Y13 Extended Certificate in Sport summer work (SIL)

Compulsory Task 1:

Questions

Q1.

Carys is a mountain walker. She is experiencing pain in her knees. Her doctor has diagnosed her condition as arthritis.

Explain why arthritis causes pain.

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(Total for question = 3 marks)

Q2.

Zoe competes in long-distance swimming races.

Explain why type I muscle fibres are used in long-distance swimming races.

(3)

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(Total for question = 3 marks)

Q3.

Jane is an 800m runner. One of the adaptations of her training is an increase in the size and number of her

mitochondria.

One reason Type IIa muscle fibres are important to an 800m runner's performance is that they are more resistant to fatigue than Type IIx muscle fibres.

Explain one **other** reason that Type IIa muscle fibres are important to an 800m runner's performance.

(3)

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(Total for question = 3 marks)

Q4.

State **three** characteristics of type IIx muscle fibres.

1 .....

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2 .....

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3 .....

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(Total for question = 3 marks)

Q5.

State **three** characteristics of type I muscle fibres.

1 .....

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2 .....

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3 .....

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(Total for question = 3 marks)

Q6.

Steph is a hockey player. She has been playing for several years and there have been cardiovascular adaptations in her body. One of these adaptations is an increase in blood volume.

State what happens to Steph's stroke volume when she is playing hockey.

(1)

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(Total for question = 1 mark)

Q7.

Imran is a rugby player. He has been playing for several years and his body has undertaken cardiovascular adaptations. One of these adaptations is a decreased heart rate recovery time.

Imran is playing in a rugby match.

In the match, Imran's cardiac output changes from rest.

(i) State what happens to Imran's cardiac output during a rugby game.

(1)

.....

(ii) State the **two** cardiovascular responses of the body that cause this change in cardiac output.

(2)

1 .....

2 .....

(Total for question = 3 marks)

Q8.

Jane is an 800m runner. One of the adaptations of her training is an increase in the size and number of her mitochondria.

(i) State the function of mitochondria.

(1)

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(ii) Explain why an increase in the number of mitochondria is beneficial to Jane's 800m performance.

(4)

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(Total for question = 5 marks)

Q9.

Heart rate increases in response to a single exercise session.

Give **two other** responses of the cardiovascular system to a single exercise session.

(1)

1 .....

(1)

2 .....

(Total for question = 2 marks)

Q10.

Nadia is a triathlete. When on a training run some of her blood vessels vasodilate and some vasoconstrict.

Explain why vasodilation and vasoconstriction help Nadia to perform in the triathlon.

Vasodilation -

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Vasoconstriction -

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(Total for question = 4 marks)

Q11.

Beth and Katie are identical twins, Beth (trained athlete) regularly participates in exercise and Katie (untrained athlete) does no exercise. **Table 3** displays their resting heart rates.

	Resting heart rate (BPM)
Beth	55
Katie	75

Table 3

Explain why Katie's resting heart rate is higher than Beth's resting heart rate.

(3)

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(Total for question = 3 marks)

Q12.

Marcos is a marathon runner.

Gas exchange occurs so that Marcos's body receives oxygen from the air he breaths in.

Explain the process of gaseous exchange of oxygen at the alveoli during a marathon.

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(Total for question = 4 marks)

Q13.

Asthma is a condition that affects the respiratory system.

Explain **one** way in which asthma affects breathing.

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(Total for question = 3 marks)

Q14.

Farzana is a 10,000 m runner. She is in the middle of her athletics season. She is competing in races and she is also doing her training programme.

One of the long-term adaptations that has occurred in Farzana's respiratory system following her training programme is an increase in her vital capacity.

Explain how increasing vital capacity will help Farzana's performance in a 10,000 m race.

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(Total for question = 4 marks)

Q15.

Carbon dioxide (CO_2) is a by-product of respiration.

Explain how carbon dioxide (CO_2) is removed from the body.

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(Total for question = 5 marks)

Q16.

Steph is a hockey player. She has been playing for several years and there have been cardiovascular adaptations in her body. One of these adaptations is an increase in blood volume.

Explain how an increase in blood volume impacts on Steph's hockey performance.

(4)

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(Total for question = 4 marks)

Q17.

