

Unit 4: The Sports Performer in Action

# Scheme of work

Guided learning hours (GLH): 30

Number of lessons: 30

Duration of lessons: 1-2 hours

Learners should spend lesson time and non-supervised time working on assignments.

This scheme of work is provided to help you make the most of your planning time. Customise this by adding your own activities/lesson ideas to the 'Activities' column.

Lesson	Unit content*	Activities	Links to other units
1	Unit introduction	<ul style="list-style-type: none"> <li><b>Tutor presentation (approx. 10 minutes):</b> outline the nature of the learning aims and the number of assignments that learners will be expected to complete.</li> </ul>	
<b>Learning aim A: Know about the short-term responses and long-term adaptations of the body systems to exercise</b>			
1-2 cont.	<b>Topic A.1 Short-term effects of exercise on the musculoskeletal system:</b> <ul style="list-style-type: none"> <li>increased production of synovial fluid</li> <li>increased joint range of movement</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> short-term effects of exercise on joints.</li> <li><b>Group activity:</b> learners to produce informational posters on how exercise benefits joints.</li> </ul>	<b>Topic A.1</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.10)</li> </ul>
3	<b>Topic A.1 cont.:</b> <ul style="list-style-type: none"> <li>new bone formation</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> short-term effects of exercise on bones.</li> <li><b>Group activity:</b> learners to research how new bone is formed. Learners to then present their findings to the class.</li> </ul>	<b>Topic A.1</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.3)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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4	<p><b>Topic A.1 cont.:</b></p> <ul style="list-style-type: none"> <li>• micro tears in muscle fibres</li> <li>• increased metabolic activity</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Tutor-led recap session:</b> Q&amp;A on new bone formations.</li> <li>• <b>Tutor presentation:</b> short-term effects of exercise on muscles.</li> <li>• <b>Group activity:</b> learners to produce an information poster for a gym on the short-term effects of exercise on muscles.</li> <li>• Group discussion regarding assessment requirements.</li> </ul>	<p><b>Topic A.1</b> has links with:</p> <ul style="list-style-type: none"> <li>• Unit 5: Training for personal fitness (Topic A.3)</li> <li>• Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
5-6	<p><b>Topic A.2 Short-term effects of exercise on the cardiorespiratory system:</b></p> <ul style="list-style-type: none"> <li>• increased heart rate</li> <li>• increased breathing rate</li> <li>• increased blood flow</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Tutor presentation:</b> short-term responses of the cardiorespiratory system.</li> <li>• <b>Practical activity:</b> learners to investigate the effects of exercise on heart rate.</li> </ul>	<p><b>Topic A.2</b> has links with:</p> <ul style="list-style-type: none"> <li>• Unit 5: Training for personal fitness (Topic A4)</li> <li>• Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
7	<p><b>Topic A.2 cont.</b></p> <ul style="list-style-type: none"> <li>• sweat production and skin reddening</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Tutor presentation:</b> short-term responses of the cardiorespiratory system.</li> <li>• <b>Practical activity:</b> learners investigate how much they sweat.</li> </ul>	<p><b>Topic A.2</b> has links with:</p> <ul style="list-style-type: none"> <li>• Unit 5: Training for personal fitness (Topic A4)</li> <li>• Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
8	<p><b>Topic A.2 cont.:</b></p> <ul style="list-style-type: none"> <li>• re-distribution of blood flow</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Tutor presentation:</b> blood flow.</li> <li>• <b>Individual activity:</b> learners to investigate changes in blood flow during exercise.</li> </ul>	<p><b>Topic A.2</b> has links with:</p> <ul style="list-style-type: none"> <li>• Unit 5: Training for personal fitness (Topic A4)</li> <li>• Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>

