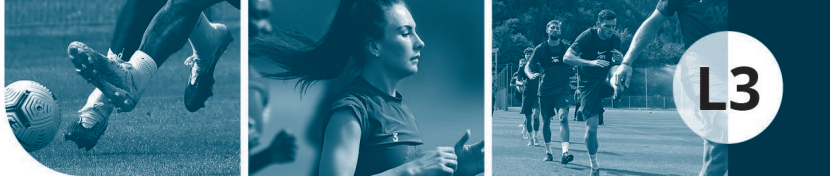


Unit title	Unit 8: Anatomy and Physiology for Exercise and Physical Activity
Guided learning hours	120
Number of lessons	60
Duration of lessons	2 hours
Links to other units	
This unit links to: ● Unit 6: Exercise and Fitness Skills Development ● Unit 7: Personal Training and Programming ● Unit 9: Nutrition for Physical Activity and Exercise	

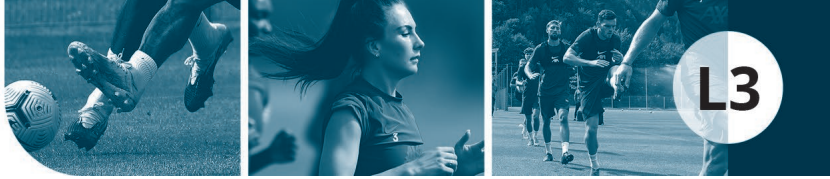
Key to learning opportunities			
AW	Assignment writing	**RS**	Revision session
GS	Guest speaker	**V**	Visit
IS	Independent study	**GW**	Group work

Lesson	Topic	Lesson type	Suggested activities	Resources
Learning aim A: Examine the function of the musculoskeletal system and how it responds to exercise and physical activity				
1	Unit introduction	IS	• Introduce the unit: outline the nature of the topics and the examination that learners are expected to complete for this unit. • Whole-class activity: learners to work individually, in pairs or in small groups to demonstrate prior knowledge of the subject. Suggestions include getting learners to independently recall prior knowledge before developing knowledge in pairs and finally small groups (using A3 paper as means to record findings). Learners to feed back with directed Q&A.	
2	**A1** Structure of skeletal system **A2** Function of the skeletal system	IS	• **Individual or paired activity:** ask learners to complete an activity locating different bones on a partner's body (using sticky notes), followed by on a pre-drawn skeletal worksheet. **Tutor presentation:** the location of major bones, types of bone, and the axial and appendicular skeleton. • **Individual task:** learners to create an information sheet illustrating the different types of bone, and how they are used within different sporting techniques and/or actions. • **Whole-class activity:** a practical exercise identifying the major bones. Call out the bone name and ask learners to point to the location of the bone on their own body, and state a sporting technique and/or action where it is used. • **Individual activity:** learners to label areas of skeleton. • **Whole-group activity:** individual recap sheet to complete on different types of bone and sporting action. Follow with learners labelling the skeletal system as a group.	Sticky notes Model of human Skeleton Tutor-prepared recap sheet Pictures to label for recap activity

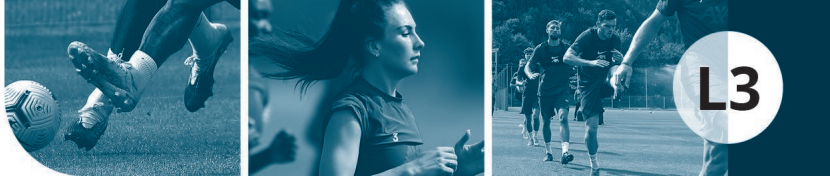
Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Tutor presentation:** curvature of the spine and the process of bone growth. • **Individual activity:** ask learners to independently research and then create an information sheet about the curvature of the spine and the process of bone growth. • **Whole-group activity:** get learners to act as tutors by feeding back information to the rest of the group. • **Individual task:** recap curvature of the spine (by labelling pictures) and the process of bone growth (by completing worksheet in the style of a mini quiz). • **Tutor presentation:** the functions of the skeletal system. • **Individual and group activity:** individuals are given a different function of the skeletal system to research independently. This can be developed via the snowball technique. This involves learners moving into pairs, taking it in turns to explain their research and make notes, then joining another pair to do the same. Ask learners then to feed back all functions to the rest of the class in their groups.	
3	**A3** Structure and function of joints	IS	• **Small-group activity:** instigate learner discussion on 'What are joints?' • **Tutor presentation:** joints, their classification, and their structure and function. Use video-sharing websites to give a visual on the theory content, e.g. www.youtube.com/watch?v=0cYal_hitz4. • **Individual task:** ask learners to label the structure of a synovial joint.	Internet access for videos on video-sharing websites Synovial joints worksheet

Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Small-group task:** allocate to groups one or more synovial joints. They can then create a list of sporting actions that incorporate movement at these joints and demonstrate this practically (in front of the class).	
4	**A4** Bone structure and growth	IS	• **Paired activity:** learners should have access to 'real' or imitation bones (if this is not possible diagrams should be printed off). Learners to create a 'living' poster that identifies the different structures in the bone. • **Individual activity:** learners to research the stages of bone growth and create a storyboard, showing how bone either grows or remodels.	Bones
5	**A5** Structure of muscular system	IS	**Tutor presentation/group discussion:** what is the muscular system? Describe the key characteristics and functions of the different types of muscles in the human body. • **Individual or paired activity:** ask learners to identify and describe muscle types by creating an information leaflet to use as notes for the assessment. • **Whole-class activity:** carry out a quick-fire quiz to check learning. • **Individual or paired activity:** ask learners to label a diagram of the muscular system with the muscles listed in the specification. They should then complete a peer review using a diagram with the correct location of the muscles on. • **Extension activity:** set learners extended open answer question, in line with the distinction criteria. There is an opportunity to develop extended writing skills here.	Quiz Reusable adhesive Outline of human body

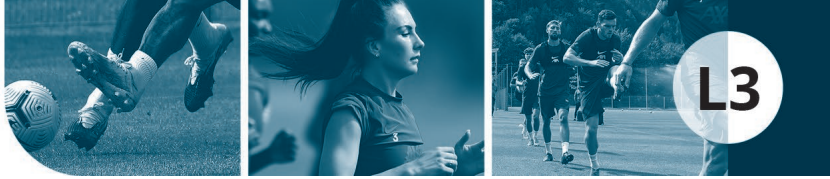
Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Individual activity:** learners to complete a mix-and-match task, followed by several tutor-created questions. • **Individual or paired activity:** ask learners to complete an activity locating different types of muscle. Examples include a 'pin the muscle on the body' game (using reusable adhesive instead of pins) as an adaptation of 'pin the tail on the donkey'. The muscles should be stuck on the appropriate places of an A3 outline of a human body. • **Individual activity**: learners to complete a tutor-created worksheet labelling the muscles of the muscular system. • **Individual or paired activity:** ask learners to come up with methods to remember the names of difficult muscles (e.g. erector spinae = erect = to stand tall = back muscle).	
6–7	**A5** Structure of muscular system **A6** Function of muscular system	IS	• **Tutor presentation:** to embed key points from previous activity. • **Whole-class activity:** carry out a practical exercise identifying major muscles and their sporting actions. Using a random name selector, call out a bone name and joint. Learners must point to and identify the location of the bone and joint on their own body, the muscles attached, and the movements enabled at the joint. • **Tutor presentation:** recap on the major muscles. Ask learners to complete a worksheet. • **Tutor presentation:** antagonistic muscle pairs. • **Small-group activity:** allocate each group a different sporting action. Their task is to identify the muscle(s) of the agonist, antagonist, synergist and fixator. On completion, ask the groups to feed back to the rest of the class. As an extension activity, ask	Tutor-created worksheets Practical space for exercises and sporting actions Internet access for video-sharing websites Practical space for exercises