Imran is a rugby player. He has been playing for several years and his body has undertaken cardiovascular adaptations. One of these adaptations is a decreased heart rate recovery time.

Explain how a decreased heart rate recovery time benefits Imran's rugby performance.

(2)

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(Total for question = 2 marks)

Q18.

State the role of chemoreceptors.

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(Total for question = 1 mark)

Y13 Extended Certificate in Sport summer work (SIL)

Q19.

Complete the following table by stating the chemical source and amount of ATP produced for both the ATP-PC and aerobic energy system.

Energy System	Chemical Source/Fuel(s)	Amount of ATP produced
ATP-PC	.....	.....
Aerobic	(i) Glycogen (ii)	.....

(Total for question = 4 marks)

Q20.

Clarissa is a time trial cyclist. She has to cycle 25 miles as quickly as she can.

Clarissa has just completed her time trial.

Figure 4 shows Clarissa's rest, exercise and recovery period.

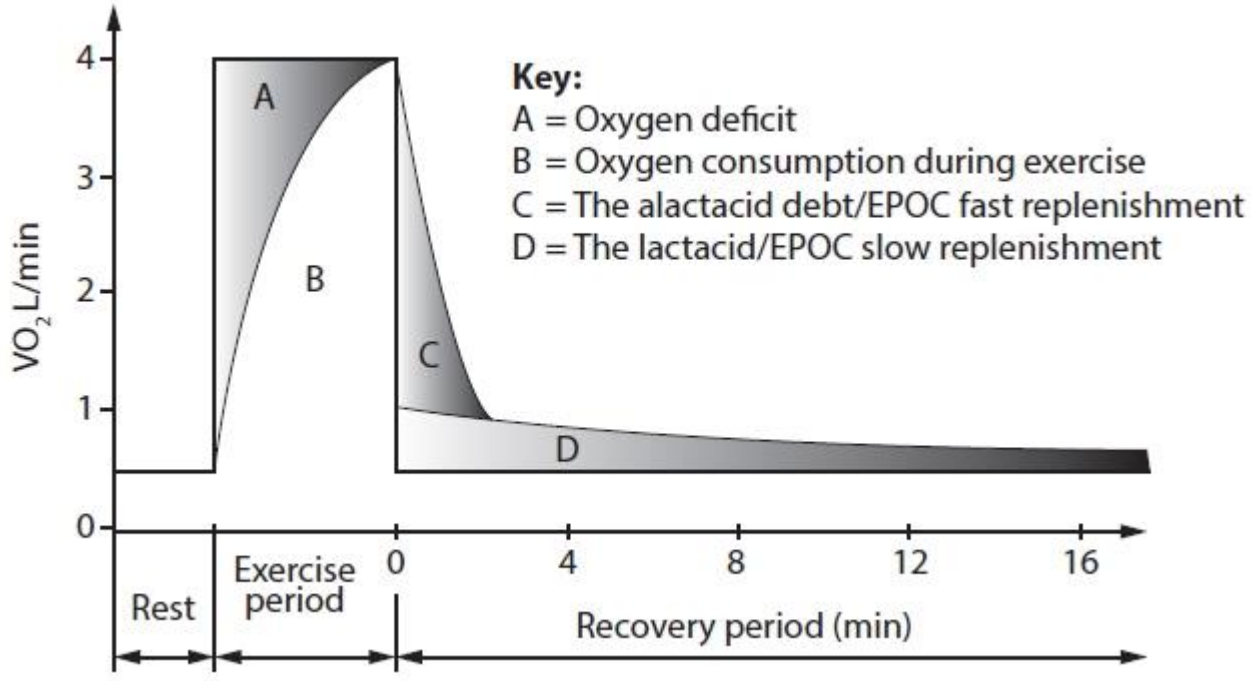

Figure 4

(i) Explain the section labelled C, that is the alactacid component of Clarissa's recovery process.

(5)

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(ii) Evaluate the effects of oxygen and fuel source availability to determine the energy system Clarissa uses in a race.

(6)

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(Total for question = 11 marks)

Q21.

Figure 6 shows Dave performing in a shot put event.

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Source: © Jamie Roach/Shutterstock

Figure 6

Dave uses the ATP-PC energy system when putting the shot.

