



The Sutton Academy

Knowledge Rich Curriculum Plan

BTEC Extended Certificate in Sport / Unit 1

Learning aim E: The effects of exercise and sports performance on the energy systems

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Tiered Vocabulary	Prior Knowledge: <i>In order to know this students, need to already know that...</i>	Assessment
Lesson 1: The importance of energy in sports performance and the role of ATP	<ul style="list-style-type: none"> Students will know that the methods by which your body generates energy is determined by the intensity and duration of the activity being undertaken. Students will know that intensity means how hard you are working or how physically demanding a task is Students will know that prolonged means to continue to perform over a longer period of time than usual Students will know that we create energy either aerobically (with oxygen) or anaerobically (without oxygen) Students will know how the body breaks down ATP to ADP to create energy Students will know that ATP means adenosine Triphosphate and is the only source of energy in the body ADP means Adenosine diphosphate and is what is left after energy has been created 	<p>Aerobic Oxygen Anaerobic Adenosine Triphosphate (ATP) Adenosine Diphosphate (ADP) Energy</p>	<ul style="list-style-type: none"> Students need to already know that energy is created in muscle cells (mitochondria) Students need to already know that energy is obtained through the breakdown of foods in our diet - particularly carbohydrates and fats (unit 2 link) 	
Lesson 2: To know the key features and process of the ATP-PC system in energy production	<ul style="list-style-type: none"> Students will know that the ATP-PC system is also known as the alactic system and is anaerobic Students will need to know that this system re-synthesises ATP for sports with sudden or powerful movements Student will need to know that re-synthesis means to combine or produce something again Students will need to know that this process is known as a coupled reaction which means were the energy from one reaction is used for another reaction Students will need to know how phosphocreatine is broken down to re-synthesis 1 ATP Students will need to know that this system can only provide energy for 8-10 seconds 	<p>Alactic system Re-synthesis Power Coupled reaction Phosphocreatine</p>	<ul style="list-style-type: none"> Students need to already know that ATP means adenosine Triphosphate and is the only source of energy in the body Students need to already know how this process of energy production works Students will already need to know that ATP only lasts for 2-3 seconds 	
Lesson 3: To know the key features and processes of the lactate system in energy production	<ul style="list-style-type: none"> Students will know that the lactate system is a short term energy system and also works anaerobically. Students will need to know that this system re-synthesises ATP for sports that are higher intensity over longer periods such as 400m Student will need to know that this system can produce energy for 60-90 seconds of maximal work. Students will need to know that maximal means using a great effort 	<p>Lactate system Anaerobic Re-synthesis ATP Energy Glycogen Glycoysis Glucose</p>	<ul style="list-style-type: none"> Students need to already know that carbohydrates are stored in the body as glucose and glycogen (unit 2) Students need to already that when exercising at a high intensity our muscles produce lactic acid which inhibits performance 	

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	<ul style="list-style-type: none"> Students will need to know that this process uses glycogen to create energy through a process known as anaerobic glycolysis Students will need to know that anaerobic glycolysis means to break down glucose without the presence of oxygen Students will need to know the process of how glucose and glycogen are broken down to re-synthesis 2 ATP Students will need to know that a by product of this system is lactic acid. Students will need to know that a by product means a secondary product made in the manufacture or synthesis of something else. 	By-product Manufacture		
Lesson 4: To apply knowledge of the energy system to an extended response exam question			<ul style="list-style-type: none"> Students need to already know the role of ATP Students already need to know the process of energy production via the ATP-PC system and the lactate system Students will already need to know how long each of the above systems can provide energy for to be able to relate this knowledge to the exam question. 	
Lesson 4: To know the key features and processes of the aerobic system in energy production	<ul style="list-style-type: none"> Students will need to know that the aerobic system requires oxygen to re-synthesise ATP Students will need to know that this system re-synthesises ATP for sports that are long, continuous and moderate in intensity. Students will need to know that there are 3 processes in the aerobic system: Aerobic glycolysis, Krebs cycle, Electron transport chain Student will need to know that this system can produce 38 ATP and allow you to perform for long periods. Students will need to know that the aerobic system uses fats and carbohydrates as the fuel source. These are then broken down into glycogen, glucose and fatty acids. Student will need to know that it can take a few hours or up to 2-3 days for the aerobic system to recover after exercise. 	Oxygen Re-synthesis ATP Aerobic Glycolysis Krebs Cycle Electron Transport Chain Aerobic system Fats Carbohydrates Glycogen Glucose	<ul style="list-style-type: none"> Students need to already know how the body creates energy through anaerobic glycolysis Students need to already know different types of endurance events, such as a marathon, tour de France, long distance swimmer 	

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Lesson 5: To know how the energy systems work in combination	<ul style="list-style-type: none"> Students will know that during exercise energy is derived from all three systems Students will know that derive means to obtain something from (a specified source) in this case ATP Students will need to know how to interpret energy continuum graphs and energy blocks in relation to energy contribution 		<ul style="list-style-type: none"> Students need to already know that the energy systems work together to create energy for exercise Students need to already know how the energy systems re-synthesise ATP Students will need to already know how exercise intensity can determine which energy system is used 	
Lesson 6: To know how the energy systems adapt to long term exercise	<ul style="list-style-type: none"> Students will know that long term exercise will allow the body's energy systems to adapt to the demands of physical activity Students will know that the body adapts in the following ways: <ul style="list-style-type: none"> Increased creatine stores Increased tolerance to lactic acid Increased aerobic capacity Increased use of fats as an energy source Increased storage of glycogen and increased number of mitochondria 	Creatine Lactic Acid Tolerance Aerobic capacity Glycogen Mitochondria	<ul style="list-style-type: none"> Students will need to already know what creatine is used for (ATP-PC system) Students will already need to know what lactic acid is (Muscular system) Students will need to know what fats and glycogen are (Unit 2) 	
Lesson 7: To know the additional factors that affect the energy systems and their impact on performance	<ul style="list-style-type: none"> Students will need to know that there are two additional factors that can impact the energy systems and performance in sport (diabetes / hypoglycaemic attack & children lack of a lactate system) Students will need to know that hypoglycaemia is an abnormally low level of glucose in the body Students will need to know how hypoglycaemia and diabetes can affect performance and what the key symptoms are Students will need to know how a child's lack of lactate system can impact performance 	Hypoglycaemic Lactate system Glucose Diabetes	<ul style="list-style-type: none"> 	
Lesson 8: Energy systems EOU assessment				