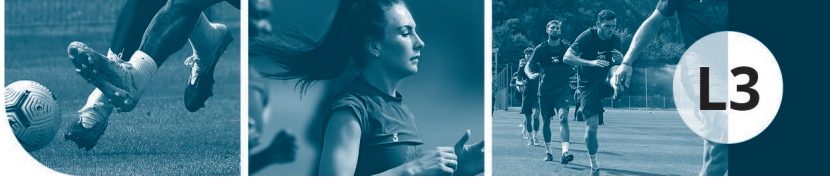
Lesson	Topic	Lesson type	Suggested activities	Resources
			groups to come up with a different sporting action for further stretch and challenge. • **Tutor presentation:** explain the link between antagonistic pairs – use video to aid explanation and use tutor-directed Q&A. Suggestions include www.youtube.com/watch?v=I80Xx7pA9hQ, with numerous other appropriate videos online for support. • **Tutor presentation:** recap antagonist pairs. Give learners a worksheet with questions to answer, and ask them to write down two further questions to test the rest of the group. Q&A and discussion to follow. • **Tutor presentation:** the different types of muscle contraction. • **Individual/paired activity:** give learners different types of exercise and ask them to identify the different types of muscle contraction taking place at each phase of movement. Do this activity in the classroom if possible, or the sports hall if needed. • **Tutor presentation:** explain the link between antagonist pairs. For example, when a bicep brachii contracts concentrically, the tricep brachii has to contract eccentrically. • **Individual plenary activity:** ask learners to create a rhyme, poem or dance to help them remember the differences between the types of muscular contraction.	
8–9	**A7** Muscle fibre types	IS	• **Group activity:** as a recap, get learners to create a short presentation on one of the muscle types to feed back to the group. • **Tutor presentation:** the three types of muscle fibres: type I, type IIa and type IIb.	Practical space for exercise Range of weights



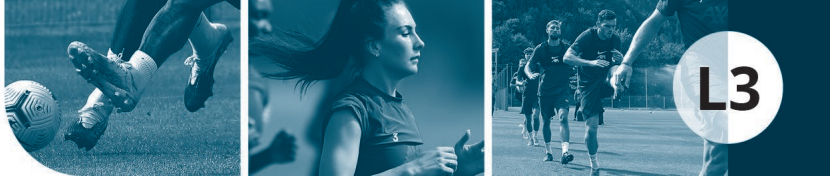
Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Individual or paired activity:** ask learners to describe the characteristics of muscle fibres, with reference to athletes and sporting application. • **Tutor presentation:** nervous control of muscular contraction and the 'all or none law'. • **Whole-class activity:** get learners to take part in a practical to demonstrate recruitment of muscle fibres depending on effort, e.g. light, medium and heavy weights. • **Individual task:** quiz/Question of Sport-style game to check learning.	
10–11	**A8** Musculoskeletal responses to exercise	IS	• **Lead-in:** learners to take part in a 20-minute activity – this can be sport or exercise as long as learners are constantly moving. • **Individual activity/group discussion:** ask learners to identify as many responses of the musculoskeletal system to a sport or exercise session as possible. Discussion can then follow. • **Tutor presentation:** responses to exercise. • **Small-group activity**: in groups, ask learners to produce a presentation with supplemented demonstrations to show the responses of the musculoskeletal system. • **Individual task:** give a mini test to check learning. Use extended questioning as an extension. • **Whole-class discussion:** what adaptations occur to the musculoskeletal system from exercise?	Tutor presentation
12–13	**A9** Musculoskeletal responses to long-term exercise	IS	• **Tutor presentation:** introduce adaptations of the musculoskeletal system.	Tutor presentation



Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Pair activity:** ask learners to create a poster presentation on musculoskeletal adaptation(s). The pairs should then present to the group with time allocated for Q&A from their peers. • **Individual/small-group/whole-class activity:** create four information packs, each representing a key adaptation of the muscular system. Give learners a pack each and allow them time to read and annotate the packs, and gain a sound understanding of the adaptations. On completion, learners become the tutor to create a 'knowledge cafe', where learners teach among themselves. • **Tutor presentation:** adaptations of the muscular system to exercise. • **Small-group activity:** Question of Sport-style recap quiz.	Tutor-created 'pack' relating to muscular adaptations
Learning aim B: Examine the function of the cardiorespiratory system and how it responds to exercise and physical activity				
14–15	**B1** Structure of cardiovascular system	IS	• **Tutor presentation:** the structure of the heart. • **Individual activity:** get learners to label the structure of the heart or complete a jigsaw puzzle. • **Paired activity:** ask learners to test each other on the structure of the heart. • **Group activity –** the tutor will lay out marker disks in the shape of the heart with the oxygenated side of the heart in red cones and de-oxygenated in blue cones. Each learner is given a role in the heart to play, e.g. bicuspid value. Some learners will be the blood vessels and they start off holding blue bibs and follow the pathway of blood through the heart to pick up red bibs in the 'lungs'. Learners must remember the function of their structure and when	Jigsaw puzzle of the heart/diagram of the heart without labels Practical space Marker discs and bibs in blue and red