Explain **one** reason why the ATP-PC energy system is used when putting the shot.

(3)

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(Total for question = 3 marks)

Q22.

Evaluate the importance of the ATP-PC energy system for elite marathon runners in a race.

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(Total for question = 6 marks)

Q23.

The warm-up is a fundamental part of a team's preparation that takes place before a game.

Dave is a rugby coach and his team warm up before every game. In their warm-up they do some light jogging, dynamic stretching and more intense drills.

Analyse the response of the muscular and cardiovascular systems to the warm-up.

(Total for question = 8 marks)

Q24.

Describe the process of the Krebs cycle.

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(Total for question = 5 marks)

Q25.

Describe the process of the electron transport chain.

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(Total for question = 4 marks)

Q26.

Describe the process of anaerobic glycolysis.

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(Total for question = 3 marks)

Q27.

Describe the process of aerobic glycolysis.

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(Total for question = 3 marks)

Q28.

Andre is an elite tennis player.

Figure 4 shows the contribution of the energy systems during a tennis match.

Energy system	Contribution %
ATP-PC	70
Lactate	20
Aerobic	10

Figure 4

Assess the contribution of the energy systems during Andre's tennis match.

(Total for question = 6 marks)

Q29.

Joe is a 100m sprinter. Joe takes **11.50 seconds** to complete a race. **Figure 4** shows the contribution from each of the energy systems to sprinting.

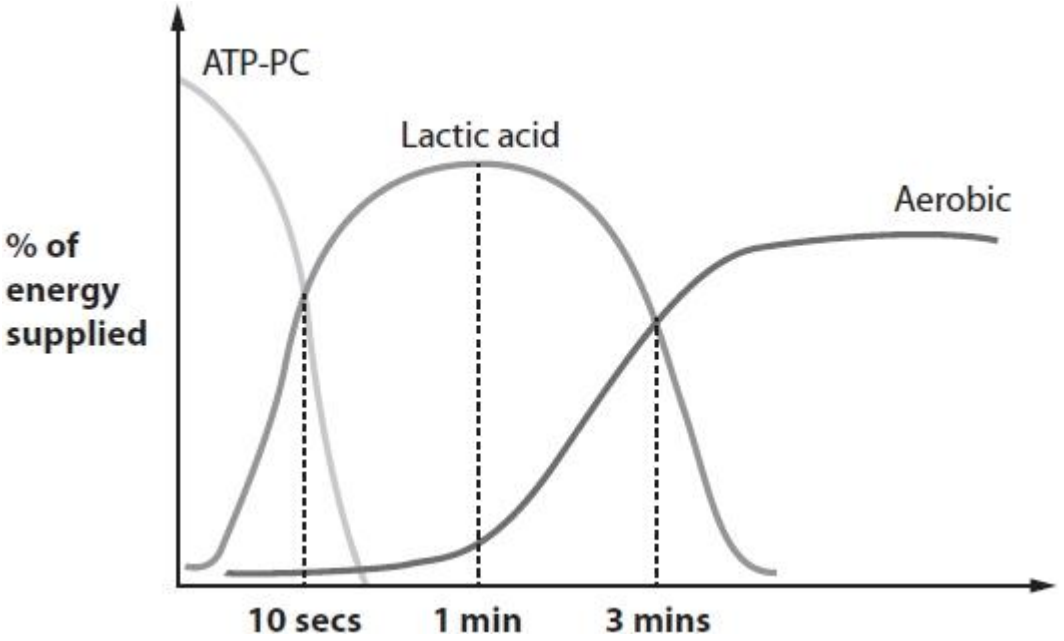

Figure 4

Assess the contribution of each energy system to Joe's 100m sprint.

(6)

(Total for question = 6 marks)

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Strongly Recommended task – Expanding your Subject Knowledge. This section is designed to develop your understandingof a sporting context and recent contextualisation in Sport and Leisure settings.

