IGCSE Physical Education (0413)
Unit 1: Factors affecting Performance

Recommended Prior Knowledge
This unit contains a variety of factors that are considered important in the way they affect performance. There is a high degree of inter-relationship between the factors, but very often they are considered separately and as such are taught as discrete parts. In order to cope with the demands of this unit, students should have a simple understanding of the structure of the body and the functioning of different parts of the body. This is likely to have occurred through topics on the body in other subject areas, but also through their early experiences in Physical Education. They should also be able to identify parts of the body by their common names, how the body responds to exercise, why it is necessary to prepare for exercise and how fitness is affected by exercise and influences healthy living, the importance of skill learning and practice. They may well have been taught about other factors such as drugs and smoking that will have detrimental effects on the body and ultimately their health.

Context
Most Physical Education teachers regard an understanding of the structure of the body, the effects of exercise on the body, and how skills are learned, as being important starting points for a more detailed understanding of the other topics covered in the course.

To avoid over duplication of some of the topics covered within this unit it is important that other departments within the school should be asked to indicate which of the topic have been taught and to what depth.

Outline
Students study the functions of the skeleton and joints, their relevance to performance and participation in practical activities. Students should also study the different types of joints, the essential parts of joints and types and ranges of movements. They should also know the important muscles groups and their role in movement and how they work in understanding the different fitness components. Also within this unit students should gain an understanding of what motivates people to participate in physical activities and how they prepare for exercise, understand how skills are learned, recognise that certain physiques equip people better for certain activities as well as avoiding the temptation of drugs that have detrimental effects on health and performance.

All these topics, within this unit, can be taught in any order that fits in well with the course as a whole. However, the following order has been used in the past and has been shown to be successful.

AO 3	Learning outcomes	Suggested Teaching activities	Learning resources
Skeleton and joints	Describe (1) the four functions of the skeleton; namely, shape and support, movement, protection and blood production. (2) different types of joints e.g. ball and socket, hinge, gliding and pivot and specific ranges of movement e.g. flexion, extension, rotation, adduction and abduction. (3) the importance of the skeleton for movement and participation in practical activities.	Pupils should be either shown a picture of the skeleton or a model of the skeleton and replicate by drawing and naming the different parts of the body. Pupils should be familiar with both the common names and major anatomical names of bones of the body. This exercise could be developed through pupils assembling two sets of cards, one set with each part of the skeleton on, and one set with the names of the bones on. Groups could compete to produce an accurate composite of the parts and names. Pupils should give examples of major bones and their functions e.g. skull protects the brain, eyes etc. Pupils should be able to locate different types of joints, explain their structure in terms of cartilage, ligaments, tendons and synovial fluid and explain their importance in different types of movement. Teachers have the opportunity to show how movement functions of the skeleton are linked to practical activities and tests e.g. flexibility test – sit and reach. Wherever possible students should relate theoretical knowledge to practical situations.	http://www.bbc.co.uk/sn/ Interactive section on bones enables bones to be dragged and dropped on an outline of the body. Instant feedback. www.innerbody.com Human Anatomy Online. Shows all the body systems. www.physicaleducation.co.uk Website of all things to do with Physical education
Muscles and tendons	Describe (1) the composition and function of skeletal muscle. Compare skeletal muscle with the heart muscle and explain the differences. (2) the difference between slow and fast twitch muscle fibres	Pupils should be presented with situations where they can familiarise themselves with the location of the major muscle groups. This can be done by asking them to compile a table with three columns, the first column contains the common name for a muscle group (e.g. forearm muscle) the second column contains its anatomical name (e.g. biceps muscle) and the third column contains its location (e.g. upper front part of arm). Alternatively pupils can sketch in muscle	www.bbc.co.uk/sn/ Click to body and muscles and use the interactive exercise that enables muscles to be dragged and dropped onto an outline of the body. The muscles can be animated to show movement.

