

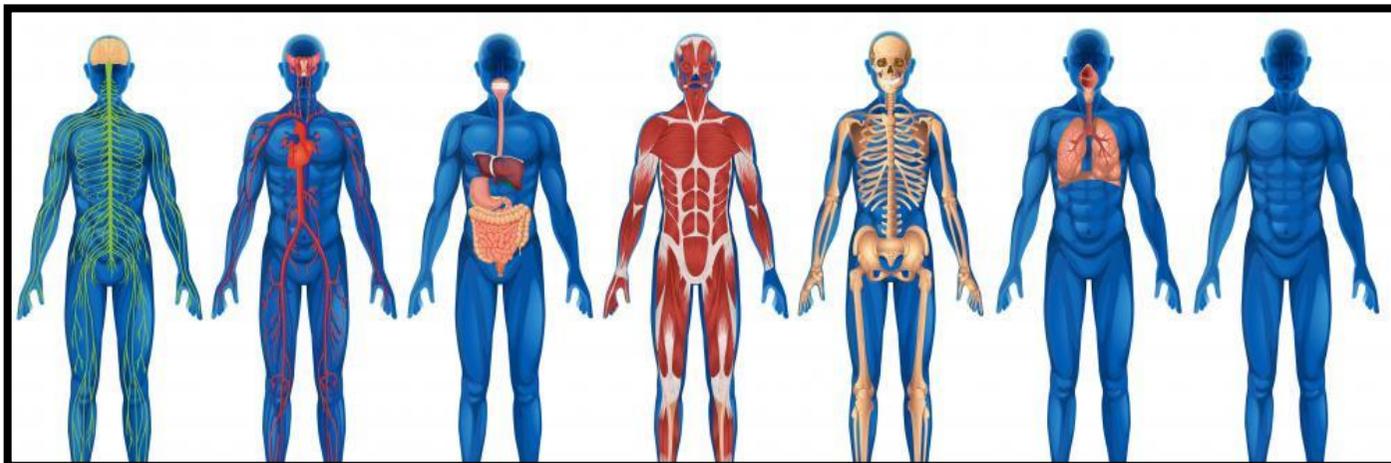
BTEC Level 3 National Foundation Diploma in Sport

Unit 1: Anatomy and Physiology

SPECIFICATION & GLOSSARY OF KEY TERMS



Sport



LEVEL 3 SPORT - ANATOMY & PHYSIOLOGY. Self-checking chart in preparation for the exam.

Topic	In class notes	Revision notes made	Practice questions attempted
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.			
Functions of the skeleton: 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.			
Joints & movements- Understand how joints of the upper & 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).			
Responses of the skeletal system to a single sport or exercise session • Simulated increase of mineral uptake in bones due to weight-bearing exercise.			
Long-term effects / Adaptations of the skeletal system to exercise • Skeletal adaptations - increased bone strength, increased ligament strength.			
Additional factors affecting 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.			
The effects of exercise and sports performance on the muscular system			
Understand different types of muscles and their use in sport. Cardiac - non-fatiguing, involuntary / Skeletal - fatiguing, voluntary / Smooth - involuntary, slow contraction.			
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.			
Movement of muscles in antagonistic pairs and their use in a variety of sporting actions; • Agonist. • Antagonist. • Synergist. • Fixator.			
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).			
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).			

<p>The impact of adaptation (long term) 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.</p>			
<p>Understand additional factors affecting the muscular system and their impact on exercise and sports performance.</p> <ul style="list-style-type: none"> • Age - effect of the aging process on loss of muscle mass. • Cramp - involuntary sustained skeletal muscle contraction. 			
<p>The effects of exercise and sports performance on the respiratory system</p>			
<p>Structure of the respiratory system</p> <ul style="list-style-type: none"> • nasal cavity, epiglottis, pharynx, larynx, trachea, bronchus, bronchioles, lungs, alveoli, diaphragm, thoracic cavity, Intercostal muscles (external and internal). 			
<p>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.</p>			
<p>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).</p>			
<p>Understand how breathing rate is controlled in response to exercise and sports performance; Neural (medulla oblongata as the respiratory centre in the brain).</p> <ul style="list-style-type: none"> • Chemical (chemoreceptors detect change in blood carbon dioxide concentrations and changes in pH). 			
<p>Responses of the respiratory system to a single sport or exercise session</p> <p>Increase in breathing rate & Increased tidal volume.</p>			
<p>The impact of adaptation of the system on exercise and sports performance.</p> <p>Increased vital capacity, Increased strength of the respiratory muscles and Increase in oxygen and carbon dioxide diffusion rate.</p>			
<p>Understand additional factors affecting the respiratory system and their impact on exercise and sports performance.</p> <p>Asthma & Effects of altitude/partial pressure on the respiratory system.</p>			

The effects of sport and exercise performance on 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, venules, 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.			
Understand the control of the cardiac cycle and how it changes during exercise and sports performance; Sinoatrial node (SAN) / Atrioventricular node (AVN) / Bundle of His / Purkinje fibres / the sympathetic & parasympathetic nervous system.			
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.			
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.			
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.			
The effects of exercise and sports performance on the energy systems			
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.			

