

**OCR**

**A2**



**Physical  
Education**

***Questions and Answers***



# Questions and Answers

This online resource comprises worksheets of some exam-style questions, a summary of some frequently asked questions and, finally, a sample unit test. Mark schemes, specimen answers and examiner comments are provided to clarify what is required and to enable you to assess your answers. These examples, from across the specification, will give you an idea of the kinds of questions you will be asked in the Unit G453 exam paper and will therefore help you with your revision.

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## Worksheet

### Section A (Option A1): Historical studies

The G453 exam is in two sections. Section A contains two questions on the sociocultural aspects of the specification: historical studies and comparative studies. Section B has three questions on the scientific aspects of the specification: psychology, biomechanics and physiology. You have to answer three questions, at least one of them from Section A.

Historical studies is the first A2 option in the sociocultural section. As with all A2 questions, you must answer three parts worth between 4 and 6 marks, and then the final part worth 20 marks. Part d will be marked using a 'levels' mark scheme covering a range of marks, from 0–7 at Level 1, 8–12 at Level 2, 13–17 at Level 3, through to 18–20 at Level 4. The levels are explained in the OCR specification and link to various criteria, including relevant content linked to the question set as well as quality of written communication.

Mark allocations are shown in brackets.

Answer all parts of the question.

The time allowed for this worksheet is 45 minutes.

#### Question 1

- a Mob games are no longer played regularly in modern-day society. What social factors caused the decline in the playing of mob games from the nineteenth century onwards?** (4 marks)

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- b How would modern-day National Curriculum PE be more effective at improving an individual's health and fitness compared with the 1902 Model Course?** (5 marks)

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## Worksheet

### Section A (Option A2): Comparative studies

The second sociocultural option is Comparative studies. Note the information about 'levels' marking on the Option A1 worksheet.

Mark allocations are shown in brackets.

Answer all parts of the question.

The time allowed for this worksheet is 45 minutes.

#### Question 2

- a The UK and Australia place a high emphasis on providing opportunities to participate for as many people as possible. How does the American development of mass participation compare with that of the UK?** (4 marks)

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- b Australia is a relatively young nation achieving a high level of success in global sports events. What factors may account for Australia's status as a leading nation in world sport despite its relatively low population compared with the UK?** (6 marks)

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## Worksheet

### Section B (Option B1): Sports psychology

The G453 exam is in two sections, section A and B. Section A contains two questions on the sociocultural aspects of the specification: historical studies and comparative studies. Section B has three questions on the scientific aspects of the specification: psychology, biomechanics and physiology. You have to answer three questions, at least one of them from Section B. Note the information about 'levels' marking on the Option A1 worksheet.

Mark allocations are shown in brackets.

Answer all parts of the question.

The time allowed for this worksheet is 45 minutes.

#### Question 3

**a Attitudes are an important influence on sports participation. What do you understand by the term 'attitude' and how are attitudes formed?**

(4 marks)

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**b When participating in a healthy lifestyle, sports players may become part of a team or group that could suffer from the effects of social loafing. What do you understand by 'social loafing' and how can it be prevented?**

(5 marks)

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## Worksheet

### Section B (Option B2): Biomechanics

Note the information about 'levels' marking on the Option A1 worksheet.

Mark allocations are shown in brackets.

Answer all parts of the question.

The time allowed for this worksheet is 45 minutes.

#### Question 4

- a Identify the forces that act on a player when he/she is running towards a ball during a game of football, and describe the effects of forces on the flight of the ball when it is kicked towards a team-mate.** (7 marks)

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- b Identify the nature of the fluid friction force that is acting on a skier and describe the factors that determine its size.** (3 marks)

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**c** During a high board dive, the vertical velocity of the diver changes. Sketch a vertical velocity–time graph to show these changes. On your graph, label the following:

**X** = the take-off from the board

**Y** = the highest point of the flight

**Z** = entry into the water

(5 marks)

**d** Identify Newton’s three laws of motion and apply each of these laws to an over-arm throw. What additional factors can affect the horizontal distance achieved by the throw?

(20 marks)

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## Questions and Answers



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## Worksheet

### Section B (Option B3): Exercise and sport physiology

Note the information about 'levels' marking on the Option A1 worksheet.

Mark allocations are shown in brackets.

Answer all parts of the question.

The time allowed for this worksheet is 45 minutes.

#### Question 5

- a Describe and explain the predominant energy system used by an athlete during the 400m.** (6 marks)

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- b At the end of a team game, players may experience EPOC. Define EPOC, give the functions of the alactacid and lactacid components of EPOC, and explain how these functions are achieved.** (6 marks)

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## Answers

### Historical studies

#### Question 1

- a** Choose four from:
- banned by authorities/churches
  - too violent/damaged property
  - injuries to workers led to loss of production
  - lack of space in urban areas
  - lack of free time/no holy days
  - middle classes encouraged more civilised ‘rational recreation’ (set up church/factory teams)
- b** Choose five from:
- increased knowledge today of the link between health and fitness and nutrition
  - modern-day NC PE attempts to promote an understanding of the importance of the health and fitness link
  - NC PE offers a broader range of activities; find one to enjoy and carry on participating in
  - better equipment/facilities
  - specialist PE teachers deliver more effectively
  - specialist PE teachers provide links to clubs to further participation
  - more fitness-related activities as part of the PE programme
- c** Choose six from:
- Initially:
    - long working hours
    - little disposable income to spend on sport
    - no private facilities/personal equipment
    - poor, cramped living conditions/no space for mob games
    - no public provision until later in the nineteenth century
  - Later improvements:
    - Trade Unions fought for workers’ rights (fewer working hours/higher rates of pay)
    - start of public provision (e.g. parks)
    - civilising of activities, rationalisation more acceptable to the church/middle classes
    - opportunities for professional sport/spectators
    - transport improved
- d** The 20-mark questions will be marked according to generic levels criteria.

The games we play today, for example football and rugby union, were greatly influenced by the public schools, such as Eton and Rugby, in many different ways.

Reforming headmasters like Thomas Arnold thought it was important to provide facilities ✓ and allow time to practise ✓, which were necessary for skill development in the boys ✓. Ex public school boys were often employed in their own schools to coach boys ✓ and to try to improve the reputation of a public school through success

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in inter-school matches ✓. Rules were developed ✓ and games were codified so that competitive matches could take place. Such provision reflected the ‘cult of athleticism’ and the high status given to playing team games.

The qualities of ‘physical endeavour’ and ‘moral integrity’ could not be achieved through tennis ✓ since tennis gave few chances to demonstrate the respected qualities of leadership and teamwork ✓. Tennis was also seen more negatively as it was less good for social control ✓ and was more of an individual game with fewer numbers taking part ✓. This had been noted in the Clarendon Report ✓, which looked into the running of public schools. Tennis therefore received less money for facilities and coaching ✓.

- e** This is an excellent answer that would score in the top band because of the high level of relevant factual comment, use of practical examples and the fact that it has good spelling, punctuation and grammar.