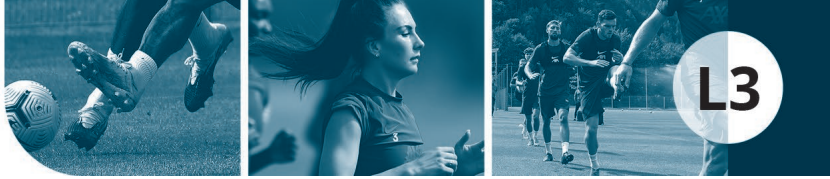
Lesson	Topic	Lesson type	Suggested activities	Resources
			they return to the classroom learners must work together to discuss the flow of blood through the heart. • **Tutor presentation:** go through the functions of each component. • **Pair or small-group activity:** groups illustrate the different blood vessels and describe their structure. You can use e-learning to aid learner research. • **Tutor presentation:** directed Q&A on the structure of blood vessels.	
16–17	**B1** Structure of the cardiovascular system	IS	• **Tutor presentation:** recap the structure of the cardiovascular system. • **Individual activity:** as a further recap activity, get learners to race to see who can label the system the quickest. • **Independent research task:** ask learners to research the composition of blood. Learners should create a poster to show the percentages of the different components. • **Tutor presentation:** the composition of blood. • **Quiz:** learners make a quiz/game to test learning and understanding.	Tutor presentation
18–19	**B2** Function of the cardiovascular system	IS	• **Tutor presentation:** recap on composition and function of blood. Recap worksheet followed by Q&A. • **Practical activity:** learners bring in layers of warm clothing, hat and gloves. They take their temperature before, during and after playing a short game. • **Group discussion:** learners discuss how they felt during the activity and the differences in their temperatures.	Practical space Tutor-created worksheet Poster paper/A3/flip chart for stall signs and info



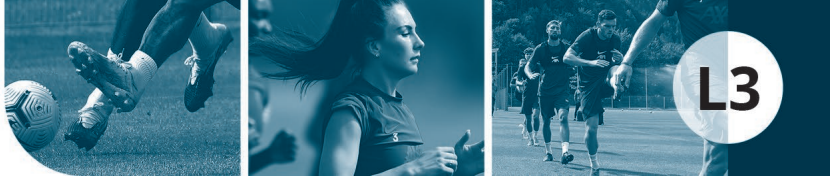
Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Tutor presentation –** thermoregulation. • **Individual/pair/group activity:** marketplace learning – research using worksheets to increase knowledge in the field. Set up stalls to represent different topic areas. Learners will walk among the different 'stalls' to share learning and content. • **Tutor presentation:** the functions of the cardiovascular system. Hold directed Q&A to check learning.	
20–21	**B3** Structure of the respiratory system		• **Tutor presentation:** the structure of the respiratory system. • **Individual activity:** ask learners to label the structures of the respiratory system. Create a jigsaw puzzle from the structure of the entire respiratory system and ask them to solve it, while identifying each structure. • **Tutor presentation:** the different structures and their function within the respiratory system. • **Paired activity:** get learners to create a quiz for their partner to complete on the structures and their function within the respiratory system. • **Individual activity:** examination-style questions as a recap on the structure of the respiratory system.	Jigsaw
22–23	**B4** Function of the respiratory system		• **Pair activity:** using peak flow and a spirometer, get learners to measure lung volumes and capacity, noting their partner's results. • **Tutor presentation:** lung volumes applied to the sporting context. • **Tutor presentation/practical session:** get learners to take part in a range of movements/activities. Hand out a worksheet for them to	Practical space for exercise Tutor-created worksheet Paper and pens YouTube video - 'How to Measure Vital

