

Cambridge TECHNICALS LEVEL 3

SPORT AND PHYSICAL ACTIVITY

Cambridge
TECHNICALS
2016

Unit 1

Body systems and the effects of
physical activity

K/507/4452

Guided learning hours: 90

Version 2 - Revised content - March 2016

LEVEL 3

UNIT 1: Body systems and the effects of physical activity

K/507/4452

Guided learning hours: 90

Essential resources required for this unit: none

This unit is externally assessed by an OCR set and marked examination.

UNIT AIM

Whether you are aiming to become a coach, nutritionist, personal trainer or leisure centre manager, knowledge of the human body, its systems and how they function will help you to ensure that your clients gain the benefits of an active, healthy lifestyle. By understanding the effects that physical activity, training and lifestyle can have on the body systems you can ensure that sports and activities are properly focused and do not risk a client's health or wellbeing and will help you to persuade others to pursue and maintain a balanced, active, healthy lifestyle.

In this unit you will gain an understanding of the structures and functions of the key body systems, how these support and impact performance in sport and physical activity and the effects that physical activity, training and lifestyle can have on them.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades. Anything which follows an i.e. details what must be taught as part of that area of content. Anything which follows an e.g. is illustrative.

For externally assessed units, where the content contains i.e. and e.g. under specific areas of content, the following rules will be adhered to when we set questions for an exam:

- a direct question may be asked about unit content which follows an i.e.
- a direct question will not be asked about unit content which follows and e.g..

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
1. Understand the skeletal system in relation to exercise and physical activity	1.1 The axial and appendicular skeletons, i.e. Axial skeleton, i.e. <ul style="list-style-type: none"> • cranium • sternum • ribs • vertebral column, i.e. <ul style="list-style-type: none"> ○ cervical vertebrae ○ thoracic vertebrae ○ lumbar vertebrae ○ sacrum ○ coccyx Appendicular skeleton, i.e. <ul style="list-style-type: none"> • scapula • clavicle • humerus 	

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
	<ul style="list-style-type: none"> • radius • ulna • carpals • metacarpals • phalanges • ilium • ischium • pubis • femur • patella • tibia • fibula • tarsals • talus • metatarsals <p>1.2 The functions of the skeleton and the link to types of bone, i.e.</p> <ul style="list-style-type: none"> • functions, i.e. <ul style="list-style-type: none"> ○ shape ○ support ○ protection ○ movement ○ blood cell production ○ mineral storage 	<p>1.2 Learners will be expected to understand how the type of bone relates to the function it has.</p>

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
	<ul style="list-style-type: none"> • types of bone, i.e. <ul style="list-style-type: none"> ○ long ○ short ○ flat ○ irregular ○ sesamoid <p>1.3 Classifications of joints, i.e.</p> <ul style="list-style-type: none"> • fixed/fused (e.g. cranium, pelvis) • slightly movable/cartilaginous (e.g. adjacent vertebrae) • freely movable/synovial <p>1.4 The types of synovial joint, i.e.</p> <ul style="list-style-type: none"> • hinge, i.e. elbow, knee, ankle • ball and socket, i.e. shoulder, hip • pivot, i.e. neck, radio-ulnar • condyloid, i.e. wrist • saddle, i.e. thumb • gliding, i.e. processes of the vertebrae <p>1.5 Structures and functions of synovial joints, i.e.</p> <ul style="list-style-type: none"> • structure, i.e. <ul style="list-style-type: none"> ○ articular/hyaline cartilage ○ ligaments ○ synovial membrane ○ synovial fluid ○ menisci ○ pads of fat ○ bursae ○ joint capsule 	<p>1.3 and 1.4 Learners should appreciate that in some areas of the body there are different types of joints working together (e.g. the vertebral column).</p> <p>1.5 Structures and functions of synovial joints: Learners will need to know the structure and functions of different types of joints and how these relate to one another in practical situations. This must include all of the joints stipulated in 1.4</p>