## Comparative studies

### Question 2

- a** Choose four from:
- limited focus on mass participation
  - limited sports club system
  - focus on high school, college and professional franchises to develop sport (more at elite levels)
  - limited public sector provision
  - spectatorism dominates as opposed to participation
  - emphasis on winning, not on taking part
- e** The focus of the answer should be on reasons for lower participation rates in physical activity in the USA compared with the UK.
- b** Any six from those listed below:
- high level of funding (central government/federal/state levels)
  - set up academies (e.g. AIS)
  - high-level facility provision
  - professional coaching programmes
  - sports science support offered to performers
  - school sport/PE initiatives (e.g. SEPEP, PASE, Aussie Sport)
  - talent identification (e.g. Sport Search)
  - nation obsessed with sport
  - sports success leads to national pride
  - desire of ‘young culture’ to prove itself in the world
  - desire to emerge from bush culture/success over ‘motherland’
  - expectation of success
- e** A number of different points need to be made linking Australia’s success in world sport to a range of political and social factors.

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c Choose five from:

<b>Crowd size</b>	Both have generated a large spectator following
<b>Media</b>	Both attract high levels of media coverage in their respective countries, and so gain more power to dictate (e.g. starting times, dates)
<b>Global appeal</b>	American sports have limited global appeal while soccer has created genuine global interest
<b>Size of spectator market</b>	USA spectator market is large enough to support 'big four'; UK has a limited spectator market to support other sports and make them commercially viable
<b>Sponsorship</b>	Large network of sponsors/media interest attracted to sports in both countries, with high financial rewards in American sports
<b>Spectators</b>	Strong level of family support in USA sport compared with soccer in the UK because of creation of festival atmosphere
<b>Business</b>	Top clubs are plcs in both countries, with corporate entertainment and selling of merchandise on a global scale by soccer and American sports
<b>Entertainment</b>	Much more emphasised in USA than UK via soccer
<b>Superstars</b>	Big four professional sports tend to have stars of world renown, as does soccer
<b>Ethos</b>	Winning much more emphasised in USA
<b>Player recruitment</b>	USA from within America, UK soccer clubs from world soccer
<b>Nature of game</b>	American sports are more high-octane, high-scoring affairs, with no draws

**e** A table of direct comparisons is a good way of organising the answer to this question. An alternative would be short sentences making the direct comparisons required between association football and any of the 'big four' American sports as appropriate.

**d** For this 'levels' question it is important to structure your answer to enable direct comparisons to be made. Sentences should link points made from the perspective of both countries.

A generic OCR levels mark scheme will be used for this question. The following factual content is relevant to this question and will be taken into account when setting a level of achievement.

Following poor performances in Olympic Games in the late 1900s, both Great Britain and Australia reacted quickly to try to put right what they saw as wrong in elite sporting development.

Australia has seen a lot of direct government intervention ✓ but in Great Britain the government has mainly left development of excellence to sports organisations such as UK Sport, NGBs and the BOA ✓. However, Tony Blair and Gordon Brown have both pledged government money for London 2012, and millions of pounds from the National Lottery ✓ has been invested in sport. UK Sport has developed its World Class programme in the UK ✓. This is very important to the chances of success in global sporting events for Team GB. In the Australian model, the ASC funds sport ✓ at elite level. The ASC has overall control of elite development in Australia ✓.

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Both countries have set up specialist centres for elite performers to train and get all the support they need. Australia has the AIS ✓ while Team GB has the UKSI ✓ with top-class facilities and coaches available. Links between these institutes and talented children in schools is also important for elite performer development in both countries ✓.

Both Australia and Great Britain see the development of elite coaches as a key requirement for success in global sport. Sports Coach UK works with NGBs in the UK ✓ to develop coaching excellence to support our top performers. In Australia this is the task of the AIS.

Overall, Team GB seems to be on top at the moment, showing that Lottery funding, talent ID and the UKSI are all working in sports such as cycling, swimming, rowing and yachting.

- e** This is an excellent top-levels answer. It makes a number of different points and gives comparisons between Great Britain and Australia, as required by the question. It is well written, satisfying the requirement for good spelling, punctuation and grammar.

## Sports psychology

### Question 3

- a** An attitude is a state of readiness or expectation directed at an attitude object ✓. It is an idea charged with emotion ✓. Attitudes can be learned ✓ from past experiences ✓, such as the enjoyment gained from taking part in a pleasant mountain walk.

Attitudes in sport can be learned from the media ✓, such as the negative coverage given to the England football team.

Attitudes can be learned from significant others ✓, such as role models ✓ and our parents or friends — if they display positive attitudes to sport then we are likely to follow. If your parents took you to junior football coaching then you are likely to have developed positive attitudes to football, especially if you enjoyed it. Positive reinforcement ✓ and making activities fun ✓ and enjoyable could also lead to the development of positive attitudes.

- e** This question requires recall of the definition of attitudes combined with applied knowledge of how such attitudes are formed. You should note that attitudes can be positive or negative but that a common set of influences leads to their development.
- b** Social loafing is when individual members of the team lose their motivation ✓ and stop trying because they feel that their efforts are not being recognised ✓. It can be prevented if the coach highlights individual performance ✓ by using statistics ✓ such as tackle counts. The coach should create a positive impression and motivate the players with positive reinforcement ✓ and use a goal-setting ✓ strategy to give the players targets to aim for that are performance related and not just about winning.

The coach could point out role models ✓ who are similar to the players in ability. Peer group ✓ pressure could be used to keep the players motivated — the captain could urge the players to keep trying. The players could be given a specific role ✓ in the team so that they stay focused on their job.

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- e** Specific knowledge of the concept of social loafing is required here. Social loafing is just one of the things that can detract from group performance and you should indicate in your answer how a coach can integrate strategies to combat its effects.
- c** Personality in sport can be measured by a questionnaire ✓, by observation ✓ of a live performance, or by some form of physiological ✓ measure such as a heart rate monitor. The problems with such measures are that they can be unreliable ✓ and give results that are inconsistent and therefore invalid. In the answers to a questionnaire the respondent may not understand ✓ the question, or might give an answer that is biased ✓ to give a response that is socially more acceptable. When being observed, performers might change their behaviour ✓ because they know they are being watched. Observations may be inconsistent because they are subjective ✓ opinions and the thoughts of one observer may differ from the thoughts of another. Physiological methods of assessment involve being wired up and movements will be restricted ✓, so the performer may be unwilling to use such methods during a real game.
- e** The measures of personality are those that are commonly used in sports psychology to assess performance. The easy part of the question is to name them; the hard part is to critically evaluate their effectiveness.
- d** Aggression in sport is an intent ✓ to harm that is outside the rules ✓ of the game and is uncontrolled ✓, often reactive, behaviour. An example is a foul tackle in football that is aimed at a player's leg rather than the ball. There are four theories that explain how aggression is caused.

The instinct theory ✓ suggests that an aggressive instinct is innate ✓ and is a product of evolution. This aggressive instinct can surface when a player reacts to being provoked ✓, such as when they are fouled. Some players need just a little provocation!

The frustration–aggression ✓ hypothesis suggests that once our goals have been blocked ✓, a build-up of frustration ✓ means that an aggressive inclination is inevitable ✓. If this aggressive tendency can be released in the form of a reaction from the player, a subsequent calming down or catharsis ✓ might occur once the player has ‘let off steam’. If the aggressive tendency cannot be released — for example, if the fouled player is unable to reach the player who committed the foul — an even greater ✓ aggressive inclination will occur. The things that might cause an aggressive inclination in sport include being fouled ✓, a poor decision by the referee, or losing the game.

