**Specification for Theory in new GCSE (Year 10)**

**3.1 The human body and movement in physical activity and sport**

**3.1.1 Applied A & P**

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| ***3.1.1.1*** | ***Structure and functions of the musculoskeletal system*** |
| Structure of the skeleton | How the skeletal system provides a framework  for movement (in conjunction with the muscular  system):  •• the skeletal system allows movement at a joint  •• the shape and type of the bones determine the amount of movement (short bones enable finer controlled movements/long bones enable  gross movement)  •• flat bones for protection of vital organs  •• the different joint types allow different types of movement  •• the skeleton provides a point of attachment for muscles – when muscles contract they pull the bone. |
| Functions of the skeleton | •• support  •• protection of vital organs by flat bones  •• movement  •• structural shape and points for attachment  •• mineral storage  •• blood cell production.  Functions should be applied to performance in physical activity. |
| Structure of a synovial joint | Identification of the following structures of a synovial joint and how they help to prevent injury:  •• synovial membrane  •• synovial fluid  •• joint capsule  •• bursae  •• cartilage  •• ligaments. |
| ***3.1.1.2*** | ***Structure and functions of the cardio-respiratory system*** |
| The pathway of air | Identification of the pathway of air (limited to):  •• mouth/nose  •• trachea  •• bronchi  •• bronchioles  •• lungs  •• alveoli. |
| Gaseous Exchange | Gas exchange at the alveoli – features that assist in gaseous exchange:  • large surface area of alveoli  • moist thin walls (one cell thick)  • short distance for diffusion (short diffusion pathway)  • lots of capillaries  • large blood supply  • movement of gas from high concentration to low concentration.  Oxygen combines with haemoglobin in the red blood cells to form oxyhaemoglobin. Students should also know that haemoglobin can carry carbon dioxide. |
| Blood Vessels | Structure of arteries, capillaries and veins:  •• size/diameter  •• wall thickness  •• valves in veins.  How the structure of each blood vessel relates to the function:  •• carrying oxygenated/deoxygenated blood to/from the heart  •• gas exchange  •• blood pressure  •• redistribution of blood during exercise  (vasoconstriction and vasodilation).  Students should be taught the names of the arteries and the veins associated with blood entering and leaving the heart. |
| Structure of the heart | Structure of the heart:  •• atria (left and right atria)  •• ventricles (left and right ventricles). |
| Cardiac output, stroke volume & heart rate | Cardiac output, stroke volume and heart rate, and the relationship between them.  Cardiac output (Q) = stroke volume x heart rate.  Students should be taught how to interpret heart rate graphs, including an anticipatory rise, and changes in intensity. |
| Mechanics of breathing – the interaction of the intercostal muscles, ribs and diaphragm in breathing | Inhaling (at rest) with reference to the roles of the:  •• intercostals  •• rib cage  •• diaphragm.  Exhaling (at rest) with reference to the roles of the:  •• intercostals  •• rib cage  •• diaphragm.  Lungs can expand more during exercise  (inspiration) due to the use of pectorals and sternocleidomastoid. During exercise (expiration), the rib cage is pulled down quicker to force air out  quicker due to use of the abdominal muscles.  Changes in air pressure cause the inhalation and exhalation. |
| ***3.1.1.3*** | ***Anaerobic and aerobic exercise*** |
| Understanding the terms aerobic exercise (in the presence of oxygen) and anaerobic exercise (in the absence of enough oxygen) | Definition of the terms:  •• aerobic exercise  •• anaerobic exercise.  Summary of aerobic exercise (glucose + oxygen → energy + carbon dioxide + water).  Summary of anaerobic exercise (glucose → energy + lactic acid). |
| The use of aerobic and anaerobic exercise in practical examples of differing intensities | Link practical examples of sporting situations to aerobic or anaerobic exercise.  Identification of the duration and/or intensity of a physical activity in order to identify and justify why it would be aerobic or anaerobic, eg marathon (aerobic), sprint (anaerobic). |
| ***3.1.1.4*** | ***The short and long term effects of exercise*** |
| Immediate effects of exercise (during exercise) | •• hot/sweaty/red skin  •• increase in depth and frequency of breathing  •• increased heart rate. |
| Short term effects (24 to 36 hrs after) | •• tiredness/fatigue  •• light headedness  •• nausea  •• aching/delayed onset of muscle soreness (DOMS)/cramp. |
| Long term effects of exercise (months & years of exercising) | •• body shape may change  •• improvements in specific components of fitness  •• build muscle strength  •• improve muscular endurance  •• improve speed  •• improve suppleness  •• build cardio-vascular endurance  •• improve stamina  •• increase in the size of the heart (hypertrophy)  •• lower resting heart rate (bradycardia).  Students should be taught the components of fitness to understand the long term effects of exercise. |
| **3.1.2** | **Movement Analysis** |
| ***3.1.2.1*** | ***Lever systems, examples of their use in activity and the mechanical advantage they provide in movement*** |
| First, second and third class lever systems within sporting examples | Identification of first, second and third class lever systems.  Basic drawings of the three classes of lever to illustrate the positioning of:  •• fulcrum  •• load (resistance)  •• effort.  Draw linear versions of a lever, showing the positioning of the fulcrum, load/resistance and effort.  Students do not need to be taught to draw anatomical body parts but must be able to link the correct lever to a sporting movement or action.  Interpretation of sporting movements or actions which involve flexion or extension of the elbow and/or knee, and plantar or dorsi-flexion at the ankle. |
| Mechanical advantage – an understanding of mechanical advantage in relation to the three lever system | Label the effort arm and load/resistance arm on the three classes of lever.  Mechanical advantage = effort arm ÷ weight (resistance) arm.  Labelling of the effort arm and resistance arm on lever drawings, and interpretation of the mechanical advantage of that lever. |
| ***3.1.2.2*** | ***Planes and axes of movement*** |
| Identification of the relevant planes (frontal, transverse, sagittal) and axes (longitudinal, transverse, sagittal) of movement used whilst performing sporting actions | Planes (frontal, transverse, sagittal) and axes (longitudinal, transverse, sagittal) should be related to sporting actions. Teaching of these planes/axes should include but not be limited to the following sporting actions:  •• front somersault/forward roll/running action  •• 360° twist (ice skating spin)/discus thrower rotating in circle effort  •• cartwheel. |