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	and how they benefit different forms of exercise. (3) the location of all the muscles identified in the syllabus. (4) how exercise and activities affect the composition and efficiency of muscles and ultimately performance. (5) how muscles work as antagonistic pairs to affect movement, their role as prime movers and synergists during specific movements. (6) the role of tendons.	locations on an outline of the body from the list in the syllabus. Pupils should perform different exercise that emphasise the use of certain muscle groups e.g. press ups use triceps muscles. Other muscles are used as fixators or synergists in the same exercise. Pupils should know which muscles are the prime movers in any movement e.g. quadriceps in the sprint start. Movements should be shown to demonstrate flexion, extension, adduction, abduction and rotation. Wherever possible, during the teaching of practical activities teachers should emphasise the work of different muscle groups. This is particularly helpful in activities such as jumping and throwing events in Athletics, and arm and leg actions in Swimming.	As a cautionary note, point out to pupils that there are far more muscles shown in the exercise than are identified in the syllabus. GCSE PE for OCR by Frank Galligan and David White; Heinemann Educational Publishers, Oxford ISBN 0 435 50629 3 Ideal student text book for all aspects of the IGCSE PE course OCR Sport Examined by Paul Beashel, Andy Sibson and John Taylor: Nelson Thornes Ltd, ISBN 0 7487 7723 7 Very detailed student text book containing all the topics covered in the IGCSE PE course. GCSE PE for OCR Teacher's Resource File by Frank Galligan, Eric Singleton and David White: Heinemann Educational Publishers, Oxford ISBN 0 435 506 30 7 Resource book containing numerous student worksheets covering the entire IGCSE PE course. Revise for PE GCSE OCR by Frank Galligan, Eric Singleton and David

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			White: Heinemann Educational Publishers, Oxford ISBN 0 435 10043 2 Student resource text book for use when revising for the IGCSE PE theory examination.
Circulatory and respiratory systems	Describe: (1) the structure, function and location of the heart, lungs and how they are linked via arteries and veins. (2) how the two systems affect performance and participation levels. How performance is affected by the build up of lactic acid and oxygen debt tolerance. How the heart responds to the length of activity and how the heart recovers after exercise. (3) how exercise and activity develop and effect the efficiency of the respiratory and circulatory systems: increased heart muscle strength, increased stroke volume, lower resting heart rate, more efficient exchange of gases, increased vital capacity and tidal volume and	The circulatory system can be introduced by enabling pupils to draw a figure of 8 to represent the circulatory system. At the top of the 8 draw an outline of the lungs, in the middle, an outline of the heart and at the bottom, an outline of a muscle. Then draw arrows on the 8 to indicate the direction of the flow of blood. Add to the diagram oxygenated and de-oxygenated blood and pulmonary and systemic systems. The action of the heart and the movement of the blood is crucial to an understanding of the circulatory system. Pupils need to be familiar with taking pulse counts from radial and carotid arteries and using stop watches or other measuring devices. Pupils should be presented with practical situations where they monitor their heart and breathing responses to different intensities of exercise. Plot graphs to show heart and particularly recovery rates following different intensities of exercise. Ask pupils to devise a method for measuring breathing rate. Ensure that pupils recognise the difference between aerobic respiration, by requiring them to participate in a long run and anaerobic respiration, where the exercise is over a short	www.bbc.co.uk/sn/ Click on the body and locate the different organs that are covered in this section. Drag and drop these onto an outline of the body. www.ablongman.com Very useful (and downloadable) coloured images/diagrams of respiratory system, circulatory system etc.

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	increased oxygen debt tolerance. (4) how aerobic and anaerobic respiration differs and the effect of lactic acid on performance	period of time e.g. 20m sprint. Ask them to explain their feeling in their body after different forms of exercise. More able pupils can be introduced to the structure of the heart and how different chambers within the heart respond to exercise and how the muscle of the heart is affected by training. Pupils should be introduced to any heart measuring instruments that might be available.	
Fitness	Describe: (1) a simple definition of fitness. (2) health related fitness in terms of cardio vascular endurance (aerobic fitness), body composition, flexibility, muscular endurance, speed, stamina and strength. (3) skill related fitness in terms of agility, balance, co-ordination, power, speed of reaction, and timing. Explain: (1) tests for both Health related and Skill related fitness. (2) maximum oxygen uptake and what it means in fitness terms.	Pupils should measure each component of fitness using a recognised test as follows: Cardio vascular endurance – Cooper 12 minute run. Body composition – skin fold test or body mass index Flexibility – sit and reach test. Muscular endurance – heave on beam or similar test. Speed – 60m sprint Stamina – Multi Stage Fitness Test (Bleep test) Strength – Any single test of strength e.g. grip strength. Agility – Timed agility run in and out of cones. Balance – Stork Test. Co-ordination – throw ball and catch rebound from wall with other hand. Power – Spring from knees to feet or similar test. Speed of reaction – Metre rule drop and catch. Timing – Any test which enables pupils to keep time with a set timing device e.g. metronome. Pupils with a good grasp of the understanding of fitness testing could carry out a project on testing a variety of fitness	www.primusweb.com/fitnesspartner/ Useful American fitness website. www.teachpe.com/ Website for teachers. Links quizzes fitness injuries worksheets etc.