The aggressive cue ✓ hypothesis suggests that aggression is caused by certain learned ✓ cues that can be present during the game and that these cues can trigger ✓ an aggressive response once they are encountered. A corner kick in football can trigger the players to start pulling shirts and committing fouls, for example. Such cues have been seen and learned by the players in previous games.

Aggression can also be caused by social learning ✓. Players will copy ✓ the aggressive behaviour of significant others ✓ they hold in high esteem, especially if the aggressive behaviour is reinforced ✓. A senior player fouling an opponent to prevent a certain score may be reinforced behaviour that is copied. The fact that sport is a live event ✓ makes it more likely to be copied.

- e** This longer question requires detailed knowledge and the ability to logically construct an answer. It is a good idea to jot down a few points on the exam paper before you write so

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that you do not miss any key points. Each theory that explains how aggression is caused should be explained in detail to gain maximum marks.

### Biomechanics

#### Question 4

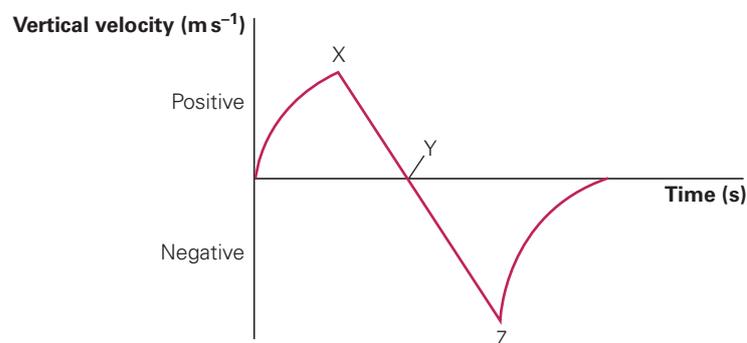
- a** This question requires a knowledge of vertical forces (weight/gravity and reaction) and horizontal forces (air resistance and friction). Try to make sure that you apply knowledge of these forces to the sporting example given in the question.

The forces that act on a player are gravity ✓, friction ✓ and reaction ✓. The force provided by the muscles changes the motion of the ball ✓. Gravity pulls the ball down ✓ and air resistance affects the distance the ball travels ✓.

- e** This answer scores 6 marks out of 7. A mention of the reduction of both the vertical component and the horizontal component would score additional marks.
- b** Questions often refer to the fluid environment of a travelling body. This fluid is either air or water. For the purpose of your exam, try to remember that air resistance is the force opposing motion in air and drag is the force opposing motion in water.

The fluid force acting on the skier is air resistance ✓. The factors that determine its size are the velocity ✓ and the body position ✓ of the skier.

- e** This answer scores 3 marks out of 3. The candidate has kept the response simple and has broken the answer down to follow the requirements of the question. He/she has correctly identified the fluid friction force as air resistance and has given two factors that determine the size. Other factors include the cross-sectional area of the body and the shape or surface characteristics of the body.
- c** As with any graph question, marks are awarded for labels. Always label what the x and y axes represent and you will be guaranteed at least 1 mark, sometimes 2.



- e** This candidate scores full marks. 2 marks are awarded for the correct axes showing vertical velocity ( $\text{m s}^{-1}$ ) and time (s). A further 3 marks are awarded for correctly labelling X, Y and Z. Marks could also have been awarded for showing:
- upward acceleration before the diver leaves the board
  - constant deceleration before the diver reaches the highest point
  - constant acceleration until the diver hits the water
  - deceleration until the diver's vertical velocity is zero

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- d** In this extended question, in order to access the higher mark bands you need to show detailed knowledge and understanding and link this to effects on performance. Examples should be used wherever possible, as should accurate, technical and specialist vocabulary. Written communication should be of a high standard.

Newton's first law of motion states that a body continues in its state of rest or motion in a straight line, unless compelled to change that state by external forces exerted upon it ✓. When throwing a ball, for example, the ball will continue in one direction until a force such as gravity/weight acts upon it ✓. Newton's second law of motion states that the rate of momentum of a body (or the acceleration for a body of constant mass) is proportional to the force causing it ✓ and the change that takes place in the direction in which the force acts ✓. With the throw, the more force that is applied, the further and faster the ball will go ✓. Newton's third law of motion is that to every action there is an equal and opposite reaction. ✓

Other factors that can affect the horizontal distance achieved by the throw are the speed ✓ of release, which results in a greater distance travelled ✓. The angle of release can also affect distance ✓. The optimum angle of release is  $45^\circ$  ✓. Higher or lower than  $45^\circ$  reduces the distance travelled ✓. Height of release ✓ is also important. A lower angle of release is needed if landing height is lower ✓ and a higher angle of release if landing height is higher ✓.

The Bernoulli effect can increase horizontal distance ✓ and air resistance ✓ can reduce horizontal distance ✓.

- e** This answer scores 14 knowledge marks. It shows good, clear knowledge and understanding and examples have been used. There is also good use of technical language and the candidate would probably be awarded marks at the top of the second band (13–17 marks). Other factors that could have been mentioned in this answer are the Magnus effect, different types of spin (back, top and side) and the use of a follow-through.

## Exercise and sport physiology

### Question 5

- a** A common mistake when answering this question is to name both the ATP-PC system and the lactic acid system. The question asks for the predominant energy system, so naming both is incorrect and results in no marks. The predominant energy system in use during the 400m is the lactic acid system and this should be explained.

The main energy system is the lactic acid system ✓. This is because the 400m is a high-intensity activity ✓ lasting longer than 10 seconds ✓. The system is anaerobic ✓ and glucose is broken down into pyruvic acid ✓. The controlling enzyme is PFK ✓ where two ATP ✓ molecules are formed and lactic acid is the by-product ✓. This system takes place in the sarcoplasm ✓.

- e** This answer scores more than a maximum as the correct energy system is explained in detail. There are eight points that you need to remember about each energy system:
- type of reaction

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- chemical/fuel used
- site of reaction
- controlling enzyme
- specific stages within a system
- energy yield
- intensity
- duration

- b** Most questions on EPOC involve the alactacid and lactacid components. Occasionally a question comes up on the role of myoglobin. Make sure that you can define these three and give timings as well as explaining how lactic acid is removed.

EPOC stands for excess post-exercise oxygen consumption ✓. The alactacid component is the restoration of ATP and PC ✓ and the resaturation of myoglobin with oxygen ✓. The lactacid component is the removal of lactic acid ✓. This is achieved by taking in extra oxygen, which is used to oxidise lactic acid into carbon dioxide and water ✓, converted to glycogen/glucose ✓ and converted to protein ✓.

**e** This answer contains more scoring points than are needed for maximum.

- c** Circuit training is designed to improve muscular endurance ✓. It consists of small stations of exercises such as press-ups as well as running activities ✓.

**e** This answer scores 2 marks out of 3. It misses out the guidelines for planning a circuit, such as rotation of the muscle groups or the fitness of the group. In an exam, it is easy to answer a question in a rush and forget that there is more than one part to it. Always check your answers to make sure you have answered all parts to the question.

- d** When revising training programmes, make a list of the things you need to include. Once you have learnt that list, all you need to do is repeat it and make sure you apply it to the training programme you are writing about.

A sprinter who does the 100m ✓, such as Asafa Powell, is a power athlete. His training programme will aim to improve maximum strength and elastic strength ✓. He needs to work on his ATP-PC system ✓ and to some extent the lactic acid system ✓.