**3.1.3 Physical Training**

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| ***3.1.3.2*** | ***The compenents of fitness, benefits for sport and how fitness is measured and improved*** |
| Demonstration of how data are collected for fitness testing | Understanding of how test scores are measured/ recorded (eg in seconds, levels, centimetres, numbers). Definitions of the terms qualitative and  quantitative, in relation to the collection of fitness testing data. Understanding that the quantitative data collected during fitness testing can be compared to national averages. |
| ***3.1.3.3*** | ***Principles of training and their application to personal exercise/training programmes*** |
| POT & Overload | Key principles of training. SPORT to include:  •• specificity  •• progressive overload  •• reversibility  •• tedium.  Key principles of overload. FITT to include:  •• frequency  •• intensity  •• time  •• type.  Students should be taught the terms and what they mean. |
| Application of POT | How the principles of training can be applied to bring about improvements in fitness.  Application of the principles to sporting  examples. |
| Identification of the advantages and  disadvantages (the effects on the body) of training types linked to specific aims | The advantages and disadvantages (the effects on the body) of each type of training method stated above.  Students should be taught to select and evaluate appropriate training methods for various (aerobic and anaerobic) fitness needs and make links to  sporting activity, eg continuous training is fully appropriate to marathon runners. |
| ***3.1.3.4*** | ***How to optimise training and prevent injury*** |
| Considerations to prevent injury | The training type/intensity should match the training purpose (eg aerobic or anaerobic).  Where applicable, the following factors should be taken into account in order to prevent injury:  •• a warm up should be completed  •• over training should be avoided, eg  appropriate weight  •• appropriate clothing and footwear should be worn  •• taping/bracing should be used as necessary  •• hydration should be maintained  •• stretches should not be overstretched or bounce  •• technique used should be correct, eg lifting technique  •• appropriate rest in between sessions to allow for recovery. |
| Specific training techniques – high altitude training as a form of aerobic training | How high altitude training is carried out:  •• train at high altitude  •• there is less oxygen in the air and oxygen carrying capacity is reduced  •• the body compensates by making more red blood cells to carry oxygen.  Students should be taught to evaluate the benefits and the limitations of altitude training for different sports performers.  Students do not need to be taught how to calculate intensities for altitude training. |
| ***3.1.3.5*** | ***Effective use of warm up and cool down*** |
| Warming up and cooling down | The constituent parts of warming up and cooling down.  Warming up should include:  •• gradual pulse raising activity  •• stretching  •• skill based practices/familiarisation  •• mental preparation  •• increase amount of oxygen to the working muscles.  Cooling down should include:  •• maintain elevated breathing and heart rate, eg walk, jog  •• gradual reduction in intensity  •• stretching.  Students should be taught to understand and justify appropriate elements of a warm up and a  cool down for different sporting activities.  The benefits of warming up:  •• effect on body temperature  •• range of movement increased  •• gradual increase of effort to full pace  •• psychological preparation  •• practice of movement skills through the whole range of movement  •• injury prevention.  The benefits of cooling down:  •• allowing the body to recover  •• the removal of lactic acid/CO2/waste products  •• prevent (delayed onset of) muscle soreness/DOMS. |