Lesson	Topic	Lesson type	Suggested activities	Resources
			complete individually, before working in small groups to check for understanding. • **Practical application:** learners to measure vital capacity using the balloon method. Go online and watch the YouTube video before performing the task: '*How to Measure Vital Capacity Using a Balloon*.' • **Tutor presentation:** devise a game with key terms or phrases in the format of bingo to check learning to date. Call out definitions of the key terms and/or give examples alluding to the key terms or phrases. • **Independent study:** give learners articles (from journals or other credible sources) and ask them to answer questions on neural and chemical control of breathing. When complete, use the snowball method to work in pairs, then in small groups, and finally as a class to discuss. • **Tutor presentation:** the control of breathing. • **Individual task:** carry out extended questioning in line with distinction criteria.	Capacity Using a Balloon' by XoletteScience Journal articles Internet access
24–25	**B5** Lung volumes and control of breathing		• **Educational trip:** use an educational trip to a local sports university for learners to measure lung volumes using a spirometer. • **Practical activity:** ask learners to measure vital capacity using the balloon method (method available online). • **Individual activity:** each learner to be given a spirometer reading and they need to label the different lung volumes.	Diagram of a spirometer reading

Lesson	Topic	Lesson type	Suggested activities	Resources
26–27	**B6** Cardiorespiratory system responses to exercise	IS	• **Pair activity:** as a race in pairs, learners must identify the correct definition for each element making up the cardiac cycle. • **Practical activity**: learners participate in a 10-minute cardiovascular activity. They should work in pairs to record heart rate before, during and after. • **Group discussion**: learners discuss the changes in their heart rate during acute activity and compare their figures to normal heart rate boundaries for their age. • **Tutor presentation:** responses of the cardiovascular system. • **Small-group activity:** present case studies demonstrating a number of responses following a single sport or exercise session. Ask learners to depict the responses and explain why they are occurring. They should then feed back to the class. • **Individual activity:** extended style question to test for learning and understanding at the higher grades. • **Whole-class activity:** 'learner as tutor' game. Ask learners to use their class notes to devise questions to ask the rest of the class, recapping lung volumes and control of breathing. • **Small-group activity:** allocate groups one response and get them to create a presentation to deliver to the rest of the class. • **Tutor presentation:** recap responses of the respiratory system, followed by a directed Q&A.	Practical space for cardiovascular activities Case studies – heart.org and livestrong.com may be useful to create these. There are also several journals available on Google Scholar
28–29	**B6** Cardiorespiratory system responses to exercise	IS	• **Tutor presentation:** recap on responses of the cardiovascular system. • **Whole-group activity:** speed teaching – give small groups/pairs a content area and time to increase knowledge in the field. Groups	Resources on cardiovascular adaptations Mini quiz

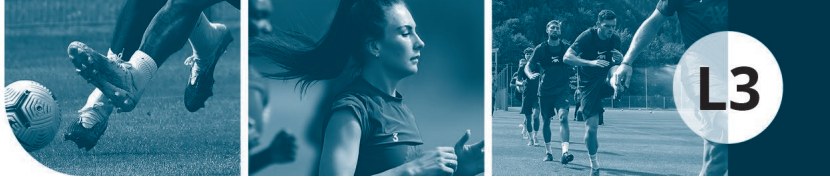


Lesson	Topic	Lesson type	Suggested activities	Resources
			rotate round to teach each other the content in the format of speed dating. Ask individuals to collate a workbook of content and score each other's teaching. • **Tutor presentation:** adaptations of the cardiovascular system. • **Individual activity:** mini quiz to check learning. • **Tutor presentation:** recap responses of the respiratory system. • **Group activity:** give learners a workbook and one key adaptation to individually work through. On completion, individuals should get together with others to form small groups and teach each other so they all have notes on all key adaptations. • **Tutor presentation:** adaptations of the respiratory system. • **Whole-class activity**: Q&A on adaptations.	Tutor-created workbook
30–34	Assessment of learning aims A and B	AW	• **Individual activity:** learners work independently to complete the tasks in the assignment brief.	Assignment brief
Learning aim C: Explore the energy and digestive systems and their response to exercise and physical activity				
35	**C1** Structure and function of the digestive system		• **Whole-class activity:** introduce the digestive system with a knowledge quiz (a quick-fire quiz). Each learner is given an outline of the human body. Quiz master calls out an organ, learner puts its position and name on the blank diagram. Go through the answers and tutor keeps the diagrams for a future lesson. • **Lead-in:** use a video of the digestive system to formally introduce learners to key processes and structures in the digestive system. https://www.youtube.com/watch?v=Og5xAdC8EUI&t=195s	

