The physiology of fitness: the body’s acute response to exercise

Sport & Tourism, Fitness

UNIT 2 As soon as you begin to exercise changes begin to happen within your body. Body systems work together, to make sure that you have enough energy to perform. Body systems respond both in the Short and Long-term in response to exercise. It is important to understand the changes that happen to the body as a result of physical activity. You will understand the: Muscoskeletal, Cardiovascular and Respiratory responses to exercise through this unit As soon as you begin to exercise changes begin to happen within your body. Body systems work together, to make sure that you have enough energy to perform.\n

Body systems respond both in the Short and Long-term in response to exercise. It is important to understand the changes that happen to the body as a result of physical activity. You will understand the: Muscoskeletal, Cardiovascular and Respiratory responses to exercise through this unit THE PHYSIOLOGY OF FITNESS CONTEXT SCENARIO You have been appointed as a Trainee Sports Therapist working with the Sixth Form Sports Teams. As part of your role you need to work with players from the teams to look at the effects that exercise has on the body.

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You will need to look at the effects of exercise in both the short and long term and conduct some investigations to show the players the effects that exercise has on their bodies. UNIT 2 THE PHYSIOLOGY OF FITNESS ASSESSMENT TASK 1(P1/P2/M1) The body’s acute response to exercise SCENARIO As a trainee Sports Therapist you have been asked to conduct some research into the short term effects of exercise on the following body

systems (Muscoskeletal, Energy, Cardiovascular and Respiratory System). You need to feedback to the Senior Sports Therapist with your findings. * DESCRIBE the MUSCOSKELETAL and ENERGY systems response to acute exercise (P1) DESCRIBE the CARDIOVASCULAR and RESPIRATORY systems responses to acute exercise(P2) * EXPLAIN the response of the MUSCOSKELTAL, CARDIOVASCULAR and RESPIRATORY Systems to acute exercise (M1) START DATE: HAND-IN DATE: START DATE: HAND-IN DATE: UNIT 2 ASSESSMENT TASK 1 (P1/P2/M1). HELPSHEET GRADING CRITERIA PASS| PASS| MERIT| P1: DESCRIBE the MUSCOSKELETAL and ENERGY systems response to acute exercise| P2: DESCRIBE the CARDIOVASCULAR and RESPIRATORY systems responses to acute exercise| M1: EXPLAIN the response of the MUSCOSKELTAL, CARDIOVASCULAR and RESPIRATORY Systems to acute exercise|

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USE OF KEY VERBS VERB| PLAIN ENGLISH| Describe| Try to “ Paint a picture” in words. Assume that the person that you are Describing to does not know anything about the subject that you are describing. Tell them what you have learned. | Explain| Once you have described the subject, often you will need to give further details and reasons why. (e. g.) Once you have described England’s poor performance in the World Cup, you may also give some reasons why the players did not perform as well as they could. | NO. | Learner Checklist(Steps to Success)| TICK WHEN COMPLETE| | | Learner| Assessor| | TITLE : The Body’s acute response to exercise| | | 2| Paint a picture of the effects that exercise has on the MUSCOSKELETAL system.

Include the following: Increased Blood Supply, Increase in Muscle Pliability, Increased range of movement and Muscle Fibre Micro-Tears (e. g.) Blood Supply increases to the muscles during exercise , this allows more oxygen to be delivered through the blood capillaries to fuel the muscles. Give further details and reasons why (where appropriate) for the effects on the MUSCOSKELTAL system. (e. g.)Dilation of the blood capillaries occurs this allows more blood to flow through the capillaries.

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This means that an increased amount of oxygen and carbon dioxide can be exchanged between the capillaries and skeletal muscle allowing energy production to increase and also to increase the speed at which waste is removed| | | 3| Paint a picture of the effects that exercise has on the ENERGY systems. Include the following: Phosphocreatine, Lactic Acid and Aerobic Energy Systems, Energy Continuum and Energy requirement of different activities (e. g.) Increased movement during exercise increases the demands on the body for energy. The Creatine Phosphate system can provide energy for High intensity activities lasting up to 10 seconds.

