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| Candidate surname                                                                 |                      |                      |                      |                      | Other names                   |                             |                      |                      |                      |  |
| Pearson BTEC<br>Level 3 Nationals<br>Diploma                                      | Centre Number        |                      |                      |                      |                               | Learner Registration Number |                      |                      |                      |  |
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| <b>Wednesday 13 January 2021</b>                                                  |                      |                      |                      |                      |                               |                             |                      |                      |                      |  |
| Morning (Time: 1 hour 30 minutes)                                                 |                      |                      |                      |                      | Paper Reference <b>31813H</b> |                             |                      |                      |                      |  |
| <b>Sport and Exercise Science</b><br><b>Unit 1: Sport and Exercise Physiology</b> |                      |                      |                      |                      |                               |                             |                      |                      |                      |  |
| You do not need any other materials.                                              |                      |                      |                      |                      |                               |                             |                      | Total Marks          |                      |  |

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**Answer ALL questions. Write your answers in the spaces provided.**

Peter is a 200m sprinter.

Sprinters need to be powerful to run fast.

Testosterone is a hormone.

**1** (a) (i) State **one** effect of testosterone on the muscular system.

(1)

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(ii) Explain **one** reason why increased levels of testosterone could improve Peter's 200m sprinting performance.

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At the start of a 200m sprint, Peter's type IIx muscle fibres are recruited.

- (b) (i) Explain **one** reason why type IIx muscle fibres are recruited at the start of a 200m sprint.

(2)

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- (ii) Name **one other** muscle fibre type found in the body.

(1)

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Peter's muscles change temperature during a 200m sprint.

- (c) Explain **one** reason why Peter's muscles change temperature during a 200m sprint.

(2)

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His body uses different energy systems during a 200m sprint.

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(Total for Question 1 = 16 marks)



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- (ii) Explain **one** reason why a change in tidal volume is important when Lena starts running.

(2)

During Lena's marathon run there will be an increase in blood flow to Lena's working muscles.

- (b) Describe **one** way the cardiovascular system increases blood flow to the muscles during Lena's run.

(2)

One long-term adaptation of Lena's training on her muscular system is capillarisation.

- (c) Explain **one** effect of capillarisation on diffusion rate in the working muscles.

(2)



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Lena's training programme involves long-distance continuous running.  
Continuous running is weight-bearing exercise.

- (d) Analyse the effect of regular weight-bearing exercise on Lena's skeletal system  
and her ability to continue with her training programme.

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(Total for Question 2 = 18 marks)



Pedro is a mixed martial arts fighter.

**Figure 2** shows Pedro during a training session.



Source: © Master1305/Shutterstock

**Figure 2**

Pedro does not always have the energy he needs to train effectively.

- 3** (a) (i) State **one nutritional strategy** Pedro should consider to make sure he has enough energy for training.

(1)

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Pedro could use dietary supplements to provide additional energy for training.

- (ii) Give **one** example of a dietary **supplement** Pedro could take **during** a training session to provide additional energy for training.

(1)

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Pedro trains for 2 hours every day.  
Pedro's coach tells him he is overtraining.

- (b) State **two** causes of overtraining.

(2)

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One effect of overtraining is excess adrenaline production.

(c) Explain the effect of excess adrenaline production on Pedro's performance.

(2)

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Pedro is not giving his body enough time to rest between training sessions.

(d) Explain **one** reason why a lack of rest between training sessions will have a **negative** impact on Pedro's muscular system and his performance.

(4)

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Pedro completes all his training indoors at his local leisure centre.

It is important that Pedro's body does not overheat during training.

- (e) Evaluate the importance of the different methods of heat loss from the body during one of Pedro's training sessions.

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(Total for Question 3 = 18 marks)



Karl is a long-distance cross-country skier. A cross-country ski course includes uphill and downhill sections.

**Figure 3** shows a cross-country skier.



Source: © Ericsmendes/Shutterstock

**Figure 3**

Karl's next race will be at high altitude.

Hypoxia is an initial response of the body to high altitude.

**4** (a) (i) State the meaning of the term hypoxia.

(1)

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(ii) Explain why Karl's **resting** heart rate increases in response to being at high altitude.

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Altitude sickness is another initial response of the body to high altitude.

(iii) State **two** possible symptoms of altitude sickness.

(2)

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The air temperature at high altitude can be extremely cold and cause frostbite.

(b) Explain why extreme cold conditions can cause frostbite.

(2)

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Shivering is one method of reducing heat loss.

(c) (i) Explain why shivering can help reduce heat loss.

(2)

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(ii) State **one other** method of reducing heat loss.

(1)

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(Total for Question 4 = 18 marks)

**TOTAL FOR PAPER = 70 MARKS**





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