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	<ul style="list-style-type: none"> • functions, i.e. <ul style="list-style-type: none"> ○ stability ○ mobility <p>1.6 Joint movements, i.e.</p> <ul style="list-style-type: none"> • flexion and extension • lateral flexion • abduction and adduction • horizontal abduction and adduction • medial and lateral rotation • circumduction • pronation and supination • dorsi flexion and plantar flexion <p>1.7 Structure and function of the vertebral column</p> <p>1.8 The impact of physical activity, training and lifestyle on the skeletal system, i.e.</p> <ul style="list-style-type: none"> • short-term effects • long-term effects • effects of warm ups and cool downs 	<p>1.6 Joint movement - Learners will need to recognise types of movement in practical situations, both individually and in combination and types of movement that different joint types are capable of.</p> <p>1.7 Learners will be expected to relate knowledge and understanding from points 1.1 to 1.6 to the vertebral column, appreciating its complex structures and functions.</p> <p>1.8 Short-term effects includes during and immediately after exercise and physical activity. Learners should consider both positive and negative impacts.</p>
2. Understand the muscular system in relation to exercise and physical activity	<p>2.1 Main muscles acting at synovial joints, i.e.</p> <ul style="list-style-type: none"> • shoulder – deltoid, latissimus dorsi, pectoralis major, trapezius, teres major • elbow - biceps brachii, triceps brachii • radio-ulnar - pronator teres, supinator muscle • wrist - wrist flexors, wrist extensors • vertebral column - rectus abdominus, erector 	<p>2.1 Learners will need to understand how the muscles acting at synovial joints support the joint movements identified in 1.6</p>

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
	<p>spinae group, internal and external obliques</p> <ul style="list-style-type: none"> • hip – iliopsoas, gluteus maximus, gluteus medius, gluteus minimus, adductor longus, adductor brevis, adductor magnus • knee - rectus femoris, vastus medialis, vastus intermedius, vastus lateralis, biceps femoris, semimembranosus, semitendinosus • ankle - tibialis anterior, gastrocnemius, soleus <p>2.2 Types of muscle function, i.e.</p> <ul style="list-style-type: none"> • agonist • antagonist • fixator <p>2.3 Types of muscle contraction, i.e.</p> <ul style="list-style-type: none"> • isometric • concentric • eccentric <p>2.4 Structure and function of muscle fibre types, i.e.</p> <ul style="list-style-type: none"> • slow oxidative • fast oxidative • fast glycolytic <p>2.5 Link between mix of fibre types and performance, i.e.</p> <ul style="list-style-type: none"> • in different types of physical activity • in different intensities of exercise <p>2.6 The impact of physical activity, training and lifestyle on the muscular system, i.e.</p> <ul style="list-style-type: none"> • short-term 	<p>2.2 Learners will need to understand types of muscle contraction that take place in joint movements identified in 1.6</p> <p>2.6 Short-term effects includes during and immediately after exercise and physical activity. Learners should consider both positive and negative impacts.</p>

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	<ul style="list-style-type: none"> • long-term • effects of warm ups and cool downs 	
<p>3. Understand the cardiovascular system in relation to exercise and physical activity</p>	<p>3.1 The structures of the heart and their roles, i.e.</p> <ul style="list-style-type: none"> • atria • ventricles • bicuspid and tricuspid valves • pulmonary and aortic valves • aorta • venae cavae • pulmonary artery • pulmonary vein <p>3.2 Stroke volume, heart rate and cardiac output, i.e.</p> <ul style="list-style-type: none"> • resting values for trained and untrained individuals • changes during exercise of different intensity • interpret and draw graphs • use of data including calculations <p>3.3 Structure of blood vessels, i.e.</p> <ul style="list-style-type: none"> • arteries • arterioles • capillaries • venules • veins <p>3.4 Components and functions of blood, i.e.</p> <ul style="list-style-type: none"> • red blood cells • white blood cells 	<p>3.1 Learners will need to understand the directional flow of blood through the heart and the role of each of the structures in this.</p>

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
	<ul style="list-style-type: none"> • platelets • plasma <p>3.5 Vascular shunt mechanism and the role of arterioles and pre-capillary sphincters</p> <p>3.6 The impact of physical activity, training and lifestyle on the cardiovascular system, i.e.</p> <ul style="list-style-type: none"> • short-term effects • long-term effects • effects of warm ups and cool downs 	<p>3.6 Short-term effects includes during and immediately after exercise and physical activity. Learners should consider both positive and negative impacts.</p>
<p>4. Understand the respiratory system in relation to exercise and physical activity</p>	<p>4.1 The structures of the lungs and their roles, i.e.</p> <ul style="list-style-type: none"> • nasal cavity • epiglottis • pharynx • larynx • trachea • bronchi • bronchioles • alveoli <p>4.2 Respiratory muscles used during exercise, i.e.</p> <ul style="list-style-type: none"> • sternocleidomastoid • scalene • pectoralis minor • internal intercostals • rectus abdominus • diaphragm <p>4.3 The mechanics of breathing, i.e.</p>	

