## Scheme of work for Option B, Physiology of exercise

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| B1               | Muscles and movement | 4 lessons | • Describe the structure of the human elbow joint and the roles of the bones, ligaments, tendons and nerves; compare the movement of the hip and knee joints  
• Describe the detailed structure of striated muscle and how the actin and myosin filaments are arranged to produce dark and light bands  
• Explain the contraction of skeletal muscle including the release of Ca\(^{2+}\) ions, formation of cross bridges, sliding filaments and use of ATP to break cross bridges; analyse electron micrographs to assess the state of contraction of muscle fibres | p310–317  
Short-answer Qs p317  
End-of-chapter Qs p330–332: Q1, Q2 | Extension: Q2  
Support: Q2 | Practical activity: dissection of suitable animal joint |
| B2               | Training and the pulmonary system | 2 lessons | • Define ‘lung capacity’, ‘vital capacity’, ‘tidal volume’ and ‘ventilation rate’; explain the need for changes in tidal volume and ventilation rate during exercise  
• Outline the effects of training on the pulmonary system, including changes in ventilation rate at rest, maximum ventilation rate and vital capacity | p317–319  
Short-answer Qs p319  
End-of-chapter Qs p330–332: Q3 | | Possible link to ICT: data logging |
| B3               | Training and the cardiovascular system | 2–3 lessons | • Define ‘heart rate’, ‘stroke volume’, ‘cardiac output’ and ‘venous return’ and explain how cardiac output and venous return change during exercise; explain the effect of training on heart rate and stroke volume  
• Compare the distribution of blood at rest and during exercise  
• Consider and evaluate the risks and benefits of EPO to improve sporting performance | p319–321  
TOK p321  
Short-answer Qs p321  
End-of-chapter Qs p330–332: Q4, Q5, Q11 | Extension: Q1  
Support: Q1 | Practical activity: opportunity for assessed practical investigating heart rate and exercise  
Link to TOK: data collection on EPO from news and internet sources |
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| B4 | Exercise and respiration | 3 | • Outline the roles of glycogen and myoglobin in muscle fibres and the methods of ATP production used during exercise of varying intensity and duration  
• Define the measures of oxygen consumption and outline the relationship between intensity of exercise and VO₂ max and the proportions of fat and carbohydrate used in respiration  
• Outline how the oxygen debt is repaid after anaerobic respiration and lactate production | p322–325  
Short-answer Qs p325  
End-of-chapter Qs p330–332: Q6, Q7, Q10 | Extension: Q3  
Practical activity: use of spirometer or analysis of given data |
| B5 | Fitness and training | 2 | • Discuss measures of fitness including speed and stamina; distinguish between fast- and slow-twitch muscle fibres  
• Discuss the effects of moderate and high intensity exercise on the different muscle fibres  
• Discuss the ethics of performance-enhancing drugs, including anabolic steroids | p325–328  
Short-answer Qs p328  
End-of-chapter Qs p330–332: Q8 | Support: Q3  
Practical activities: vertical jump practical work; training programmes of elite athletes; discuss the use of performance enhancing substances  
Link to TOK |
| B6 | Injuries | 1 | • Discuss the need for warm-up routines; describe injuries including sprains, torn muscles and ligaments, dislocation and intervertebral disc damage | p328–330  
TOK p329  
End-of-chapter Qs p330–332: Q9 | Extension: Q4  
Link to TOK |

**Note:** 1 lesson = approximately 40 minutes