He can divide his training year into cycles or stages. The macrocycle ✓ is the overall aim of his programme, which could be to improve his personal best time ✓. The mesocycle ✓ will be an 8-week training block that works on something specific, such as developing leg strength ✓, and the microcycle ✓ is a description of 1 week's training, for example what Asafa Powell will be doing on each day of the week ✓.

He will work mostly on his leg muscles, such as the gastrocnemius and the rectus femoris ✓, which are important in sprinting. Specificity ✓ is important, so his training will involve a lot of weight training ✓ and plyometrics ✓ and he must make sure he overloads ✓ his sessions gradually. He will also ensure that he exercises in moderation ✓ and has rest days.

At the end of strenuous training sessions it is important for Asafa Powell to take an ice bath. He needs to stay in an ice bath for 5–10 minutes ✓. This is because the cold causes the blood vessels to tighten and this drains the blood out of the legs ✓. When he leaves the bath, his legs fill up with new blood containing oxygen ✓. The blood that

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leaves the legs takes away with it the lactic acid that has built up during the training session ✓.

- e This is an excellent answer which scores full marks. The candidate correctly identifies a performer and relates the training programme to that performer throughout. A lot of examples are given, which shows that the candidate can apply his/her knowledge and more marks are awarded for this.



## Frequently asked questions

### Historical studies

The historical studies option starts with the topic of popular recreation from which a number of frequently asked questions appear. For example, you may be asked to:

**State the key characteristics of popular recreation.**

**List the social and cultural factors influencing the development of activities during pre-industrial Britain.**

Knowledge of the features of case study activities during the era of popular recreation may also be tested, or required in comparisons with later rationalised versions.

The rationalisation of sport in post-industrial Britain is likely to provide a wide range of questions, from the relatively straightforward:

**Describe the characteristics of rational recreation.**

**How and why did the Church develop sport?**

to the potentially more complicated:

**Explain the effects of the Industrial Revolution on the development of sport.**

Whichever question is set, it is important that you answer it as clearly and concisely as possible.

The public school influence on physical activity provides a range of possible questions, including:

**Describe the characteristics of nineteenth-century public schools.**

**How and why were team games such as cricket used for 'social control' in public schools during the nineteenth century?**

**How did public schools increase participation by young people in physical activity in 'Stage 3' and how is this impact still felt on participation and physical activity in schools today?**

Finally, you should be able to relate your knowledge and understanding of the development of state PE, from the 1902 Model Course through to the 1933 PT syllabus and 1950s PE developments (i.e. *Moving and Growing*). Questions set will link the last century of development in PE/PT to modern-day National Curriculum PE. For example:

**What are the main differences between the Model Course and National Curriculum PE?**

**How would National Curriculum PE be more useful in preparing students for a healthy lifestyle than the 1902 Model Course?**

### Comparative studies

The comparative studies option focuses on factors affecting participation and improving performance in the USA and Australia compared with the UK.

#### The UK

Study of the UK forms the basis against which to compare the USA and Australia. It is important that you have background knowledge of sports development in the UK to enable you to relate

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back to it when you study the USA and Australia. Exam questions will always require comparison with the UK, as illustrated by the questions set in this online resource.

The cultural background of the UK should be clearly understood. The long histories of public schools and amateur traditions have been highly influential factors on sports development. The recent increased emphasis on government policy to raise levels of participation in PE and school sport should be emphasised in your studies (for example, sports colleges, PESSCLs, TOPs), as well as an awareness that a rise in obesity threatens the UK's levels of health and fitness. Mass participation organisations and initiatives illustrate the continued importance placed on promoting participation among all sections of the community (for example, Sport England). Finally, you need to understand how the UK is attempting to raise standards of performance and achieve sports excellence — with UK Sport, UKSI, EIS and various case study activities all needing to be covered in preparation for potential exam questions.

### The USA

Your study of the USA should follow the same overall topics as those of the UK (see above). The USA is a 'young' capitalist nation with a relatively large population. It is important to understand the impact of the economic system (capitalism) on sport in the USA and to compare this with the UK. Key features include the ideology of individualism, individual accumulation of wealth, profit orientation, the 'win at all costs' ethic, and sport sponsorship for profit.

An area of contrast to the UK is that of PE/school sport in the USA. For example, the ethos and relatively high status given to high-level high school sport in the USA is worthy of note, as is the lower importance placed on compulsory PE programmes. The lack of progression through public and voluntary sector provision for mass participation also contrasts with the UK and illustrates the relatively low participation levels in the USA.

Comparative sports excellence policies are popular as an exam focus. These illustrate the varied pathways to professional sport and the high degree of commercialism and media interest throughout American sport.

Popular topic areas for questions comparing the USA to the UK include:

- school PE and sports programmes and initiatives
- reasons for low participation rates in the USA
- comparing case study activities
- comparing ways of developing sports excellence in both cultures

### Australia

Australia is the final cultural context to consider. The relatively high level of importance given to sport in Australia should be understood in relation to how and why it is supported. Key factors include government support, high levels of funding, the AIS, the concept of nation building and the national preoccupation with sport. Using the state of Victoria as a case study, comparisons in terms of school sport/PE should be made with the UK. Some similarities are evident, for example school–club links, as are differences, for example higher levels of focus on, and participation in, outdoor education in Australia. Mass participation initiatives in Australia need to be compared with the UK, as well as considering how Australia has become relatively successful in global sport despite having a relatively small population.

Popular topics include:

- social and cultural factors accounting for the high level of importance placed on sport in Australia

# Questions and Answers



- reasons for the relative popularity of outdoor sport and education in Australia
- initiatives promoting PE/school sport in Australia
- factors (particularly strategies and initiatives) accounting for Australia's status as a leading Olympic nation and achievement of sports excellence compared with the UK
- case study activities compared with the UK — for example, the initial limited development of association football in Australia

## Sports psychology

### Leadership

Questions on leadership are common and tend to follow a pattern of asking for a definition (such as, 'What do you understand by a prescribed or an emergent leader?') and then asking for some explanation of a related theory (such as Chelladurai or Fiedler). A definition question will require simple recall — so learn your key terms. The explanation of theory requires recall and application. You may be asked to describe the key points of a theory and then to apply it using an example. In Chelladurai's model, for example, there are three factors that affect leadership and you should be able to give sporting examples that help to explain each factor. The examiners will often want you to explain how the choice of leadership style is affected by the three factors outlined in the Chelladurai theory. The trick is to know each style of leadership and explain how and when it is best used.