**3.1.4 Use of data**

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| ***3.1.4.1*** | ***Demonstrate an understanding of how data are collected – both qualitative and quantitative*** |
| Quantiative data | Quantitative data deals with numbers |
| Methods of collecting quantitative data | * Questionnaires * Surveys |
| Qualitative data | Qualitative data deals with descriptions |
| Methods for collecting qualitative data | * Interviews * Observations |
| ***3.1.4.2*** | ***Present data (including tables and graphs)*** |
| Present data | How to present data in tables.  How to plot basic:   * Bar charts * Line graphs   How to label x and y axes on bar charts and line graphs |
| ***3.1.4.3*** | ***Analyse and evaluate data*** |
| Analysis and evaluation of data | Interpretation of data presented in basic:   * Tables * Bar charts * Line graphs * Pie charts |

**3.2 Socio-cultural influences and well-being in physical activity and sport**

**3.2.1 Sport Psychology**

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| ***3.2.1.3*** | ***Basic information processing*** |
| Basic info processing model | The role of each stage (input, decision making, output and feedback) of the model.  Input – information from the display (senses),  selective attention.  Decision making – selection of appropriate response from memory. The role of long term and  short term memory.  Output – information sent to muscles to carry out the response.  Feedback – received via self (intrinsic) and/or others (extrinsic).  Draw (in a box format) and/or explain the stages of a basic model of information processing.  Students should be taught to apply the basic information processing model to skills from sporting examples. |
| ***3.2.1.5*** | ***Mental preperation for performance*** |
| Arousal | Definition of arousal |
| Inverted – U theory | The shape of the ‘inverted-U’ placed appropriately in a graph depicting y axis (performance level – low to high) and x axis (arousal level – low to high).  Students should be taught to draw an inverted-U  graph with both x and y axis appropriately  labelled.  Describe the inverted-U graph.  The relationship between arousal level and performance level, eg when under aroused,  performance level is low/under or over arousal  causing low performance levels. |
| How optimal arousal levels vary according to  the skill being performed in a physical activity or  sport | Link appropriate arousal level (high/low) to gross/  fine skills in sporting actions.  Link skills (not sports) to an appropriate arousal  level, eg a tackle in rugby will need a high arousal  level. |
| How arousal can be controlled using stress  management techniques before or during a  sporting performance | Knowledge of the following stress management  techniques:  •• deep breathing  •• mental rehearsal/visualisation/imagery  •• positive self talk.  Students should be taught to explain how  these techniques are carried out, using sporting  examples. |