Choose 1 Option from the lists above and write a report (minimum 1 xA4) which;
(A01) Describes an overview of the Video/Book
(A02) Explains the relationship between the video/book and your BTEC Sport Course
(A03) Analyses the video/book and discuss your opinion and conclusion
Tick the boxes of the ones you are completing. Feel free to watch as many as you want if you have time

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Expanding your subject knowledge Learning Log

Record here any additional reading/viewing you are undertaking in order to show what you have been completing in order to prepare you for the course. Use the reading list on the previous slides you have been given for guidance on what you could you watch/read/

Date	Title	Summary of content	My thoughts

Y13 Extended Certificate in Sport summer work (SIL)

Compulsory task (Fully correct and self assess your answers)

Q1.

Question Number	Answer	Mark
	Award **one** mark for identification of what causes the pain and up to **two** marks for linked justification/reasoning. • Arthritis causes inflammation/swelling (1) because the bones rub together (1) due to cartilage having been worn away. (1) Accept any other appropriate answer.	3

Q2.

Question Number	Answer	Mark
	Award **one** mark for identification of a reason for the use of this fibre type and up to **two** marks for linked justification. • The fibres speed/force of contraction is low (1) therefore can continue to contract throughout the race/resisting fatigue (1) allowing the pace to be maintained towards the end of a swim/race (1) Accept any other appropriate answer.	3

Q3.

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Question Number	Answer	Mark
	Award **one** mark for identifying a reason why type IIa muscle fibres are important to an 800m runners performance and **two** marks for linked justification/reasoning. Type IIa are used because they are fast contracting/they can produce great force (1) so enabling Jane to work at a high intensity (1) so Jane can keep running fast/maintain her pace to the end of the race/run race quicker (1) Accept any other appropriate answers.	3

Q4.

Question Number	Answer	Mark
	Award **one** mark for each characteristic of type IIx muscle fibres, up to **three** marks. • Contract with a lot of force (1) • Contract quickly (1) • Not resistant to fatigue/tire quickly (1) • Large in size (1) • White colour (1) • Capillary density is low (1) • The number of mitochondria is small/few (1) • Glycolytic capacity is high (1) • Anaerobic (1) • Phosphocreatine levels are high (1) Accept any other appropriate answer.	3

Q5.

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Question Number	Answer	Mark
	Award **one** mark for each characteristic of type I muscle fibres, up to **three** marks. • Contract with little force (1) • Contract slowly (1) • Resistant to fatigue (1) • Small in size (1) • Red in colour (1) • Capillary density is high (1) • The number of mitochondria is high (1) • Oxidative (1) • High Myoglobin stores (1) Accept any other appropriate answer.	3

Q6.

Question Number	Answer	Mark
	Award **one** mark for stating the change in stroke volume in the game. Increases/Goes up/Higher/Greater (1)	1

Q7.

Question Number	**Answer**	**Mark**
(i)	Award **one** mark for stating the change in cardiac output correctly. • It increases (1)	1

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Question Number	Answer	Mark
(ii)	Award **one** mark for identifying each component correctly, for a maximum **two** marks • Anticipatory rise (1) • Heart rate/HR (1) • Stroke volume/SV (1)	2

Q8.

Question Number	Answer	Mark
(i)	Award **one** mark for stating the function of mitochondria. To produce energy (1) Accept any other appropriate answers.	1

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Question Number	Answer	Mark
(ii)	Award **one** mark for identification of why increasing the number of mitochondria will be beneficial to performance and up to **three** marks for linked justification/reasoning • More energy can be produced **aerobically** (1) **+any three from** • which reduces the requirement for anaerobic energy production (1) therefore less lactic acid would be produced/delayed OBLA (1) • Jane can work at a higher intensity/maintain faster speed for longer in the 800 m (1) • therefore finishing the race in a quicker time/delaying fatigue until later in the race (1) Accept any other appropriate answers.	4

Q9.

Question Number	Answer	Mark
	Award **one** mark for identifying each response of the cardiovascular system, up to a maximum of **two** marks. • Increased cardiac output/stroke volume (1) • Increased blood pressure (1) • Redirection of blood flow (1) Accept any other appropriate answer.	2

Q10.