Learning outcomes The Learner will:	Teaching content Learners must be taught:	Exemplification
	<ul style="list-style-type: none"> • inspiration • expiration <p>4.4 Gaseous exchange at the alveoli</p> <p>4.5 Tidal volume, breathing frequency and minute Ventilation, i.e.</p> <ul style="list-style-type: none"> • resting values for trained and untrained individuals • changes during exercise of different intensity • interpret and draw graphs • use of data including calculations <p>4.6 The impact of physical activity, training and lifestyle on the respiratory system, i.e.</p> <ul style="list-style-type: none"> • short-term effects • long-term effects • effects of warm ups and cool downs 	<p>4.4 An awareness of differences in partial pressures is required but learners will not be expected to know specific pressures.</p> <p>4.6 Short-term effects includes during and immediately after exercise and physical activity. Learners should consider both positive and negative impacts.</p>
<p>5. Understand the different energy systems in relation to exercise and physical activity</p>	<p>5.1 The three energy systems, i.e.</p> <ul style="list-style-type: none"> • ATP-PC/lactic system • lactic acid system • aerobic system • type of reaction (aerobic or anaerobic) • chemical or food fuel • amount of ATP produced • by-products <p>5.2 The energy continuum and how intensity and duration of exercise determines which energy system is predominant</p>	<p>5.2 Learners need to be able to place different types of activities on the continuum and justify the placement.</p>

Learning outcomes	Teaching content	Exemplification
The Learner will:	Learners must be taught:	
	5.3 The recovery process for each energy system, i.e. <ul style="list-style-type: none"> • processes involved • timescales for full recovery 	5.3 ATP-PC system: process = restoration of PC stores; timescale for full recovery = 2-3 minutes.

LEARNING OUTCOME (LO) WEIGHTINGS

Each learning outcome in this unit has been given a percentage weighting. This reflects the size and demand of the content you need to cover and its contribution to the overall understanding of this unit. See table below:

LO1	15-25%
LO2	15-25%
LO3	15-25%
LO4	15-25%
LO5	5-15%

ASSESSMENT GUIDANCE

All Learning Outcomes are assessed through an externally set, written examination paper, worth a maximum of 70 marks and 1 hour 30 minutes in duration.

Learners should study the different body systems and the impacts of physical activity and lifestyle on them within the taught content in the context of a range of sport and physical activity situations. Exam papers for this unit will use sport and physical activity situations as the focus for some questions, however it is not a requirement of this unit for learners to have any detailed prior knowledge or understanding of particular sports or activity types used. Questions will provide sufficient information to be used, applied and interpreted in relation to the taught content. During the external assessment, learners will be expected to demonstrate their understanding through questions that require the skills of analysis and evaluation in particular contexts.

During the assessment of this unit, learners will benefit from using learning from the following units and Learning Outcomes:

- Unit 4, Working safely in sport, exercise, health and leisure – LO5 Know how to safeguard children and vulnerable adults in sport, exercise, health and leisure
- Unit 7, Improving fitness for sport and physical activity – LO1 Understand principles applied in fitness training
- Unit 10, Biomechanics and movement analysis – LO1 Understand movement in relation to sport and physical activity and LO2 Understand motion and force in relation to sport and physical activity
- Unit 11, Physical activity for specific groups – LO2 Know the benefits of and barriers to participating in physical activity for specific groups
- Unit 12, Nutrition and diet for sport and exercise – LO2 Understand energy balance
- Unit 13, Health and fitness testing for sport and exercise – LO1 Know a range of fitness tests and LO2 Be able to complete a client health and fitness consultation
- Unit 17, Sports injuries and rehabilitation – LO1 Know common sports injuries and their effects

To find out more

ocr.org.uk/sport

or call our Customer Contact Centre on **02476 851509**

Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**



OCR
Oxford Cambridge and RSA

OCR is part of Cambridge Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. ©OCR 2015 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office 1 Hills Road, Cambridge CB1 2EU. Registered company number 3484466. OCR is an exempt charity.