<p>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).</p>			
<p>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 - duration and intensity</p>			
<p>Understand the role of the aerobic energy system in energy production for exercise and sports performance; Aerobic site of reaction (mitochondria), Food fuel source, aerobic glycolysis, Krebs cycle, electron transport chain, Recovery time, Contribution to energy - duration and intensity of exercise).</p>			
<p>The impact of adaptation of the systems on exercise and sports performance.</p> <ul style="list-style-type: none"> • 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. 			
<p>Understand additional factors affecting the energy systems and their impact on exercise and sports performance; Diabetes (hypoglycaemic attack) Children's lack of lactate system.</p>			

Look for past papers & mark schemes –

[https://qualifications.pearson.com/en/support/support-topics/exams/past-papers.html?Qualification-Family=BTEC-Nationals&Qualification-Subject=Sport%20\(2016\)&Status=Pearson-UK:Status%2FLive&Specification-Code=Pearson-UK:Specification-Code%2Fnat16-sport](https://qualifications.pearson.com/en/support/support-topics/exams/past-papers.html?Qualification-Family=BTEC-Nationals&Qualification-Subject=Sport%20(2016)&Status=Pearson-UK:Status%2FLive&Specification-Code=Pearson-UK:Specification-Code%2Fnat16-sport)

Key Word Glossary: write definition / memory tool to help use key words in the exam -

Bone names			
cranium		pelvis	
clavicle		cervical vertebrae	
ribs		thoracic vertebrae	
sternum		lumbar vertebrae	
scapula		sacrum	
humerus		coccyx	
radius		femur	
ulna		patella	
carpals		tibia	
metacarpals		fibula	
phalanges		tarsals	
		metatarsals.	
Types of Bone			
Long Bone		Flat Bone	
Short Bone		Irregular Bone	
		Sesamoid Bone	
Areas of the skeleton			
axial skeleton		postural deviations	
appendicular skeleton		kyphosis,	
Epiphyseal plate		scoliosis	

Bone Growth			
Osteoblasts		Osteoclasts	
Classification of joints			
Fibrous joint		Ball & Socket	
Cartilaginous joint		Hinge	
Synovial joint		Condylloid	
Gliding		Saddle	
		Pivot	
Synovial Joints			
joint capsule		bursa	
articular cartilage		synovial fluid	
Synovial membrane		ligaments	
Joint Movements			
flexion		extension	
plantarflexion		dorsiflexion	
lateral flexion		hyperextension	
horizontal flexion		horizontal extension	
abduction		adduction	
horizontal abduction		horizontal adduction	
rotation		circumduction	

Muscular system			
Cardiac Muscle		Agonist	
Smooth Muscle		Antagonist	
Skeletal Muscle		Synergist	
Type 1 (Slow)		Fixtator	
Type 11a (FOG)		Concentric	
Type 11x (FTG)		Eccentric	
All or none law		Isometric.	
Hypertrophy		Tendon	
Glycogen		Myoglobin	
Lactate		Mitochondria	
Microtears		Pliability	
Cramp		DOMS	
Respiratory system			
nasal cavity		pharynx,	
larynx		epiglottis	
trachea		bronchus	
bronchioles		lungs	
alveoli		diaphragm	
thoracic cavity,		external intercostal	
internal intercostal		Gaseous exchange	
inspiration		expiration	

Tidal volume		Vital capacity	
Residual volume		Total lung volume	
Minute ventilation		medulla oblongata	
Chemoreceptors		Asthma	
Altitude		Partial pressure	
Cardiovascular system			
atria,		ventricles,	
tricuspid valve		bicuspid valve	
semi-lunar valves		septum	
aorta		vena cava,	
pulmonary artery		pulmonary vein	
coronary arteries		arteries	
arterioles,		veins	
venules		capillaries.	
red blood cells		plasma	
white blood cells		platelets	
vasoconstriction		vasodilation	
Thermoregulation		Clotting	
sympathetic nervous system.		parasympathetic nervous system.	

Sinoatrial node		AV node	
Bundle of His		Purkinje fibres	
Anticipatory rise		Heart rate	
Stroke Volume		Blood pressure	
Cardiac Output		Vascular shunt	
Cardiac hypertrophy		Sudden Arrhythmic Death Syndrome	
Capillarisation		High blood pressure	
Hyperthermia		Hypothermia	
Energy systems			
ATP		Phosphocreatine PC	
Resynthesis		Anaerobic	
Duration		Intensity	
Glycolysis		Glucose	
Pyruvic Acid		Glycogen	
Aerobic glycolysis		Lactic Acid	
Krebs Cycle		Mitochondria	
Recovery time		Electron transport Chain	
hypoglycaemic		Diabetes	