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Question Number	Answer	Mark
	Award **one** mark for identifying how vasodilation helps performance in exercise and **one** mark for linked justification/reasoning. Award **one** mark for identifying why vasoconstriction helps performance in exercise and **one** mark for linked justification/reasoning. Vasodilation • Increased blood flow to the muscles/skin (1) allowing Nadia to maintain her intensity in the run/preventing her overheating (1) Vasoconstriction • Decreased blood flow to the non-essential organs/skin(1) allowing the blood to be **redirected** to the muscles/maintain core body temperature (during swim) (1) Accept any other appropriate answer	4

Q11.

Question Number	Answer	Mark
	Award **one** mark for lack of hypertrophy and up to **two** marks for linked expansion. Smaller heart muscle /lack of hypertrophy of heart (1) resulting in a lower stroke volume (1) therefore required to beat more to maintain resting cardiac output (1) Accept any other appropriate answer.	3

Q12.

Y13 Extended Certificate in Sport summer work (SIL)

Question Number	Answer	Mark
	Award up to **four** marks for explaining the process of gaseous exchange of O_2 at the alveoli ppO_2 (Partial Pressure of Oxygen) /concentration/levels of oxygen in the alveoli is high (1) $PP0_2$ (Partial Pressure of Oxygen) concentration /levels of oxygen in the blood is low (1) This creates a steeper diffusion gradient/ oxygen diffuses quicker (1) oxygen moves from the alveoli **into the blood** (1)	4

Q13.

Question Number	Answer	Mark
	Award **one** mark for identification of an effect and up to **two** marks for linked expansion of why asthma affects breathing. • Asthma causes an increase in breathing rate/decrease in tidal volume (1) because bands of tissue around the airway narrows/constrict (1) causing wheezing/shortness of breath/restricts airflow (1) Accept any other appropriate answer.	3

Q14.

Y13 Extended Certificate in Sport summer work (SIL)

Question Number	Answer	Mark
	Award up to **four** marks for explaining how increasing vital capacity aids performance. Due to the increased strength of the respiratory muscles (1) more air (carbon dioxide) can be expelled from the lungs (1) and more air (oxygen) can be inspired (1) to allow performance to be at a higher intensity/speed (1) without/delaying **fatigue** (1) Accept any other appropriate answer.	4

Q15.

Question Number	Answer	Mark
	Award a maximum of **five** marks for explaining how Carbon Dioxide (CO_2) is removed from the body • CO_2 diffuses from the muscle to the blood (1) • CO_2 is transported to the heart via the vena cava/veins/venules (1) • The Pulmonary Artery transports CO_2 to the lungs (1) • Gases diffuse from high partial pressure or concentration to low partial pressure or concentration (1) causing a diffusion or concentration gradient (1) • CO_2 diffuses/gaseous exchange from the blood to the alveoli where it is breathed out (1)	5

Q16.

Question Number	Answer	Mark
	Award **two** marks for explaining the impacts of increased blood volume and **two** marks for linked justification. (More blood increases) the ability to transfer more oxygen to the working muscle (1) and remove carbon dioxide (1) therefore enabling Steph to play at a higher intensity for a longer duration (1) and delay the onset of fatigue (1) Accept any other appropriate answer	4

Q17.

Question Number	**Answer**	**Mark**
	Award **one** mark for the effects decreased heart rate recovery time has on performance, up to **two** marks. This allows Imran to recover following periods of (high intensity) work quickly (1) and therefore able to tackle/run again quicker (1) Accept any other appropriate answer.	2

Q18.

Y13 Extended Certificate in Sport summer work (SIL)

Question Number	Answer	Mark
	Award **one** mark for stating the role of chemoreceptors. • To detect chemical changes in the blood (1) Also accept examples of chemical changes, e.g. detect increase in CO_2/drop in pH/increase in acidity.	1

Q19.

Question Number	Answer	Mark
	Award **one** mark for each correctly stated chemical source and amount of ATP produced for a maximum of **four** marks. **ATP-PC system** • (Chemical source/fuel) Phosphocreatine/PC/creatine phosphate/CP (1) • (ATP produced) 1(ATP) (1) **Aerobic system** • (Chemical source/fuel) fats/fatty acids/triglycerides (1) • (ATP produced) 36-39 (ATP) (1)	4

Q20.

