatomy and Physiology Curriculum Summary

Name of unit	Unit 1: Anatomy and Physiology
Why do we study this unit?	Having an understanding of body systems is imperative in the sports industry so that professionals can help support people who are taking part in sport and exercise. The human body is made up of many different systems that interrelate to allow us to take part in a huge variety of sport and exercise activities. For example, an athlete can go from rest to sprinting in a matter of seconds, whereas an endurance athlete can continue exercising for many hours at a time.
By the end of the unit, students will be able to….	Learners will be able to appreciate how each of these systems function, they will explore the structure of the skeletal, muscular, cardiovascular, respiratory and energy systems as well as additional factors which affect sport and exercise performance. They will understand anatomy and physiology of each body system and their processes are very different but work together to produce movement. You will gain a full appreciation of how the body is able to take part in sport and exercise through understanding the interrelationships between these body systems
Links to previous units	
Key vocabulary	Structure, Functions, Effects, Adaptations, Cardio vascular, Cardio respiratory, Muscular skeletal, Synovial joints, Muscle fibre, Characteristics, systemic, Pulmonary, Comparisons, Factors, Principles, Training methods, Target setting.
Week and summary topic	**Knowledge and skills learned**
1:The structure and function of the 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. 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 functions 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.
2: 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, coccygeal 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).
2: Response and adaptation of the skeletal system to exercise.	Responses of the skeletal system to a single sport or exercise session: ● Simulated increase of mineral uptake in bones due to weight-bearing exercise. ● Skeletal adaptations – increased bone strength, increased ligament strength

3: Additional factors of the skeletal system.	Understand the impact of the skeletal system on exercise and sports performance and the impact of exercise and sports 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.
4: Location and function of major skeletal muscles of the muscular system	Major skeletal muscles and their combined use in a range of sporting actions. These include: 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.
5: Characteristics and functions of different types of muscles and Antagonistic muscle pairs	Understand different types of muscles and their use in sport. ● Cardiac – non-fatiguing, involuntary. ● Skeletal – fatiguing, voluntary. ● Smooth – involuntary, slow contraction. Movement of muscles in antagonistic pairs and their use in a variety of sporting actions: ● Agonist. ● Antagonist. ● Synergist. ● Fixator.
7. Types of skeletal muscle contraction and muscle fibre types.	Understand skeletal muscle contraction in different sporting actions. ● Isometric. ● Concentric. ● Eccentric Understand fibre type recruitment during exercise and sports performance. Characteristics of each muscle fibre type: ● type I ● type IIa ● type IIx. ● Nervous control of muscle contraction (all or none law).
8. Responses and adaptations of the muscular system to a single sport or exercise session	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).

	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.
9. 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.
10. Structure and function of the respiratory system	Structure of the respiratory system (nasal cavity, epiglottis, pharynx, larynx, trachea, bronchus, bronchioles, lungs, alveoli, diaphragm, thoracic cavity), and Intercostal muscles (external and internal). Understand the function of the respiratory system in response to exercise and sports performance. ● Mechanisms of breathing (inspiration and expiration) at rest and during exercise. ● Gaseous exchange
11. Long volumes and control of red breathing	Understand the lung volumes and the changes that occur in response to exercise and sports performance. ● Tidal volume. ● Vital capacity. ● Residual volume. ● Total lung volume. ● Minute ventilation (VE) Understand how breathing rate is controlled in response to exercise and sports performance. ● Neural (medulla oblongata as the respiratory centre in the brain). ● Chemical (chemoreceptors detect change in blood carbon dioxide concentrations and changes in pH).
12. Response and adaptation of the respiratory system	Responses of the respiratory system to a single sport or exercise session: ● Increase in breathing rate. ● Increased tidal volume. Adaptations of the respiratory system to exercise The impact of