**3.2.2 Cultural influences**

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| ***3.2.2.1*** | ***Engagament patterns of different social groups in physical activity and sport*** |
| Engagement patterns of different social groups and the factors affecting participation | Engagement patterns in physical activity and sport can differ between different social groups.  Understand factors that contribute to  engagement patterns in the following social groups:  •• gender  •• race/religion/culture  •• age  •• family/friends/peers  •• disability.  Students should be taught to make justifiable links between the following factors and their relevance to engagement patterns of the groups  above:  •• attitudes  •• role models  •• accessibility (to facilities/clubs/activities)  •• media coverage  •• sexism/stereotyping  •• culture/religion/religious festivals  •• family commitments  •• available leisure time  •• familiarity  •• education  •• socio-economic factors/disposable income  •• adaptability/inclusiveness. |
| ***3.2.2.3*** | ***Ethical and socio-cultural issues in physical activity and sport*** |
| Prohibited substances | Categories of prohibited substances, including the basic positive effects and negative side effects:  •• stimulants  •• narcotic analgesics  •• anabolic agents  •• peptide hormones (EPO)  •• diuretics. |
| Prohibited methods (Blood doping) | How blood doping occurs and the effects/side effects of doing it.  Blood doping involves the removal of blood a few weeks prior to competition. The blood is frozen and re-injected just before competition.  Students should be taught how blood doping leads to increased red blood cell count and be able to evaluate which types of sporting performers this could benefit.  Side effects can be:  •• thickening of blood (viscosity)  •• potential infection  •• potential for heart attack  •• embolism (blockage of vessel). |
| Drugs subject to certain restrictions (Beta Blockers) | Beta blockers are taken to:  •• reduce heart rate, muscle tension and blood pressure  •• reduce the effects of adrenaline  •• improve fine control/preciseness.  Side effects can lead to:  •• nausea  •• weakness  •• heart problems.  Beta blockers should be prescribed by a medical professional. |
| Type of performers that may use different types of PEDs with sporting examples | Stimulants – alertness  Narcotic analgesics – pain killers from over training  Anabolic agents – muscle mass  Diuretics – lose weight  Peptide hormones – oxygen carrying capacity  Blood doping – oxygen carrying capacity  Beta blockers – for fine motor control  Students should be taught to understand in which sports performers may decide to use PEDs, with examples. |
| Advantages/disadvantages for the performer of taking PEDs | Advantages include:  •• increased chances of success  •• fame  •• wealth  •• level playing field.  Disadvantages include:  •• cheating/immoral  •• associated health risks  •• fines  •• bans  •• reputational damage. |
| Disadvantages to the sport/event of performers taking PEDs | Disadvantages include:  •• reputation  •• credibility. |
| Spectator behaviour (the positive and the negative effects of spectators at events) | The positive influence of spectators at matches/events:  •• creation of atmosphere  •• home-field advantage (for home team/individuals).  The negative influence of spectators at matches/events:  •• negative effect on performance as a result of increased pressure  •• potential for crowd trouble/hooliganism  •• safety costs/concerns  •• negative effect on participation numbers amongst younger performers. |
| Reasons for holliganism occurs | Reasons for hooliganism:  •• rivalries  •• hype  •• fuelled by alcohol/drugs  •• gang culture  •• frustration (eg at official's decisions)  •• display of masculinity. |
| Strategies employed to combat hooliganism/spectator behaviour | Strategies include:  •• early kick-offs  •• all-seater stadia  •• segregation of fans  •• improved security  •• alcohol restrictions  •• travel restrictions/banning orders  •• education/promotional activity/campaigns and high profile endorsements.  Students should be taught to evaluate the effectiveness of these strategies, eg high costs of security versus safety of spectators. |

**3.2.3 Health, fitness and well-being**

**3.2.3.1 Physical, emotional and social health, fitness and well-being**

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| ***3.2.3.2*** | ***The consequences of a sedentary lifestyle*** |
| The consequences of a sedentary lifestlye | Definitions of sedentary and lifestyle.  Possible consequences of a sedentary lifestyle:  •• weight gain/obesity  •• heart disease  •• hypertension  •• diabetes  •• poor sleep  •• poor self-esteem  •• lethargy. |
| Obesity and how it may affect performance in physical activity and sport | Definition of obesity.  Obesity and how it may affect performance in physical activity and sport:  •• limits stamina/cardiovascular endurance  •• limits flexibility  •• limits agility  •• limits speed/power.  Causes ill health (physical):  •• cancer  •• heart disease/heart attacks  •• diabetes  •• high cholesterol.  Causes ill health (mental):  •• depression  •• loss of confidence.  Causes ill health (social):  •• inability to socialise  •• inability to leave home. |
| ***3.2.3.3*** | ***Energy use, diet, nutrition and hydration*** |
| Energy use | Energy is measured in calories (Kcal) and is obtained from the food we eat.  The average adult male requires 2,500 Kcal/day and the average adult female requires 2,000 Kcal/day but this is dependent upon:  •• age  •• gender  •• height  •• energy expenditure (exercise). |
| Nutrition – reasons for having a balanced diet | There is no single food that contains all the nutrients the body needs.  A balanced diet contains lots of different types of food to provide the suitable nutrients, vitamins and minerals required.  The reasons for a balanced diet:  •• unused energy is stored as fat, which could cause obesity (particularly saturated fat)  •• suitable energy can be available for activity  •• the body needs nutrients for energy, growth and hydration. |
| Nutrition – the role of carbs, fats, protein and vits/mins | A balanced diet contains 55–60% carbohydrate, 25–30% fat, 15–20% protein.  Carbohydrates are the main and preferred energy source for all types of exercise, of all intensities.  Fat is also an energy source. It provides more energy than carbohydrates but only at low intensity.  Protein is for growth and repair of muscle tissue.  Vitamins and minerals are for maintaining the efficient working of the body systems and general health.  Students do not need to be taught about specific vitamins and minerals. |
| Reasons for maintaining water balance (hydration) | Definition of dehydration.  Water balance (hydration) prevents dehydration.  Dehydration results in:  •• blood thickening (increased viscosity), which slows blood flow  •• increases in heart rate/heart has to work harder/irregular heart rate (rhythm)  •• increase in body temperature/overheat  •• slowing of reactions/increased reaction time/poorer decisions  •• muscle fatigue/cramps.  Students should be taught to understand and evaluate the consequences of dehydration to  performance in different sporting activities. |