Y13 Extended Certificate in Sport summer work (SIL)

Question Number	Answer	Mark
(i)	Award a maximum of **five** marks for explaining the main processes involved in the alactacid component of Clarissa's recovery process. • The alactacid component takes between two and three minutes for full recovery (1) • Uses up to 4 litres of oxygen (1) • Oxygen consumption remains h gh (1) • To restore the ATP (1) and PC stores depleted during exercise (1) • This energy is provided by the break-down of fats and carbohydrate (1) • Using the aerobic system (1) **Accept any other appropriate answer**	5

Y13 Extended Certificate in Sport summer work (SIL)

Question Number	Answer	Mark
(ii)	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers. Award up to **six** marks for evaluating how Oxygen (O_2) availability and fuel availability determine which energy system is used. **Oxygen** • If there is O_2 available then the aerobic system would be predominantly used. • If there is no O_2 available then the anaerobic energy system (ATP-PC / lactic acid) would be predominantly used. • If an activity is short duration (10 seconds)/high intensity then the predominant system is the ATP-PC • Aerobic threshold will occur if O_2 levels fall below the requirements of the aerobic system then the lactic acid system will be predominant. **Fuel Availability** • If there are sufficient PC stores then the ATP-PC will be predominant for high intensity short duration (<10 seconds). • PC stores deplete quickly during very high intensity meaning the ATP-PC cannot be predominant after 10 seconds unless recovery to resynthesise. • If glycogen/carbohydrate is present and it is high intensity then the lactic acid system will be used. • If glycogen/carbohydrate is present and is low intensity then the aerobic system will be used. • The greater the glycogen stores then the longer the aerobic system can be predominant. • If intensity is low fats are the predominant fuel source for the aerobic system. **Accept any other appropriate answer**	6

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Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to how Oxygen availability and fuel availability determine which energy system is used. • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of Oxygen and fuel availability. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	• Demonstrates accurate knowledge and understanding. • References to how Oxygen availability and fuel availability determine which energy system is used. • Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the energy system used in relation to Oxygen and fuel availability. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.
Level 3	5–6	• Demonstrates accurate knowledge and understanding. • Sustained coverage of how Oxygen availability and fuel availability determine which energy system is used. • Might demonstrate the ability to integrate and synthesise relevant information about the energy systems. • A contextualised analysis of the Oxygen and fuel available is developed using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and use of technical language.

Q21.

Question Number	Answer	Mark
	Award **one** mark for identification of why the system is used, and up to **two** further marks for linked expansion. • Because it provides/releases energy quickly (1) so the shot putter can produce an explosive movement / so it can provide enough energy to sustain the movement (1) which allows the athlete to throw the shot as far as possible (1) Accept any other appropriate response.	3

Q22.

Question Number	Answer	Mark
	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but learners should be rewarded for other relevant answers. **Why ATP-PC system might not be considered important** • ATP-PC energy system is used for high intensity work, marathon is low/medium intensity exercise • ATP-PC energy system used for working over a short duration, (e.g.)100 m. Marathon is a long duration/elite performers complete it in just over 2 hours	6

	• ATP-PC energy system is typically used by power athletes, marathon runners are endurance athletes • ATP-PC energy system would not be able to provide enough energy therefore the aerobic energy system would be used during the activity **Why ATP-PC system might be considered important** • To be able to change pace when breaking away from the field • To perform a sprint finish if it is required/overtake somebody • To support the partial regeneration of PC stores • Marathon runner will not focus solely on training their anaerobic energy pathways, therefore they will not be as efficient as that of an power athlete	

Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated elements of knowledge and understanding. • Few of the points made will be relevant to the context in the question. • Limited evaluation which contains generic assertions leading to a conclusion that is superficial or unsupported.
Level	**Mark**	**Descriptor**
Level 2	3–4	• Demonstrates some accurate knowledge and understanding. • Some of the points made will be relevant to the context in the question, but the link will not always be clear. • Displays a partially developed evaluation which considers some different aspects leading to a conclusion which considers some different competing points, although not always in detail.
Level 3	5–6	• Demonstrates mostly accurate knowledge and understanding. • Most of the points made will be relevant to the context in the question, and there will be clear links. • Displays a developed and logical evaluation which clearly considers different aspects leading to a conclusion which considers different competing points in detail.

Q23.