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	Compile: (1) graphs and charts to monitor fitness components. (2) a personal fitness programme to cater for any weaknesses in personal fitness.	components for a group of pupils. Alternatively, they may wish to assess certain fitness components for pupils who play in different sports to see if these sports encourage increased levels of certain fitness components.	
Skill	Describe (1) what is meant by the term 'skill'. (2) the difference between the following types of skill: basic and complex skills, fine and gross motor skills, open and closed skills (3) factors affecting skill such as age and maturity, motivation, anxiety and arousal, conditions, facilities and environment, teaching and coaching. (4) how we learn a new skills, including; limited channel capacity, overload, only do a little, simple instructions, demonstration should be simple. (5) when we learn a skill it first goes into a short term memory, then we practice and it finally goes into a long	Discuss what is meant by 'skill' and then ask pupils to write a simple definition. In a practical situation ask pupils to demonstrate a basic skill (walking) and then a complex skill (hop, step and jump). The same practical situation can be used for fine and gross motor skills and open and closed skills. Pupils can either draw a chart to illustrate each type of skill or draw simple diagrams. Get pupils to cut out newspaper pictures illustrating each type of skill and paste them into an exercise book or use them in a wall display. Discuss a range of skills, such as swimming, walking, cycling, doing a somersault etc and consider if age and maturity are factors in whether they can be performed. Draw a list and say whether these skills can be performed at 2, 10, 20, 40 and 65 years of age. Why are certain skills best learned at a particular ages? Choose a complex skill e.g. a feint and drive to the basket in Basketball, using video evidence or someone (ideally the teacher) to demonstrate the movement. Then ask pupils to have 6 attempts to replicate the movement. Then teach the movement by teaching different parts, with pupils practising	www.bbc.co.uk/schools/gcsebitesize/ This is an ideal website for pupils who want to improve their performance in a given sport. It outlines the skills that need to be learnt in order to play that sport well. www.teachpe.com Choose a suitable definition of the word 'Skill' in sport. ? The learned ability to bring about a pre-determined result with maximum certainty. (Knapp) Information on all aspects of teaching PE www.learningideas.me.uk This website is advertised as being for ordinary people who enjoy a sport but would enjoy it more if they had more skill.

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	term memory. (6) simple information processing model: input, decision making, output and feedback. (7) the importance of feedback and different types; intrinsic, extrinsic, knowledge of performance, knowledge of results.	each part separately. Then perform the whole skilled movement. Ask pupils to explain where feedback comes from when performing a skill similar to the one mentioned above. Answers should include, knowledge of results (they score or not), they jump off the correct leg (intrinsic – they feel the movement and extrinsic – their friend tells them that they have jumped off the correct leg). Ask pupils to explain how a skill is performed in terms of the simple information processing model. Ask pupils to video record skills of different sports for use in lessons. Get students to perform a safe skill (Badminton serve) blindfolded. Only provide knowledge of result feedback e.g. whether the badminton shuttlecock landed in the correct area. Let pupils devise their own situation to show how learning a new skill can be made difficult or easy under certain conditions. These should involve limited channel capacity, overload and little or vague instructions. Get pupils to explain their experiences.	
Motivation and Mental Preparation	Describe: (1) the meaning of motivation (2) types of motivation including intrinsic and extrinsic motivation, rewards and	In a classroom situation the teacher asks one pupil to clap their hands, and then the next pupil claps their hands and so on round the room. Tell the group that the time from the start to the last clap will be timed. Note the times down. Then provide some incentive or reward to speed up the clapping.	