	adaptation of the system on exercise and sports performance: ● Increased vital capacity. ● Increased strength of the respiratory muscles. ● Increase in oxygen and carbon dioxide diffusion rate.
13. Additional factors affecting the respiratory system	Understand additional factors affecting the respiratory system and their impact on exercise and sports performance. ● Asthma. ● Effects of altitude/partial pressure on the respiratory system
14. Structure and function of the cardiovascular system	Structure of the cardiovascular system – atria, ventricles, bicuspid valve, tricuspid valve, semi-lunar valves, septum, major blood vessels (aorta, vena cava, pulmonary artery, pulmonary vein), coronary arteries. Structure of blood vessels – arteries, arterioles, veins, venuoles, capillaries. Composition of blood – red blood cells, plasma, white blood cells, platelets Understand the function of the cardiovascular system in response to exercise and sports performance. ● Delivery of oxygen and nutrients. ● Removal of waste products – carbon dioxide and lactate. Thermoregulation – vasoconstriction, vasodilation of blood vessels. ● Fight infection. ● Clot blood.
15. Nervous control of the cardiac cycle	Understand the control of the cardiac cycle and how it changes during exercise and sports performance. Conduction process: ● Sinoatrial node (SAN). ● Atrioventricular node (AVN). ● Bundle of His. ● Purkinje fibres. Effect of the sympathetic and parasympathetic nervous system.
16. Responses and adaptation of the cardiovascular system to a single sport or exercise session	Responses of the cardiovascular system to a single sport or exercise session: ● Anticipatory increase in heart rate prior to exercise. ● Increased heart rate. ● Increased cardiac output. ● Increased blood pressure ● Redirection of blood flow.

	Adaptations of the cardiovascular system to exercise The impact of adaptation of the system on exercise and sports performance: ● Cardiac hypertrophy. ● Increase in resting and exercising stroke volume. ● Decrease in resting heart rate. ● Capillarisation of skeletal muscle and alveoli. ● Reduction in resting blood pressure. ● Decreased heart rate recovery time. ● Increase in blood volume.
17. Additional factors affecting the cardiovascular system	Understand additional factors affecting the cardiovascular system and their impact on exercise and sports performance: ● Sudden arrhythmic death syndrome (SADS). ● High blood pressure/low blood pressure. Hyperthermia/hypothermia.
18. The role of ATP in exercise	Understand the role of adenosine triphosphate (ATP) for muscle contraction for exercise and sports performance: ● Immediately accessible form of energy for exercise. ● Breakdown and resynthesis of ATP for muscle contraction.
19. The ATP-PC (alactic) system in exercise and sports performance	Understand the role of the ATP-PC system in energy production for exercise and sports performance: ● Anaerobic. ● Chemical source (phosphate and creatine). ● Resynthesis of ATP. ● Recovery time. ● Contribution to energy for exercise and sports performance (duration and intensity of exercise).
19. The lactate system in exercise and sports performance	Understand the role of the lactate system in energy production for exercise and sports performance: ● Anaerobic. ● Process of anaerobic glycolysis (glucose converted to lactic acid). ● Recovery time. ● Contribution to energy for exercise and sports performance (duration and intensity of exercise).
20. The aerobic system in exercise and sports performance	Understand the role of the aerobic energy system in energy production for exercise and sports performance: ● Aerobic site of reaction (mitochondria). ● Food fuel source. ● Process of aerobic glycolysis, Krebs cycle, electron transport chain. ● Recovery time.

	● Contribution to energy for exercise and sports performance (duration and intensity of exercise).
21. Adaptations of the energy system to exercise	The impact of adaptation of the systems on exercise and sports performance: ● ATP-PC. ● Increased creatine stores. ● Lactate system. ● Increase tolerance to lactate. ● Aerobic energy system. ● Increased use of fats as an energy source. ● Increased storage of glycogen. ● Increased numbers of mitochondria.
22. Additional factors affecting the energy systems	Understand additional factors affecting the energy systems and their impact on exercise and sports performance: ● Diabetes (hypoglycaemic attack). ● Children's lack of lactate system.