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Question Number	Answer	Mark
	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers. Award up to **eight** marks for analysing the impact of a warm up on the muscular and cardiovascular systems. **Muscular System** • Reduces risk of injury muscle strains/pulls/tears increased elasticity of muscle tissue • Increased flexibility • Extensibility of muscle • Increases temperature of muscle • Decreases muscle viscosity • Increases speed and strength of contraction • Increases enzyme/metabolic activity • Increases ATP production • Increases activation of neural pathways	8

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	Cardiovascular System • Increases heart rate/ stroke volume/ cardiac output • More oxygenated blood to muscles • Reduced lactic acid build up in muscles • Increased removal of carbon dioxide and waste products out of the blood stream • Activates vascular shunt mechanism • Vasomotor control centre (VCC)/Medulla Oblangata • Redistributes blood from nonessential organs to the working muscles • Vasodilation of arterioles leading to the working muscle • Vasoconstriction of arterioles leading to the non-essential organs • Therefore, more oxygen can be supplied to sustain energy production during the activity • Increases blood temperature • Reduces blood viscosity • Increases diffusion of oxygen from haemoglobin to muscles • Steeper diffusion gradient causes increased diffusion rate of oxygen into the blood stream. • Increases venous return ▪ Skeletal Muscle pump squeezes veins forcing blood back towards the heart ▪ Respiratory pump contraction of respiratory muscles forces blood back to the heart • Starling's law of the heart/increased venous return increases stroke volume **Accept any other appropriate answer**	

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Mark scheme (award up to 8 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to interrelationships between the relevant body systems • Generic statements may be presented, rather than linked factors/components being identified and explored in the context of the body systems mentioned. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	• Demonstrates accurate knowledge and understanding but may contain lapses. • References to relevant interrelationships between the body systems are present • Learners will identify linked factors/components, with some development in the form of mostly accurate and relevant factual material, leading to an analysis of the adaptations to training in the context being presented. The accuracy in the detail on the factors identified is likely to vary. • The response may contain parts that lack clarity or proper organisation. Evidence of correct technical language being used.

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Level 3	5–6	• Demonstrates accurate knowledge and understanding. • Sustained coverage of relevant interrelationships between the body systems is present. • Might demonstrate the ability to integrate and synthesise relevant information about the relevant body systems • A contextualised analysis of the interrelationships between the body systems is developed using mostly coherent chains of reasoning, leading to a range of factors/components being present. Learners will demonstrate understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and correct use of technical language.
Level 4	7-8	• Demonstrates accurate and thorough knowledge and understanding. • Sustained coverage of relevant interrelationships between the body systems is present. • Demonstrates the ability to integrate and synthesise relevant information about the relevant body systems • Displays a well developed contextualised analysis of the interrelationships between the body systems is developed containing logical chains of reasoning throughout. Learners demonstrate thorough understanding of linkages and relationships between/within systems. • Response demonstrates good organisation, clarity and correct use of technical language.

Q24.

Question Number	Answer	Mark
	Award up to **five** marks for describing the Krebs cycle. **Must be in logical order.** Occurs in (the matrix) of the mitochondria (1) pyruvate combines with CoA (1) to create Acetyl CoA (1) Acetyl CoA combines with oxaloacetic acid/OAA (1) to make citric acid (1) and the by-product is carbon dioxide/CO_2 (1) H^+ is produced (1) and passes onto the electron transport chain/ETC (1) the reaction yields 2 ATP (1) Accept annotated diagram/flow chart.	5

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Q25.

Question Number	Answer	Mark
	Award **one** mark for each descriptive point, up to a maximum of **four** marks. • (The electron transport chain/ETC) only occurs when oxygen is present (1) • It occurs in the mitochondria (1) • It receives hydrogen ions/hydrogen from the Krebs cycle (1) • 32-34 ATP are created (1) • Water is the by-product (1) Accept an ATP value between 32 to 34. Accept any other appropriate answer.	4

Q26.

Question Number	Answer	Mark
	Award up to **three** marks for describing anaerobic glycolysis. Glycogen is converted into glucose (1) glucose is broken down into pyruvic acid (1) pyruvate is then converted into lactic acid/lactate (1) and this reaction yields 2ATP (1) molecules/enzymes LDH/PFK (1)	3

Q27.