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The supply of Creatine Phosphate will deplete after 10 seconds however. | | | 4| Paint a picture of the effects that exercise has on the CARDIOVASCULAR system. Include: Anticipatory Response, Activity Response, Increased Blood Pressure, Vasoconstriction, and Vasodilation. (e. g.) Heart Rate increases immediately as soon as you take part in physical activity. The heart beats

more times each minute. This allows more blood containing oxygen to be delivered to skeletal muscles to allow them to create energy. Give further details and reasons why (where appropriate) for the effects on the Cardiovascular system. e. g.) Vasoconstriction occurs where some blood vessels redirect blood away from areas where it is not needed. The diameter of the blood vessels is temporarily reduced so less blood will flow to certain areas. For example, when Cycling less blood is needed in the upper body in comparison to the leg muscles| | | 5| Paint a picture of the effects that exercise has on the RESPIRATORY system. Include the following: Increase in Breathing Rate, Increased Tidal Volume. (e. g.) Breathing rate increases as an immediate response to exercise as more oxygen is needed by the body to roduce energy. More breaths and deeper breaths are taken in order to achieve this. Give further details and reasons why (where appropriate) for the effects on the Respiratory system. (e. g.)The immediate increase in breathing rate is partly due to receptors in the muscles and joints sensing the increase in activity in these parts of the body and sending messages to the brain to increase the rate of breathing so that more oxygen can be delivered to the muscles and more carbon dioxide can be removed. | | | USE IMAGES TO MAKE YOUR WORK INTERESTING| UNIT 2 THE PHYSIOLOGY OF FITNESS

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ASSESSMENT TASK 2 (P3/P4/M2) The Long-term effects of Exercise SCENARIO To further your knowledge as a Trainee Sports Therapist, You have been asked to give a presentation to members of the Sixth Form Sports

Teams to further their knowledge of how exercise affects their bodies over a period of time. Make sure that you cover the following as part of your presentation: * DESCRIBE the LONG-TERM effects of exercise on the Muscoskeletal system and Energy Systems (P3) * DESCRIBE the LONG-TERM effects of exercise on the Cardiovascular and Respiratory Systems (P4) EXPLAIN the LONG-TERM effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy Systems (M2) START DATE: HAND-IN DATE: START DATE: HAND-IN DATE: UNIT 2 ASSESSMENT TASK 2(P3/P4/M2). HELPSHEET GRADING CRITERIA PASS| PASS| MERIT| P3: DESCRIBE the LONG-TERM effects of exercise on the Muscoskeletal system and Energy Systems| P4: DESCRIBE the LONG-TERM effects of exercise on the Cardiovascular and Respiratory Systems| M2: EXPLAIN the LONG-TERM effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy Systems| USE OF KEY VERBS

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VERB| PLAIN ENGLISH| Describe| Try to “ Paint a picture” in words. Assume that the person that you are Describing to does not know anything about the subject that you are describing. Tell them what you have learned. | Explain| Once you have Described the subject, often you will need to give further details and reasons why. (e. g) Once you have described England’s poor performance in the World Cup, you may also give some reasons why the players did not perform as well as they could. | NO. | Learner Checklist(Steps to Success)| TICK WHEN COMPLETE| | | Learner| Assessor| | Assignment Title : The Long Term Effects of Exercise on the Body| | | 2| Paint a picture of

the long-term effects of exercise on the Muscoskeletal system. Include: Hypertrophy, Increase in Tendon Strength, Increase in Myoglobin Stores, Increased Mitochondria, Increased Glycogen and Fat Stores, Increased Muscle Strength, Increased tolerance to Lactic Acid, Increased Bone Calcium, Increased Ligament Stretch, Increased thickness of Hyaline Cartilage, Increased production of Synovial Fluid. (e. g.) Muscle Hypertrophy – The size and bulk of the muscles increases.

