Btec level 3 certificate in sport

BTEC Level 3 Certificate in Sport Unit 1- Principles of Anatomy & Physiology in Sport Assignment 1 of 3 Muscular system Muscles Skeletal, cardiac and smooth are the three main types of muscle in the body. Skeletal muscle is a voluntary muscle, this means that it is under control by the somatic nervous system. When viewed under a microscope the appearance of this muscle is striped/ striated. “ The primary function of the skeletal muscle is to produce fine movements to keep you alive. Skeletal muscle also contract as a reflex to a stimulus. "- (http://www. livestrong. com/article/114706-five-functions-muscular-system/- 06/12/12). Tendons or collagen fibres attach skeletal muscle to the bones in the body. Smooth muscle is involuntary, this means that it is under control of the autonomic nervous system. This type of muscles is found in the digestive system and blood vessels. They help to regulate digestion and blood pressure. Cardiac muscle is only found in the wall of the heart. It is an involuntary muscle which means it also works under the control of the nervous system, it works continuously. It is made up of a special type of striated tissue that has its own blood supply. When this muscle contracts it helps force blood around the body and through the blood vessels. Each contraction and relaxation of your heart muscle of your heart muscle as a whole represents one heartbeat. Function There are 3 functions of the muscular system; these are to produce energy, heat production and movement. Movement For muscles to move they must cross at a joint. When muscles contract they exert a pulling force on the bones, forcing them to move together around the joint. If a muscle does not cross at a joint then there will be no movement. Muscles are normally in a ‘ state of partial contraction which means that they are ready to react with a stimulus provided by the nervous system’. When the nervous system supplies a

stimulus the muscle fibres work on an ‘ all or nothing’ basis, this means that they are either contracting fully or not at all. In a response to a stimulus the strength of a muscle contraction depends on the number of muscle fibres used in a process of muscle fibre recruitment. For a contraction the muscle requires oxygen and a fuel source which tends to be either fat or glucose found in the body. Energy production Muscle cells convert chemical energy into mechanical energy, so they use up more energy than other cells in the body. When exercising, your muscles use energy at a rate that it proportional to the intensity of the exercise. If energy is not replaced as fast as it is being used up, then your muscles will not be able to maintain the intensity of the exercise at the same level. Heat Production Skeletal muscle uses ATP energy for contractions. Heat is produced by the splitting of Adenosine Triphosphate during a muscle contraction. This is vital for maintaining your normal body temperature of 37oC. Muscle Pairs Agonists are the muscles that shorten to move a joint; it is also known as the prime mover. Antagonists are the muscles opposite to the agonist which relax in a muscle contraction. Movement would not take place if the muscles did not relax. Antagonists exert a ‘ braking’ control over the movement. Antagonist muscles must relax equally to the agonist muscles to allow movement to take place smoothly. This is called muscle coordination, which is concerted action of many muscles. Synergists are a group of muscles that work together with the agonist to allow the agonist to operate more effectively. They help to control and direct movement by altering the direction of the pull on the agonists to the position. Fixator muscles stop any unwanted movement throughout the whole body by fixing or stabilising the joints involved. For the agonist to achieve a maximum and effective contraction

the fixator muscles must stabilise the origin. Muscle contractions There are 4 main types of muscular contractions, these are; isometric, isokinetic, concentric and eccentric contractions. A concentric contraction occurs ‘ when a muscle shorten against a resistance’. They are also known as the positive phase of a muscle contraction. An eccentric contraction ‘ occurs when a muscle returns to its normal length after shortening against a resistance.’ ‘ An eccentric contraction can often be a significant factor to the stimulus which promotes gains in muscle strength and size. These muscle contractions are also known as the negative phase of a muscle contraction. Isometric contractions mean that they are the ‘ length of a muscle does not change and the joint angle does not alter. Isometric contraction is where the lengths of a muscle do not change and the angle if the joint doesn’t alter either. The muscle actively engages in a static holding position, an example of this is when stopping half way through doing a press up. This is an easy type of muscle work to undertake, but a downside to this is it leads to rapid fatigue of muscles. This causes a reduction in blood flow and a sharp increase in blood pressure. Isokinetic contraction is where the muscle contracts and shortens at a constant speed. For this strength training type you need specialised equipment that detects when muscles speed up and you can increase the load. Fibres Types Type of muscle fibre | colour | example | duration | Intensity | ST1 | Red | Marathon runner | High | Low | FT2a Oxidative | Red | 400m | Middle | Middle | FT2b Glycolytic | White | 100m | Low | high | Two main types of striated skeletal muscle can be distinguished on the basis of their speed of contraction: Type 1 and Type 2. Type 1 are slow twitch muscle fibres, they contract slowly with less force. They are slow to fatigue and are suited to longer duration but low intensity

aerobic activities, such as marathon running. Because they are capable in producing repeated low level contractions they produce large amounts of ATP through an aerobic metabolic cycle. These muscle fibres are red in colour because they contain a rich blood supply and contain many mitochondria to sustain aerobic metabolism. Types 2a are also called fast-oxidative fibres, they are fast contracting because they manufacture and split ATP at a fast rate by utilizing both anaerobic aerobic metabolism. They can produce a great force, but are also resistant to fatigue. These fibres are suited to middle distance events such as 400m. They are red in colour because they contain mitochondria. Types 2b are also called fast-glycolytic. They contract rapidly and produce ATP at a slow rate by anaerobic metabolism and break it down quickly meaning that they are suited to anaerobic activities like 100m. They are recruited for higher- intensity and shorter durations activities. Type 2b fibres are white because of the low levels of myoglobin and mitochondria. (http://www. teachpe. com/anatomy/fibre_types. php 17/10/12)