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Question Number	Answer	Mark
	Award **one** mark for each descriptive point, up to a maximum of **three** marks. • Glycogen/glucose is converted into pyruvate/pyruvic acid (1) • There is oxygen present (1) • The pyruvate/pyruvic acid goes into the Krebs cycle (1) • This reaction yields 2 ATP molecules (1) • This takes place in the sarcoplasm (1)	3

Q28.

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Question Number	Answer	Mark
	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but should be rewarded for other relevant answers. • All three systems work together to provide the energy. **ATP-PC system** • System used for activity lasting 8-10 seconds and the main system used in tennis • Used when hitting powerful shots/smash/serve • Sprinting around the court to return shots • Phosphocreatine stores are replenished in 2-4 minutes, so supported during breaks between points and games. **Lactate system** • Provides energy for moderate to high intensity activity • Only lasts for 1-3 minutes • Will be used during long, intense rallies that last longer than 10 seconds • When recovery periods between points are short. **Aerobic system** • Submaximal system in exercise longer than 1 minute • Helps support the anaerobic systems during the game • To supply the energy when the match is long • Works when intensity falls between points/games and helps the muscles recover.	6

Mark scheme (award up to 6 marks)		
Level	**Mark**	**Descriptor**

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Level 1	1–2	• Demonstrates isolated elements of knowledge and understanding. • Provides little or no reference to the context in the question. • A conclusion may be presented, but will be generic and the supporting evidence will be limited. Limited attempt to address the question. • Response is likely to lack clarity, organisation and the required technical language.
Level 2	3–4	• Demonstrates accurate knowledge and understanding. • Line(s) of argument occasionally supported through the application of relevant references to context in question. • Judgement is made from a partially-developed discussion, although the discussion may be imbalanced or superficial in places. Learners will produce some statements with development in the form of mostly accurate and relevant factual material leading to an assessment being presented. • The response may contain parts which lack clarity or organisation. There is evidence of correct technical language being used.
Level 3	5-6	• Demonstrates accurate knowledge and understanding. • Line(s) of argument supported throughout by sustained application of relevant references to context in the question. Might demonstrate the ability to integrate and synthesise relevant systems. • Arrives at a supported judgement from a well-developed and logical balanced discussion, containing logical chains of reasoning. Demonstrates an awareness of competing arguments using these to reach a valid assessment. • Response demonstrates good organisation, clarity and use of technical language.

Q29.

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Question Number	Answer	Mark
	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and level descriptors below. The indicative content that follows is not prescriptive. Answers may cover some/all of the indicative content but learners should be rewarded for other relevant answers. • In the 100 m Joe will predominately use the ATP-PC system to create ATP • Because the race is maximum intensity and short duration • This is because the ATP-PC can create ATP for only 8–10 seconds • Joe runs his race in 11:50 seconds so extra energy is required • Further energy towards the end of the race is provided from the breakdown of glucose using the anaerobic glycolysis system/lactate/lactic acid system • The aerobic energy system is working in the background with very little contribution within the race	6
	• The aerobic system is unable to supply energy quickly enough due to high intensity short duration activity • The aerobic system will be used to recover after the race • Approximately 95% anaerobic and 5% aerobic • The race will be approximately 85% ATP-PC, 10% lactate system and 5% aerobic system	
Mark scheme (award up to 6 marks)		

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Level	Mark	Descriptor
Level 0	0	No rewardable material
Level 1	1–2	• Demonstrates isolated knowledge and understanding, there be major gaps or omissions • Few of the points made will be relevant to the context in the question Limited assessment which contains generic assertions rather than considering the factors or events and their relative importance, leading to a conclusion which is superficial or unsupported
Level 2	3–4	• Demonstrates some accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor • Some of the points made will be relevant to the context in the question, but the link will not always be clear Displays a partially developed assessment which considers some of the factors or events and their relative importance leading to a partially supported conclusion.
Level 3	5–6	• Demonstrates mostly accurate and thorough/detailed knowledge and understanding • Most of the points made will be relevant to the context in the question, and there will be clear links • Displays a well-developed and logical assessment which clearly considers the factors or events and their relative importance, leading to a supported conclusion

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