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Use of the muscles causes them to tear throughstress. The muscle tissue repairs itself and makes the muscle tissue bigger as a resultGive further details and provide reasons (Where appropriate). (e. g.) Muscles become more efficient at using oxygen as a result of training. More Mitochondria are produced in muscle cells. These are the site where energy is produced and if more sites are available then more energy can be produced and therefore the muscles are able to work for longer due to the increased energy that is available to them. | | 3| Paint a picture of the long-term effects of exercise on the Energy systems. Include: Increased Aerobic and Anaerobic Enzymes, Increased use of Fats for energy. (e. g.)More Aerobic Enzymes are produced through aerobic exercise. These are able to breakdown glucose more effectively and efficientlyGive further details and provide reasons (Where appropriate). (e. g.)More Enzymes are also available to breakdown Fats. More body fat can be stored in muscles as a result of training. The enzymes mean that more fat can be used as an energy source, meaning that the athlete can compete for longer. | | 4| Give further details and provide

reasons (Where appropriate) of the changes that happen to the Cardiovascular System. Include: Cardiac Hypertrophy, Increases in: Stroke Volume / Cardiac Output. Decrease in Resting Heart Rate, Capillarisation, Increase in blood volume, Reduced Resting Blood Pressure, Decreased recovery time and increased aerobic fitness. (e. g.)Cardiac Hypertrophy is when the heart muscle increases in size. The cardiac muscle in the Left Ventricle increases in thickness and is able to contract more forcefully.

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Like any other muscle, through stress from repeated training the heart responds by increasing in size. This affects Stroke Volume as the heart is able to pump more blood out with every beat at rest. In turn this affects Cardiac Output. | | | 5| Give further details and provide reasons (Where appropriate) of the changes that happen to the Respiratory System. Include: Increased -Vital Capacity/Minute Ventilation/Strength of Respiratory Muscles/Oxygen diffusion rate. (e. g.)Like the heart muscle the breathing muscles increase in size and become stronger through endurance training.

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The diaphragm and Intercostal muscles become stronger allowing the chest cavity to be able to expand more allowing more air and therefore oxygen to enter the lungs. Getting more oxygen into the lungs means that this can be converted into more energy. Therefore, endurance performers can last for longer| | | USE IMAGES TO MAKE YOUR WORK INTERESTING| UNIT 2 THE PHYSIOLOGY OF FITNESS TASK 3 (P5/M3/D1) Investigating the effects of

Exercise SCENARIO You have been asked to collect physiological data from the Sixth Form Sports Teams to assess the effects of exercise on the players within the teams.

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Make sure that you include the following: * Collect Physiological Data to investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems, with tutor support (P5) * Collect Physiological Data to investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems, with limited tutor support (M3) * Independently investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems. (D1) START DATE: HAND-IN DATE: START DATE: HAND-IN DATE: UNIT 2

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ASSESSMENT TASK 3 (P5/ M3/D1). HELPSHEET GRADING CRITERIA PASS| MERIT| DISTINCTION| P5: Collect Physiological Data to investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems, with tutor support| M3: Collect Physiological Data to investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems, with limited tutor support| D1: Independently investigate the effects of exercise on the muscoskeletal, cardiovascular, respiratory and energy systems| USE OF KEY VERBS