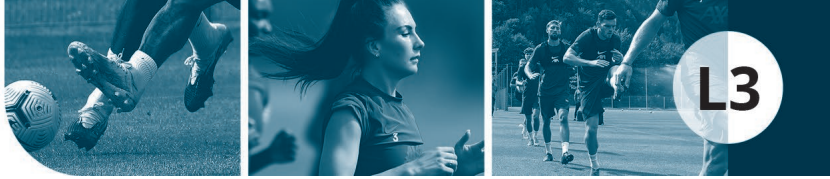


Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Class discussion:** use a follow-up discussion to make sure that all learners agree on the definitions for the key words and understand the processes in the digestive system. • **Individual activity:** each learner to create a poster that locates the structures of the digestive system and explains their function. They should then comment on the process of food through the digestive system.	
36–37	**C2** Energy systems	IS	• **Tutor-led discussion:** what is adenosine triphosphate (ATP)? • **Tutor presentation:** the role of ATP in exercise. • **Pair activity:** using five balloons, demonstrate how energy is created and recreated. One balloon represents the adenosine molecule, with a further four balloons available to represent the role of phosphate molecules in the creation and recreation of energy. Encourage discovery learning here. • **Individual activity:** extended writing task looking at the role of ATP in sport. • **Independent study:** get learners to research the ATP-PC system in exercise and sports performance. • **Pair, small-group and whole-class activity:** following the independent study, pair up individuals to share knowledge. This will then develop into small groups before feeding back to the rest of the class. Discussions and directed Q&A should follow.	Balloons
38–39	**C2** Energy systems	IS	• **Tutor presentation:** play video clips of several sports and activities. Ask learners to make notes, applying the system to the actions they can see. Any relevant sporting clip showing anaerobic activity will be appropriate.	Video clips of sports activities Space for practical activity

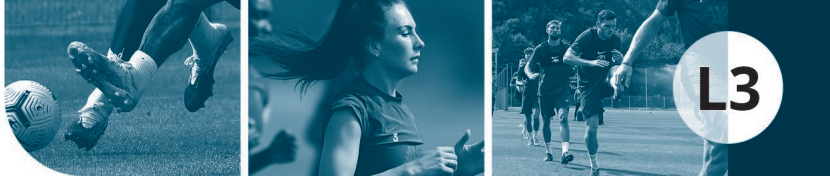
Lesson	Topic	Lesson type	Suggested activities	Resources
			• **Individual activity:** mini quiz to check learning. • **Tutor presentation:** the lactate system in exercise and sports performance. Follow your presentation with practical elements to demonstrate lactate build up (suggestions include one-minute press up and squat challenges). • **Tutor presentation:** the aerobic system. • **Individual task:** open questioning relating to the aerobic system's contribution to energy for exercise and sports performance. • **Pair activity:** get learners to create an information leaflet that explains the aerobic system in sport and exercise. These can be used as guides for the assignment.	
40–43	**C3** Energy and digestive systems response to exercise	IS	• **Whole-group activity:** recap on the aerobic system. Ask learners to produce two questions each (with answers) to ask each other. • **Tutor presentation:** on energy systems and digestive response to and recovery from acute exercise. • **Group activity:** learners work in small groups. They are given an acute response and have to research the benefit of the response. The groups present the information back to the whole class. • **Tutor presentation:** on adaptations of the energy systems and digestive system to exercise. • **Small-group activity:** small groups produce a presentation on the adaptations of the energy systems and digestive systems. • **Whole-class activity:** guided debate to encompass all aspects of ATP and the energy systems during sport and exercise. • **Individual task:** ask learners to identify key facts surrounding the topic area to aid high grade achievement.	Tutor presentations. Tutor-prepared resources