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	incentives. (3) how performance is affected by arousal and the physiological responses including production of adrenaline, increased heart rate, increased respiration, muscles tense in readiness for action. (4) how performance is related to arousal – the Yerkes-Dodson Theory (inverted U theory). How performance is affected by over arousal and anxiety. The need for relaxation to reduce anxiety (5) goal stetting – SMARTER (specific, measurable, agreed, realistic, time-phased, exciting, recorded). As a means of controlling anxiety. (6) mental rehearsal.	This might be simply encouragement or the reward of a sweet. In most cases this is sufficient to motivate the group to greater efforts. Get the group to suggest other ways of motivating colleagues in a practical situation. Suggest a scenario situation to pupils – they are about to take part in an important sprint race. Ask them to write down all the things that they should do in preparation for the race to avoid over arousal. These might include: warm up thoroughly and then rest quietly before the race, pre-run the race in their mind (mentally rehearse) so that they know what to expect at different phases of the race. Ask pupils to explain, using the inverted U theory how performance in a race is likely to be affected by different levels of arousal. Draw the inverted U graph to illustrate this. Pupils could try a relaxation technique e.g. ‘Centring’’ designed to reduce anxiety to a level appropriate for the activity, or simple slow deep breathing whilst mentally counting slowly to 10. The ability to reduce anxiety is critical in maintaining the optimum arousal level. For more able pupils set up situations where pupils monitor obvious physiological responses (heart rate, breathing rate and sweating) that are noticeable in colleagues taking part in an important competition. Try to monitor and draw graphs of these responses as the exercise/activity intensifies. Ask participants to explain their feelings to the group.	
Physique	Describe:	Pupils should be able to write a simple definition of what they	

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	(1) the term 'physique'. (2) the three extreme body types; ectomorph, mesomorph and endomorph and be able to give examples from different sports. (3) the advantages of different body types for certain sports e.g. gymnast, high jumper, rugby prop forward.	understand by the term 'physique'. Ask pupils to draw a sketch to represent each of the three body types, label the sketch and describe the main characteristics of each type. E.g. Ectomorph – thin; Mesomorph – muscular; Endomorph – fat. Pupils can either design a table to illustrate different physiques in different sport or compile a scrapbook of newspaper and magazine cuttings showing different physiques for different sports. Teachers should present questions to pupils that make them think about the broader implications of particular physiques for certain activities e.g. Why do discus throwers and shot putters need to be tall, heavy and powerful in order to perform well in these events? Describe the ideal physiques for the following sportspersons: jockey, trampolinist, heavyweight wrestler and pole vaulter.	
Drugs	Describe: (1) what is a 'drug'? (2) the effect that the following drugs have on the body • Stimulants • Narcotic-analgesics • Anabolic steroids • Diuretics • Anxiety reducing drugs • Peptide hormones and	Teachers can draw up a list of activities/sports where drugs have been known to have been taken and then ask pupils to identify the drugs and explain why they were taken. Examples might be: Sprinting in athletics – Stimulants, to improve speed of muscle contraction. Rugby player - Analgesics, to enable player to train/play whilst still injured. Shot putters/weight lifters – Anabolic Steroids, to enable athletes to build body weight and strength. Gymnasts – Diuretics, to enable the body to lose water and	www.drugsinsport.net// Website dealing with performance enhancing drugs in sport. Features link to the latest Internet articles on the subject. www.asada.org.au/ Government agency in charge of

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	analogues • Drugs subject to certain restrictions; alcohol, marijuana, beta blockers (3) types of drugs and their reaction on the body. • Blood doping • Smoking; dangers and the long term effects • Alcohol; dangers and the long term effects.	weight in order to be lighter. Tennis – Anxiety reducing drugs to overcome match nerves. Ask pupils to make a poster for a wall in school using newspaper and magazine clippings to highlight the misuse of drugs in sport.	Australia's drug testing program. Extensive information on drugs in sports and trends in drug testing.