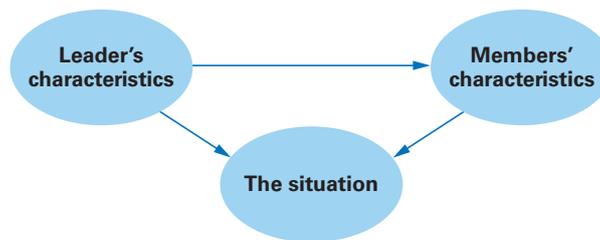
#### Sample question

**A leader is described as someone who influences you to achieve your goals.**

- i What do you understand by the terms 'prescribed leader' and 'emergent leader'?**

(2 marks)

- ii Figure 1 shows the three factors affecting leadership.**



**Using Figure 1, discuss the idea that leaders need to be adaptable in their approach.**

(6 marks)

#### Answers

- i** A prescribed leader is appointed from an outside source. An emergent leader comes from within the group.
- ii** Use the following points to guide your discussion. Leaders need to change their style according to:
- leader characteristics
    - personality
    - preferences
  - situation
    - danger
    - time
    - type of task

## Questions and Answers



- group
  - size
  - ability
  - hostility

### The relationship between arousal and performance

This popular topic often asks questions that are related to graphs or diagrams. You may be given the graph of drive theory or the inverted U theory and asked to explain the effects that increased arousal can have on performance. Often there will be an element to the question that asks you to account for changes or adaptations to the general theory, such as the different levels of arousal that provide optimum performance for a novice and an expert according to the inverted U theory, and the effects of the dominant response on drive theory. The key to success is to learn the theories, remember the theory of drive reduction, and be able to draw and interpret the graph. Remember to mention all the relevant points. You will often be asked to give practical examples to make your point, so make sure you always give an example.

#### Sample question

**Performance in sport can be affected by the level of psychological arousal experienced by the performer. Using examples from sport, explain how the level of skill, personality and the complexity of the task can influence a performer's level of arousal.** (6 marks)

#### Answer

One mark for any six of the following:

- low-skilled performer needs low arousal
- dominant response may be incorrect for low-skilled performer
- highly skilled performer can cope with high arousal
- dominant response tends to be correct for highly skilled performer
- introverts perform better at low arousal
- RAS is already highly stimulated in introverts
- extroverts perform best at high arousal
- RAS has low levels of stimulation in extroverts
- complex task best at low arousal
- lots of information to process for a complex task
- simple task can be performed at high arousal
- not a lot of information to deal with during a simple task

### Attention in sport

Questions on this topic are based on the need to understand that a sports performer has four attentional styles to choose from and must pick the right style for the right situation. You should learn the matrix of attentional styles so that you know each of the four, and remember that the styles are a combination of external/ broad, external/narrow, internal/ broad, internal/narrow. Make sure that you can give a practical example that shows the use of each style. Remember, you must use practical examples if asked for them in the question.

#### Sample question

**Nideffer suggested that there are four attentional styles that can be used in sports performance. Use practical examples to explain each of these four attentional styles.**

(4 marks)

# Questions and Answers



## Answer

One mark each for:

- broad/external, e.g. midfield hockey player looking for options
- broad/internal, e.g. planning the practical strategies of your team
- narrow/external, e.g. playing a shot in cricket or a golf putt
- narrow/internal, e.g. mental rehearsal of a specific tactic

## Biomechanics

There are often questions on this topic that involve a calculation of some sort. Always remember to write out the equation you are using when doing your calculation and show all your working, as marks are allocated for these. It is also important to give the correct units with your answer. For example, if you are calculating velocity, the unit is  $\text{ms}^{-1}$ . If there are no units with an answer, marks will be lost.

Questions on Newton's laws of motion are popular. When answering such a question, make sure you can define each of the three laws as well as apply all three to a particular sport. Simply learning the laws is not enough.

### Sample question

**Using Newton's three laws of motion, explain how a high jumper takes off from the ground.**

(6 marks)

This question requires a definition of each law and then wants you to apply each law to the high jump.

Questions that require you to draw forces acting on a body through the use of free body diagrams are also popular. When drawing your arrow for each of the forces (weight, reaction, friction and air resistance), make sure you show clearly the point of application, direction and length of the arrow.

Projectile questions involve just two forces — weight and air resistance. You need to know whether various projectiles follow a true parabola or a distorted parabola. Air resistance is the key to this. A projectile that has a high air resistance, such as a shuttlecock, will follow a non-parabolic flight path. Projectiles with little air resistance, such as the shot in a shot put, will follow a parabolic flight path.

### Sample question

**In hockey and rugby, the performer may hit or kick the ball into the air, where it becomes a projectile. Explain how the various forces involved act to affect a projectile during its flight.**

(3 marks)

When answering this question, state the shape of the flight path (parabolic) and then write about the vertical and horizontal components — gravity and air resistance.

The Bernoulli principle and Magnus effect can be tested in questions in their own right but also appear as part of the mark scheme in more general questions. Make sure that you learn the diagrams for both.

Questions on levers require you to classify and sketch a lever, but also to calculate effort using the principle of moments.

## Questions and Answers



Questions on angular momentum are usually on the conservation of angular momentum and require an understanding of the terms angular momentum, moment of inertia and angular velocity, as well as the relationship between them.

### Sample question

**Explain the mechanical principles that allow spinning ice-skaters to adjust the speed of their rotation.** (6 marks)

Definitions of angular momentum, moment of inertia and angular velocity are needed here. Use of the following equation will help to explain the relationship between them:

$$\text{angular momentum} = \text{moment of inertia} \times \text{angular velocity}$$

## Exercise and sport physiology

Questions on energy systems are always a popular choice. 'Intensity' and 'duration' are key words when deciding which energy system the question is asking for. High-intensity activities lasting up to 10 seconds, such as the 100m, will use the ATP-PC system. High-intensity activities lasting over 10 seconds, such as the 400m, will use the lactic acid system, and activities involving lower-intensity work and longer duration use the aerobic system. Once you have decided which energy system is in use (or it may be a mix), then it is relatively straightforward to identify the energy sources:

- phosphocreatine — ATP-PC system
- glycogen/glucose/carbohydrates — lactic acid system
- glycogen/glucose/carbohydrates/fats/triglycerides/fatty acids/proteins — aerobic system

EPOC questions usually involve knowledge of the alactacid component, lactacid component and the role of myoglobin. EPOC just means taking in extra oxygen to return the body to normal.

Make sure that for each of the above three you can do the following:

- give a definition
- identify how long each takes to return to resting levels
- state how much oxygen is used

In addition, for the lactacid component you need to know how lactic acid is removed.

There are often questions on relatively small parts of the specification, such as glycogen loading, and definitions of energy, work or power, so make sure your revision is thorough.

Aerobic capacity or  $\text{VO}_2$  max also forms the basis of popular questions. Make sure that you can define these terms and identify and explain tests that are used to measure them. It is also important to be aware of the factors that can affect  $\text{VO}_2$  max, such as gender, age, training and physiological factors such as an increase in stroke volume.

Finally, adaptations often appear on exam papers. Look at what type of adaptations the question is asking for. Does the examiner want aerobic or anaerobic adaptations? Then look at which part of the body they want you to talk about in your answer — is it the heart, lungs, muscles, blood? A popular mistake when the question asks for cardiovascular adaptations is to mention the lungs. The term cardiovascular does not involve the lungs — just the heart and the vascular system. Make sure that you can explain how these adaptations can affect performance.



## Sample unit test

This sample unit test contains some example examination questions, with answers and examiner comments. The aims are:

- to explain how marks are awarded
- to show the sorts of questions that might be asked
- to help you test your own understanding by answering the questions yourself before looking at the answers and comments
- to help with your learning and revision by showing you what you need to know

The Unit G453 exam is a 2 hour 30 minute written exam. It is worth 35% of the total A-level mark. It comprises two main sections.