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VERB| PLAIN ENGLISH| Investigate| To search out and look at the particular features of something. (e. g.)To search for the reasons why a team was defeated. This may be due to individual errors, a collective poor performance, a superb piece of play from the opposition etc..... | NO. | Learner Checklist(Steps to Success)| TICK WHEN COMPLETE| | | Learner| Assessor| 1| Assignment Title: Investigating the effects of exercise| | | 2| Use some of the following types of exercise as the basis for investigating. (e. g.) Aerobic, Resistance, Circuit, Interval. | | 3| Collect Pre-Exercise, Exercise and Post Exercise and Physiological readings. (e. g.) Heart Rate, Percentage of Maximum Heart Rate, Rate of perceived exertion, Blood Pressure, Flexibility, Spirometry. | | | UNIT 2 THE PHYSIOLOGY OF FITNESS ASSESSMENT TASK 4 (P6/M4/D2) Reviewing Physiological Data SCENARIO Now that you have collected your data from the sixth form sports teams you need to conduct a review of the data, using the data that you collected to look at the effects of exercise on the body. Make sure that you include the following: REVIEW physiological data collected, DESCRIBING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems. (P6) * REVIEW physiological data collected, EXPLAINING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems. (M4) * REVIEW physiological data collected, ANALYSING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems. (D2) START DATE: COMPLETION DATE: START DATE: COMPLETION DATE: UNIT 2 ASSESSMENT TASK 4 (P6/M4/D2). HELPSHEET GRADING CRITERIA PASS| MERIT | DISTINCTION|

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P6: REVIEW physiological data collected, DESCRIBING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems| M4: REVIEW physiological data collected, EXPLAINING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems| D2: REVIEW physiological data collected, ANALYSING the effects of exercise on the Muscoskeletal, Cardiovascular, Respiratory and Energy systems| USE OF KEY VERBS VERB| PLAIN ENGLISH| Describe| Try to “ Paint a picture” in words. Assume that the person that you are Describing to does not know anything about the subject that you are describing.

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Tell them what you have learned. | Explain| Once you have Described the subject, often you will need to give further details and reasons why. (e. g) Once you have described England’s poor performance in the World Cup, you may also give some reasons why the players did not perform as well as they could. | Analyse| You need to SELECT the KEY POINTS and EXPLAIN each point providing REASONS for each point and also looking at POTENTIAL IMPACTS. (e. g.) If you were looking at the performance of Barcelona you may pick out the key points in their success –Money, Lionel Messi, Iniesta etc..

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You would then explain the contribution of each player and also look at what the club could do to regain the Champions League next season| Review| Provide some feedback. Maybe focusing on good and bad points that you

have noticed. | NO. | Learner Checklist(Steps to Success)| TICK WHEN COMPLETE| | | Learner| Assessor| 1| Assignment Title: Reviewing Physiological Data| | | 2| Using the data that you collected from your participants: Paint a picture in words of the effects of exercise that you observed. (e. g.) Participant A – Pre Exercise Heart Rate – 65, Exercise Heart Rate 175, Post Exercise Heart Rate – 125.

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The participant’s heart rate increased as soon as exercise began. It reached a maximum of 175 during the continuous run. This shows that Heart Rate does increase during exercise as the body attempts to increase the delivery of oxygen to the working muscles. | | | 3| Using the data that you collected from your participants: Provide further details and give reasons (where appropriate) for the effects of exercise that you observed. (e. g.)During the Warm-Up prior to the circuit training session, Performer B’s RPE was 3. After 3 stations on the circuit this increased to 5. By station 8, the score had further risen to 7.

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On the last station of the second circuit, RPE increased to 9. 10 minutes after the session had finished RPE was 5. This shows that RPE increased as the intensity of exercise increased as the performer was working progressively harder. | | | 4| Select the KEY POINTS from your data and give REASONS for each point. (e. g.)Heart Rate increases during physical activity. This seems to correspond with a similar rise in RPE. As the sports performers’ heart and

other body systems are working harder the performer can physically feel this change and therefore reports an increase in RPE.

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Consider: Practicality of exercise activities selected, advantages and disadvantages, strengths and areas for improvement. (e. g.) The Coopers Run doesn’t cost much to carry out. It can be participated in around a field or alike. It can be carried out in a relatively short time, with quite a large group of participants. It requires minimal equipment. However, when carrying out the test it is vital with regard to reliability and validity that the distance which the run is being taken has been measured accurately. Otherwise, participant’s results can be false. | | | USE IMAGES TO MAKE YOUR WORK INTERESTING|