Lesson	Topic	Lesson type	Suggested activities	Resources
Learning aim D: Explore the nervous and endocrine systems and their response to exercise and physical activity				
44–45	**D1** Nervous system		• **Tutor presentation:** introduce learning aim D with a presentation on how we rely on our nervous system and explore reaction times, reflex actions and exercises in the gym. • **Practical activity:** learners can take part in simple reaction time tests like the ruler drop test. They can then discuss what these simple tests say about the human nervous system. • **Lead-in:** learners to watch the following video on the nervous system https://www.youtube.com/watch?v=6O-0CVAgaEM • **Tutor presentation**: learners should be made familiar with the CNS including major areas of the brain and their function. They can then investigate voluntary and involuntary activities and relate these to movements in the gym. • **Practical activity:** if possible, learners could use microscopes to look at nerve cells and nerves. This activity can then be linked to the structure of nerve cells and conduction of impulses.	Practical space Microscopes
46–47	**D2** Endocrine system		• **Group discussion:** hormones and their understanding of their role in the human body. This can be followed by independent research to identify the role and function of each hormone. • **Paired activity**: to familiarise learners with the endocrine system and glands, learners are given the outline of a blank human body. Ask the learners to tell you where to put each of the glands: pituitary, thyroid, ovaries, pancreas, adrenals, testes. • **Tutor presentation**: give definitions of the endocrine system and use visual aids to show the structure of the glands.	



Lesson	Topic	Lesson type	Suggested activities	Resources
48–49	**D3** Nervous and endocrines systems responses to exercise **D4** The nervous system in special populations		• **Paired activity:** learners work in pairs to identify the responses of the nervous and endocrine systems to exercise. • **Scenarios:** each pair should be given specific exercises used in the gym and asked to apply the responses of the nervous and endocrine systems to chronic exercise. • **Individual activity:** using the information from the paired activity, learners produce a piece of extended writing that discusses how the adaptations would enhance the performance of clients. • **Independent research task:** learners to investigate the effect of growth spurts on nervous coordination and how the nervous system affects older adults. • **Class discussion:** considerations an instructor would have to make in a gym environment.	
50–53	Assessment of learning aims C and D	AW	• **Individual activity:** learners work independently to complete the tasks in the assignment brief.	Assignment brief
Learning E Explore the principles of biomechanics in exercise and physical activity				
54–55	**E1** Planes of movement **E2** Anatomical terms		• **Lead-in:** learners to watch the following video, which introduces biomechanics https://www.youtube.com/watch?v=r3-UuoQ6fbY • **Tutor presentation:** the planes of movement. • **Small-group activity**: learners are separated into different groups and given a range of pictures. They must identify the plane of movement in the picture. • **Individual activity:** Each learner is given an anatomical term to research. They must find out: – a definition	Pictures of different exercises in the gym



Lesson	Topic	Lesson type	Suggested activities	Resources
			– application of the term in a fitness suite – a picture that demonstrates the term. • **Whole-class activity:** learners feed back the results of their research and the tutor to correct/confirm the information so the class can take notes.	
56–58	**E3** The effect of exercise variables on biomechanics and kinesiology	IS	• **Tutor presentation:** the effect of exercise variables on biomechanics and kinesiology. • **Small-group activity:** learners work in small groups and are given specific exercises to focus on. They must evaluate the effect of exercise variables on the biomechanics and kinesiology of the movement. • **Paired activity:** learners are given some practical time to take pictures of their partner completing a skill in their sport. They can then upload the picture and annotate. The pair should then analyse the biomechanics of the person doing the activity. • **Peer assessment:** groups swap their findings and the other groups critique their work.	Practical space and equipment Digital camera
59–60	Assessment of learning aim E	AW	• **Individual activity:** learners work independently to complete the tasks on the assignment brief.	Assignment brief

Pearson is not responsible for the content of any external internet sites. It is essential for tutors to preview each website before using it in class so as to ensure that the URL is still accurate, relevant and appropriate. We suggest that tutors bookmark useful websites and consider enabling learners to access them through the school/college intranet.