Section A:

- Historical studies
- Comparative studies

Section B:

- Sports psychology
- Biomechanics
- Exercise and sport physiology

Questions will be offered on each of the five topics listed above. You must answer three questions in total, and must include at least one from Section A. You must answer all parts of your chosen three questions, including the longer 20-mark parts. Remember that the final part of each question (worth 20 marks each time) will be marked using a banded 'levels' marking scheme, as explained on the Option A1 worksheet.



## Section A (A1): Historical studies

### Question 1

- a** In contrast with professional cricket in the twenty-first century, elite cricket teams in the early twentieth century were often captained by a 'gentleman amateur'. Explain why an amateur captained the team in the early twentieth century. (4 marks)
- b** Account for the use of team games like cricket by public schools as a form of social control. (5 marks)
- c** The UK is considered by many to be the 'birthplace of modern sport'. Explain the features of nineteenth-century British society that encouraged the development of sport through to its modern form. (6 marks)
- d** State school PE underwent a number of changes during the twentieth century. Account for its compulsory status as part of the National Curriculum at the start of the twenty-first century, paying particular attention to its role in promoting the benefits of a healthy lifestyle. (20 marks)

## Section A (A2): Comparative studies

### Question 2

- a** In the USA and in the UK, individual schools largely fund their own sports programmes. With such similar approaches to funding, why is the end product so different in the USA? (4 marks)
- b** Outdoor education has a higher status in Australian schools compared with those in the UK. Give cultural reasons accounting for the higher status of outdoor education in Australian schools. (5 marks)
- c** There is always a healthy competitive edge whenever England competes against Australia at sport. Compare a range of cultural factors that have influenced how sports excellence has been pursued in the UK and Australia. (6 marks)
- d** Compare the provision of school sport between the USA and the UK. (20 marks)

## Section B (B1): Sports psychology

### Question 3

- a** Participation in a healthy lifestyle can be affected by personality. Use an example from sport to explain what you understand by the interactionist theory of personality. (5 marks)
- b** Good leadership is an important aspect of participation in sport. Using Fiedler's contingency model, explain when you might use the autocratic or task style of leadership and the democratic or person-orientated style of leadership. (5 marks)

## Questions and Answers



- c** One aspect of personality is achievement motivation. Describe the personality characteristics of a person who has the motives to achieve. What could a coach do to make sure that players in their charge continue to display such motives? (5 marks)
- d** Cognitive and somatic anxiety can affect a performer in sport. What do you understand by the terms 'cognitive anxiety' and 'somatic anxiety'? What can cause cognitive and somatic anxieties and what strategies could you use to manage your cognitive and somatic anxieties in a sporting environment? (20 marks)

### Section B (B2): Biomechanics

#### Question 4

- a** Identify the type of lever system in use during plantarflexion of the ankle. Sketch this lever and label both the load arm and the effort arm on your diagram. (5 marks)
- b** During the flight of a javelin, various forces act upon it. Show these forces on a free body diagram and draw a second diagram to show how you would determine the resultant force acting on the flight of the javelin. (6 marks)
- c** In the 400m, an athlete runs one lap of the track. What do you understand by the terms 'distance' and 'displacement'? Give values for both of these once the athlete has completed the race. (4 marks)
- d** Using your knowledge of spin in the control of the flight path of a ball, explain how spin is generated on a ball and with the help of an airflow diagram explain the effect of top spin and back spin. (20 marks)

### Section B (B3): Exercise and sport physiology

#### Question 5

- a** Obesity is a problem that is increasing in Western cultures. What are the problems associated with childhood obesity? (5 marks)
- b** Outline an interval training session that would put stress on the ATP-PC energy system. Justify your choice of intervals. (6 marks)
- c** Explain what is meant by the term 'BMI' and describe how it is calculated. (4 marks)
- d** Describe the main energy system used to resynthesise ATP by a triathlete during competition. Name two illegal ergogenic aids that this performer could use and explain how they can help performance and the disadvantages associated with their use. (20 marks)



## Sample unit test: Answers

### Section A Historical studies

#### Question 1

- a** One mark for each of the following (up to 4 marks):
- gentleman amateur had high status in sport
  - gentleman amateur had high status in society
  - professional performers were of lower status/historically excluded
  - sports were run by the middle and upper classes
  - captains were selected by the ruling middle and upper classes, who may have funded the team
- e** It is important to show your knowledge of the status of amateurs in the early twentieth century. They were highly respected due to their fair play ethics and ability to play sport for the love of it. In the modern-day competitive world, this situation has changed and most sports desire professional status and the financial benefits this brings.
- b** One mark for each of the following (up to 5 marks):
- positive use of leisure time/to counter bad behaviour
  - (cricket) could be played on school grounds so staff could keep a closer eye on the boys
  - obeying the rules of (cricket) developed a code of conduct/gentlemanly behaviour
  - playing such games created loyalty to a team
  - smaller boys could be used as 'fags' to help when practising, e.g. collecting balls in the field
  - sixth formers/older boys were given authority
  - junior teachers acted as players/coaches
  - inter-school fixtures brought boys together
  - team games were seen as good for character building
  - developed respect for the captain
- e** Cricket is named as the example team game in the question, so it is important to relate your answer to cricket wherever relevant. It is also important to show your overall understanding of social control (i.e. preventing bad behaviour) and how playing sport can help to achieve it.
- c** One mark for each of the following (up to 6 marks):
- Britain was the first industrialised country in the world
  - urbanisation — large movement of people into towns created masses needing entertainment
  - spectator sport developed
  - gradual increase in free time in which to watch or play sport
  - gradual increase in disposable income with which to watch or play sport
  - public provision, e.g. parks to play in
  - public schools rationalised sport, i.e. gave it rules, respectability, etc.
  - the middle classes, through NGBs, developed administrative structures for sport
  - early professionalism and commercialism evident in sport
  - transport developments allowed competitions to become more regional and national

## Questions and Answers



- the Church played an important role — for example, in setting up teams and providing facilities
- e** This question relates to features of British society in the 1800s, which were influential in the development of sport into its more rational form. You need to identify a number of such features and briefly explain their influence as you work your way through them.
- d** A generic 'levels' mark scheme will be used. Relevant answers include the following points:
  - Reasons for compulsory National Curriculum PE status:
    - to increase health and fitness
    - to provide a wide range of activities to experience/find one to carry on with
    - to develop a variety of skills — physical, social, cognitive
    - to instil values of fair play/teamwork
    - to experience different roles — performer, coach, official
  - Importance in promoting benefits of a healthy lifestyle:
    - to increase awareness of the need for healthy lifestyle
    - if the activity is enjoyed at school, you are more likely to carry on an active lifestyle after school
    - increased concerns over health/fitness of youngsters
    - to try to decrease obesity levels
    - due to poor diet/understanding of nutrition
    - due to lack of exercise
    - due to greater range of passive leisure pursuits
  - e** As a levels question, it is important to address both parts of the question and to write with a good standard of spelling, punctuation and grammar. You should therefore make clear the division of your answer into two parts, first explaining why National Curriculum PE is a compulsory subject and then moving on to address how it promotes the benefits of a healthy lifestyle. Give your answer in sentences, rather than bullet points.