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9	<b>Topic A.2 cont.:</b> <ul style="list-style-type: none"> <li>increased cardiac output</li> <li>increased blood pressure</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> cardiac output and blood pressure.</li> </ul>	<b>Topic A.2</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
10	<b>Topic A.2 cont.:</b> <ul style="list-style-type: none"> <li>increased build-up of lactic acid</li> <li>increase in Tidal Volume (TV)</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> lactic acid and tidal volume.</li> <li><b>Group discussion:</b> is lactic acid only a waste product?</li> </ul>	<b>Topic A.2</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
11	<b>Topic A.1 and A.2 cont.:</b> <ul style="list-style-type: none"> <li>End of topic recap</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> end of topic recap.</li> <li><b>Head to head quiz:</b> split learners into two groups and ask each member to write down 3 questions and the answers. These are then given to the tutor. Students then take it in turns to go head to head. Tutor calls questions.</li> </ul>	<b>Topic A.2</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
12	<b>Topic A.3 Long-term adaptations of the musculoskeletal system:</b> <ul style="list-style-type: none"> <li>hypertrophy (increased muscle size)</li> <li>increased number of mitochondria</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> hypertrophy and increased number of mitochondria as long-term adaptations of the musculoskeletal system.</li> <li><b>Individual activity:</b> learners to produce leaflet that uses illustrations and accompanying explanations of hypertrophy and increased mitochondria. Learners should include relevant examples of how this can benefit different sports.</li> </ul>	<b>Topic A.3</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
13	<b>Topic A.3 cont.:</b> <ul style="list-style-type: none"> <li>increase in bone density (bone strength)</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> increased bone density as long-term adaptations of the musculoskeletal system.</li> <li><b>Individual activity:</b> learners to investigate bone density.</li> </ul>	<b>Topic A.3</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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14	<p><b>Topic A.3 cont.:</b></p> <ul style="list-style-type: none"> <li>increased stability of joints</li> <li>stronger connective tissues (ligaments and tendons), so more resistant to injury</li> <li>increased thickness of hyaline cartilage</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> increased joint stability as a long-term adaptation of the musculoskeletal system.</li> <li><b>Group activity:</b> learners to come up with six different exercises to be used by office workers to improve their posture.</li> </ul>	<p><b>Topic A.3</b> has links with:</p> <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
15	<p><b>Topic A.3 cont.:</b></p> <ul style="list-style-type: none"> <li>improved posture</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> improved posture as a long-term adaptation of the musculoskeletal system.</li> <li><b>Paired activity:</b> learners to produce an advice leaflet, aimed at office workers, which shows how exercise can benefit posture.</li> </ul>	<p><b>Topic A.3</b> has links with:</p> <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
16	<p><b>Topic A.3 cont.:</b></p> <ul style="list-style-type: none"> <li>decreased risk of osteoporosis</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> decreased risk of osteoporosis as a long-term adaptation of the musculoskeletal system.</li> <li><b>Individual activity:</b> learners to produce an advice leaflet, aimed at female gym users, which explains how exercise can decrease the risk of osteoporosis.</li> </ul>	<p><b>Topic A.3</b> has links with:</p> <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
17	<p><b>Topic A.3 cont.:</b></p> <ul style="list-style-type: none"> <li>end of topic re-cap</li> </ul>	<ul style="list-style-type: none"> <li><b>Group activity:</b> learners take part in 'Who wants to be a millionaire' style Q&amp;A session. Tutor could use monopoly money or similar as the 'prize'.</li> <li><b>Tutor presentation:</b> end of topic recap followed by a Q&amp;A session.</li> <li><b>Individual activity:</b> learners to investigate the long-term effects of exercise.</li> </ul>	<p><b>Topic A.3</b> has links with:</p> <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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18	<b>Topic A.4 Long-term adaptations of the cardiorespiratory system:</b> <ul style="list-style-type: none"> <li>decrease in resting heart rate</li> <li>increase in heart size and strength</li> <li>increase in stroke volume</li> <li>decreased risk of hypertension (high blood pressure)</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> long-term adaptations of the heart.</li> <li><b>Individual activity:</b> learners to investigate strong and healthy hearts.</li> </ul>	<b>Topic A.3</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
19	<b>Topic A.4 cont.:</b> <ul style="list-style-type: none"> <li>increased Vital Capacity (VC)</li> <li>increased efficiency to deliver oxygen and remove waste products</li> <li>increased lung efficiency and gaseous exchange</li> <li>increased maximum oxygen uptake (<math>VO_2</math> max).</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> long-term adaptations of the cardiorespiratory system.</li> <li><b>Group activity:</b> learners to produce A3 posters aimed at asthmatic patients on how the cardiorespiratory system adapts to exercise.</li> </ul>	<b>Topic A.3</b> has links with: <ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic B.5)</li> </ul>
20-21	<b>Assignment 1</b> Tasks for Learning aim A  Use centre-devised assignment. Alternatively, use the authorised assignment from Pearson <a href="http://www.btec.co.uk/sport2012">www.btec.co.uk/sport2012</a>	<ul style="list-style-type: none"> <li><b>Assessment:</b> evidence could be in the form of a presentation.</li> <li>Learners could use the links at the end of this scheme of work during their research for this assignment.</li> <li>Learners should spend session time and non-supervised time working on this assignment.</li> </ul>	
<b>Learning aim B: Know about the different energy systems used during sports performance</b>			
22	<b>Topic B.1 The anaerobic energy system:</b> <ul style="list-style-type: none"> <li>Sports that use this system</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> energy systems in sport.</li> <li><b>Individual activity:</b> learners to investigate energy systems in sport.</li> </ul>	<ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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Lesson	Unit content*	Activities	Links to other units
<p>23-24 ( 2 hour)</p>	<p><b>Topic B.2 ATP-CP/lactic acid anaerobic system:</b></p> <ul style="list-style-type: none"> <li>● reliance on stored adenosine triphosphate (ATP)</li> <li>● another stored molecule, creatine phosphate (CP) helps restore ATP</li> <li>● CP is restored aerobically (with oxygen)</li> <li>● energy is supplied by ATP and CP (four to 20 seconds)</li> <li>● when this system runs out of ATP-PC stores, glycolysis takes place</li> </ul> <p><b>Topic B.3 Glycolysis/lactic acid anaerobic system:</b></p> <ul style="list-style-type: none"> <li>● ATP is made from glucose stored in the liver and muscles</li> <li>● energy is supplied by ATP, CP and muscle glycogen (20 to 45 seconds)</li> <li>● energy is supplied by muscle glycogen (45 to 240 seconds)</li> <li>● waste product is lactic acid</li> <li>● when this system is unable to maintain energy requirements, the aerobic system starts to produce energy</li> <li>● sports that use this system</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Tutor presentation:</b> anaerobic energy systems.</li> <li>● <b>Group activity:</b> learners to produce poster (part A) that explains how the anaerobic energy systems work.</li> </ul>	<ul style="list-style-type: none"> <li>● Unit 5: Training for personal fitness (Topic A4)</li> <li>● Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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Lesson	Unit content*	Activities	Links to other units
25	<p><b>Topic B.4 The aerobic energy system - using oxygen:</b></p> <ul style="list-style-type: none"> <li>energy supplied by muscle glycogen and fatty acids (240 to 600 seconds)</li> <li>uses oxygen as a means of making energy (re-synthesising ATP)</li> <li>sports that use this system</li> <li>low to moderate intensity (beyond 90 seconds)</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> aerobic energy systems.</li> <li><b>Activity:</b> learners to timeline in pairs (part B) that explains how the aerobic energy system works (use as many illustrations as possible to support explanation).</li> </ul>	<ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
26	<p><b>Topic B.1,B.2,B.3,B.4 cont.:</b></p> <ul style="list-style-type: none"> <li>how do the energy systems work?</li> </ul>	<ul style="list-style-type: none"> <li><b>Class activity:</b> tutor to show video clips of different sports and learners to identify which energy systems are being used.</li> <li><b>Tutor presentation</b> on how energy systems work.</li> <li><b>Individual activity</b> on how energy systems work.</li> </ul>	<ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
27	<p><b>Topic B.1,B.2,B.3,B.4 cont.:</b></p> <ul style="list-style-type: none"> <li>know about the different energy systems used during sports performance.</li> </ul>	<ul style="list-style-type: none"> <li><b>Individual activity:</b> learners to investigate the energy system continuum.</li> </ul>	<ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A.4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>
28	<p><b>Topic B.1,B.2,B.3,B.4 cont.:</b></p> <ul style="list-style-type: none"> <li>recap on Learning aim B.</li> </ul>	<ul style="list-style-type: none"> <li><b>Tutor presentation:</b> end of learning aim recap followed by a Q&amp;A session.</li> <li><b>Small group activity:</b> learners to produce a list of questions (5 per energy system and 5 related to the application to sport). The quizzes are then swapped between groups for completion.</li> </ul>	<ul style="list-style-type: none"> <li>Unit 5: Training for personal fitness (Topic A4)</li> <li>Unit 7: Anatomy and physiology for sports performance (Topic A.5)</li> </ul>