## Section A Comparative studies

### Question 2

- a** One mark for each of the following (up to 4 marks):
  - level of funding is much higher in USA
  - far more sponsorship/private funding available in USA
  - USA system much more geared to producing elite performers/results
  - funding depends on results in USA
  - 'win' ethic part of USA motivation in all spheres of life
  - UK has a laissez faire approach to its extra-curricular programmes
- e** This opening question requires you to show how schools in the USA emphasise competitive sport far more than schools in the UK, which have more of a 'wider participation' remit.
- b** One mark for each of the following (up to 5 marks):
  - affluent Australian population can afford to engage in outdoor education activities
  - favourable climate linked to outdoor activities/lifestyle

## Questions and Answers



- outdoor education is a reflection of the 'frontier' legacy of colonial times
- urbanisation has led to the need to explore the outback/escapism
- demography of the country is important — a small population in a country with expansive, unpopulated areas
- relatively easy access to 'natural areas' for schools
- landscape ensures genuine wilderness exists

**e** Australia has a number of natural features which make participation in outdoor education far more valued than it is in the UK where orienteering around the school grounds is often the limit of a pupil's outdoor education experience. This question requires a clear focus on why the opposite is true in Australia.

**c** 1 mark for each complete comparison (up to 6 marks):

UK	Australia
Winning is important, but ruthless pursuit of victory is not considered to be 'sportsmanlike'	Winning is a high priority on the Australian sports scene
UK values success in sport, but it is not a preoccupation	Australia has an obsessive interest in sport with the pursuit of excellence fuelled by this preoccupation
UK perceives itself as the 'colonial master'/supremacy is nothing new	Australia takes great satisfaction in defeating the 'motherland' and feels a need to pursue excellence
Nation tends to lack sporting ambition	High public demand for success/tradition of success
Some funding (e.g. sports colleges) but limited government involvement	High level of federal investment in sport/state sponsorship of talented performers
Traditional culture and well-established identity	Young culture using sport as a vehicle to establish a positive international identity
Sports endorse division of home countries	Sports nationalism has played an important role in unifying Australia. The pursuit of excellence is therefore important
Unfavourable climate in which to train/compete	Highly favourable climate in which to train/compete
A large population has a relatively small participation rate, which cannot support a breadth of sporting excellence	A small population has a large participation rate; there are strong incentives for a small population to try to become an international sporting superpower

**e** This question requires a direct comparison of cultural factors that influence the pursuit of sporting excellence in Australia and the UK. Direct links should be made in an examiner-friendly style that makes your answers/direct comparisons clear. A table format as shown here is acceptable, as long as the question is not in part (d) at A2, where quality of written communication is important.

## Questions and Answers



d 1 mark for each complete comparison made. Relevant points include:

USA	UK
Sport focuses on elite groups	Elite sport in schools is an extra-curricular activity; progression is possible through town, county, regional and national representation
Development of sports strategy to win	Participation ethic prevails/more educational aims
Inter-school sport has high status/overrides the importance of PE	Inter-school sport has lower status compared with PE
School sport is highly organised by State High School Athletic Association (SHSAA)	Individual teachers may organise local leagues; SSCos now involved to plan more sport between neighbouring schools
Specialists employed as, for example, coaches, athletic director (on a hire-and-fire basis)	Teachers (on permanent contracts) tend to be in charge of sport; extra-curricular sport may be a voluntary commitment; some coaches employed in specialist schools
No school–club links	SSCos/SDOs develop links between clubs and schools
Scholarship incentive to reward outstanding performance	Limited number of sports scholarships available
High level of community interest in school sport/large crowds/media interest	Minimal community/crowd/media interest
Sport as a business with a highly competitive emphasis	Sport funded by state/part of school budget; aims more linked to increased participation

- e As a 'levels' question, it is important to try to meet the criteria for the top level (as set out by OCR) if you want to gain a high number of marks. You should therefore:
- show a high level of knowledge/understanding of the topic areas covered by the question
  - make clear, relevant and regular comparisons, linking to the question set
  - try to use a high standard of written communication in your answer — an answer given in table format would not therefore be appropriate if you want to access the top level of marks.

## Section B Sports psychology

### Question 3

- a One mark for each of the following (up to 5 marks):
- interactionist = a combination of trait and social learning
  - $B = f(P \times E)$ /behaviour is a function of personality and environmental influence
  - accounts for behavioural change
  - traits adapted to situation
  - relevant sporting example
- e The interactionist approach is best described as a combination of trait and social learning. Giving the formula that represents this combination scores a mark. Do not forget to give an example.

## Questions and Answers



- b** One mark for each of the following (up to 5 marks):
- The effectiveness of each style depends on the favourableness of the situation.
  - Task/autocratic style should be used when:
    - the situation is highly favourable
    - the task is clear
    - the leader has authority
    - group relationships are good
  - Task/autocratic style should be used when:
    - the situation is least favourable
    - the task is unclear
    - the leader is weak
    - relationships are poor
  - A person/democratic style is best in a moderately favourable situation.
- e** Learning the Fiedler model will allow you to gain easy marks. However, you need to be specific and say that an autocratic style is best in both the most and least favourable situations. Each situation should be described in detail. Don't forget to say that a democratic approach is best in a moderately favourable situation.
- c** One mark for each of the following (up to 5 marks):
- Personality characteristics:
    - competitive approach
    - accepts challenge
    - takes risks
    - is confident
    - attributes success internally
    - responsible for own actions
    - welcomes feedback
  - The coach could
    - allow early success
    - then set realistic goals
    - point out similar ability role models
    - use positive reinforcement
  - e** Make sure you learn the characteristics of a 'need to achieve' performer. The question is worth 5 marks, but you may know more than five characteristics and you should give them all to make sure that you cover the mark scheme. When asked to suggest how a coach could foster a 'need to achieve' approach, it is worth considering each characteristic you have given and suggesting a strategy to foster each one.
- d** Relevant points include:
- Somatic anxiety is physiological.
  - Cognitive anxiety is psychological.
  - Causes:
    - competition
    - conflict
    - frustration
    - poor play by you or others

## Questions and Answers

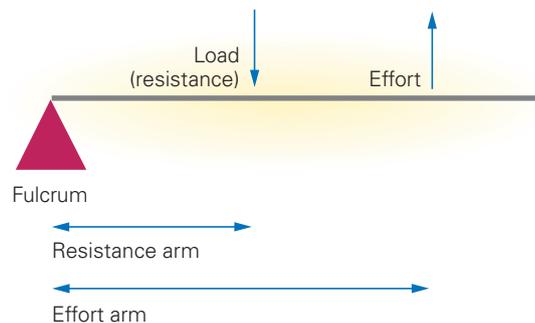


- injury
  - perceived danger
  - being watched/evaluation apprehension
  - trait anxiety/can be born anxious
  - state anxiety/specific to the situation
  - worry about letting others down
  - climate
- Strategies:
    - relaxation techniques
    - biofeedback
    - positive self-talk
    - mental rehearsal
    - imagery
    - visualisation
    - goal setting
    - positive reinforcement
- e** This longer question allows you to write all you know about a topic. Use a systematic approach to answer each part of the question in turn — definitions, then causes, then strategies.

## Section B Biomechanics

### Question 4

- a** One mark for second-order lever.



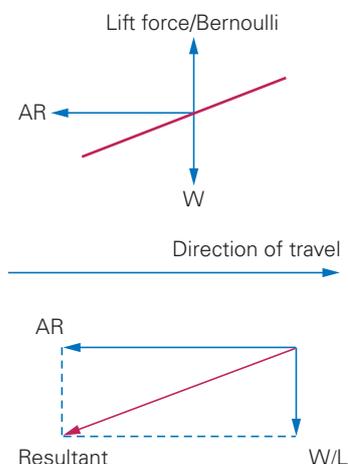
One mark each for:

- correct labels
  - correct diagram
  - correct resistance arm
  - correct effort arm
- e** Remember, apart from extension of the elbow (first order) and plantarflexion of the ankle (second order), all other lever systems in the body are third order levers. The resistance arm is always drawn from the resistance/weight part of the lever to the fulcrum; the effort arm is drawn from the effort/force part of the lever to the fulcrum.

## Questions and Answers



- b** One mark is awarded for each of: air resistance, weight/load, application of the parallelogram law and the resultant arrow on the correctly drawn diagrams.



- e** Remember, there are four main forces — two vertical: reaction and weight/load/gravity, and two horizontal: friction and air resistance. If you are asked to label forces, decide which ones are relevant. In the case of the javelin, this is a projectile so only air resistance and gravity will be relevant.

- c** One mark for each of the following (up to 4 marks):

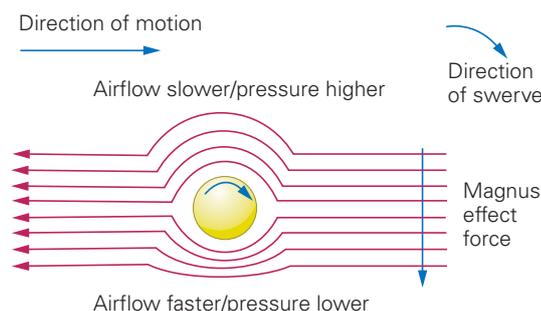
- Distance is the length of the path a body follows when moving from one position to another.
- Displacement is the length of a straight line joining the start and finish points.
- distance = 400m
- displacement = 0m

- e** Make sure that you can define all the scalar and vector quantity measurements of both linear and angular motion, so that you can understand the terminology used in questions and answer questions relating to these terms.

- d** Relevant points include:

- eccentric/off-centre force
- application of force outside centre of mass
- spin generated by moment of force/torque
- results in angular motion

*Effect of top spin*



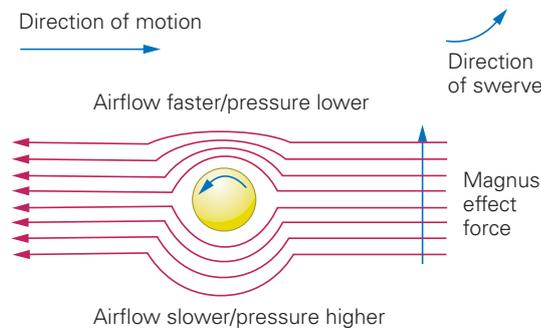
## Questions and Answers



From the diagram (one mark for each of):

- direction of motion
- airflow arrows in opposite direction to motion
- direction of spin in relation to direction of swerve
- narrow airflow lines below the ball
- wider airflow lines above the ball
- Magnus effect force labelled
- air travels faster under the ball
- low pressure created underneath
- force goes from high to low pressure
- flight path is shorter
- non-parabolic flight path

*Effect of back spin*



From the diagram (one mark for each of):

- direction of motion
- airflow arrows in opposite direction to motion
- direction of spin in relation to direction of swerve
- narrow airflow lines above the ball
- wider airflow lines below the ball
- Magnus effect force labelled
- air travels faster above the ball
- low pressure created above
- force goes from high to low pressure
- flight path is longer
- parabolic flight path

- e** The use of airflow diagrams will help you to grasp the concept of spin. Make sure you learn these comprehensively so that you don't confuse the types of spin.



## Section B Exercise and sport physiology

### Question 5

a One mark for each of the following (up to 5 marks):

- Fat/sugar could lead to:
  - hypertension
  - diabetes/high blood glucose
  - premature heart disease
  - high LDL cholesterol
- Weight-related issues:
  - lower back pain/poor posture
  - joint pain/degeneration
  - less mobility/flexibility

e Obesity is a new topic. Questions might ask for a definition of obesity, an explanation of the causes of obesity and the problems associated with it. This topic area is relatively straightforward and it will be easy to score high marks with thorough revision.

b One mark for each of the following (up to 6 marks):

- duration/distance of work interval — 60 m/70 m/80 m/90 m/100 m
- intensity of work interval — 80–95% maximum heart rate
- duration of recovery — 30 s to 1 minute
- number of work/recovery periods — 6–10

Justification:

- short work interval because PC only lasts for 10 s
- 30 s rest interval because half PC stores are replenished

e Interval training is always a popular question as this type of training can be adapted to suit each of the three energy systems. Make sure you can relate each energy system to the four key areas of interval training: the duration/distance of the work interval; the intensity of the work interval; the duration of the recovery interval; the number of work/recovery periods.

c One mark for each of the following:

- BMI = body mass index
- BMI is a measure of body fat based on height and weight for both men and women.

- $$\frac{\text{weight (kg)}}{\text{height (m)} \times \text{height (m)}}$$

- BMI > 30 = obesity

e This is another new topic. Questions might ask for a definition and calculation of BMI — and this is straightforward — but future questions might look at BMI in relation to obesity.

d Relevant points include:

- aerobic/with oxygen
- glucose/glycogen/carbohydrate

## Questions and Answers



- anaerobic glycolysis
- broken down to form pyruvic acid
- fats/triglycerides/fatty acids/glycerol
- beta oxidation
- Krebs cycle
- cyclical series of reactions
- oxaloacetic acid combines with acetyl co-enzyme A/formation of citric acid
- CO<sub>2</sub> is a by-product
- matrix/mitochondria
- two ATP
- hydrogen removed
- electron transport chain
- cristae/mitochondria (do not credit mitochondria if mark already given in Krebs cycle)
- 34 ATP

One mark for each of the following, to include two ergogenic aids:

HGH:

- definition — artificially produced hormone
- why used — increases muscle mass and causes a decrease in fats
- disadvantage — heart and nerve diseases
- disadvantage — glucose intolerance
- disadvantage — high levels of blood fats

Rh-EPO:

- definition — artificially produced hormone
- why used — increases haemoglobin levels
- why used — increases the oxygen-carrying capacity of the blood
- disadvantage — can result in blood clotting
- disadvantage — can result in stroke/death

Gene doping:

- definition — synthetic genes are taken to build muscle/increase red blood cells
- why used — can improve oxygen uptake/strength
- disadvantage — this depends on the gene used but there have been reported problems with the heart and the liver

Blood doping:

- definition — blood removed and stored; body compensates and makes more red blood cells; stored blood then injected back giving even higher red blood cell count
- why used — to improve aerobic capacity by increasing the oxygen-carrying capacity of the body
- disadvantage — the viscosity of the blood could increase, leading to clotting and a risk of death

- e** Make sure you know the following information for each of the three energy systems:
- the type of reaction (aerobic or anaerobic)
  - the chemical or food fuel used
  - the site of the reaction
  - the controlling enzyme

## Questions and Answers



- energy yield (how many ATP)
- specific stages within each system
- the by-products
- duration and intensity

You also need to be able to relate these systems across the specification, for example, in terms of recovery, relevant fitness components, types of training and suitable ergogenic aids.