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29-30 (2 hours)	<p><b>Assignment 2</b></p> <p>Tasks for Learning aim B</p> <p>Use centre-devised assignment. Alternatively, use the authorised assignment from Pearson <a href="http://www.btec.co.uk/sport2012">www.btec.co.uk/sport2012</a></p>	<ul style="list-style-type: none"> <li>● <b>Assessment:</b> evidence could be in the form of a newspaper article.</li> <li>● Learners could use the following during their research for this assignment (see below).</li> <li>● Learners should spend session time and non-supervised time working on this assignment.</li> </ul>	
<b>TOTAL: 30 hours</b>			

## Useful links

<http://www.britannica.com/EBchecked/topic/434208/bone-formation>

<http://www.livestrong.com/article/236801-short-term-long-term-effects-of-exercise-on-the-skeletal-system/>

[http://www.teachpe.com/anatomy/short\\_term\\_effects.php](http://www.teachpe.com/anatomy/short_term_effects.php)

<http://www.livestrong.com/article/236801-short-term-long-term-effects-of-exercise-on-the-skeletal-system/>

<http://www.livestrong.com/article/127016-short-longterm-effects-exercise/>

<http://www.normalbreathing.com/c-effects-of-exercise-on-the-respiratory-system.php>

<http://www.brianmac.co.uk/energy.html>

<http://www.sport-fitness-advisor.com/energysystems.html>

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