

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Learner Registration Number

--	--	--	--	--	--

--	--	--	--	--	--	--	--

Pearson BTEC Level 3 Nationals Diploma

Time 1 hour 30 minutes

Paper
reference

31813H

Sport and Exercise Science

UNIT 1: Sport and Exercise Physiology

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 ►

P67515A

©2022 Pearson Education Ltd.

1/1



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

Ed is a cricketer.

When Ed plays cricket his skeletal system responds by increasing the amount of synovial fluid in his joints.

- 1** (a) Explain **one** advantage of increased synovial fluid in Ed's joints for his cricket performance.

(2)

.....

.....

.....

.....

.....

.....

During a 12-week cricket training programme Ed's skeletal system adapts through the process of bone remodelling.

- (b) Describe the process of bone remodelling.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Ed's breathing rate changes when he is playing cricket.

(c) Name **two** of the respiratory muscles involved in breathing.

(2)

1

2

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 6 7 5 1 5 A 0 3 2 0

Figure 1 shows two players during a cricket match.

The batter is trying to hit the ball hard, so it goes as far as possible. The further a batsman hits the ball the more runs he can score by repeatedly sprinting between the wickets.

The wicket-keeper is stationary behind the wicket.



Source: © CHEN WS/Shutterstock

Figure 1

(d) Evaluate the importance of the different muscle fibre types to the cricket players in **Figure 1**.

(8)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area with 30 horizontal dotted lines.





DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 1 = 16 marks)



Shawn is a rugby player. He is training to improve his muscular strength and VO_2 max.
Strength training causes adaptations to the levels of hormones produced by the body.

- 2 (a) (i) State the effect of strength training on the resting levels of human growth hormone (HGH).

(1)

- (ii) Explain the effect of HGH on the muscular system.

(2)

- (iii) Name **one other** hormone that has a similar effect on the muscular system as HGH.

(1)



P 6 7 5 1 5 A 0 7 2 0

Shawn's aerobic training increases his VO_2 max.

(b) (i) State the meaning of the term **VO_2 max.**

(1)

.....

.....

.....

(ii) Explain **one** effect of an increase in VO_2 max on Shawn's **anaerobic** threshold.

(2)

.....

.....

.....

.....

.....

.....

Shawn's blood composition adapts and changes as a result of his aerobic training.
One adaptation is an increase in blood plasma volume.

(c) (i) State **two other** changes to blood composition as a result of aerobic training.

(2)

1

.....

.....

2

.....

.....

(ii) State **one** advantage of an increase in blood plasma volume.

(1)

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Table 1 shows three responses of Shawn's body systems to a single training session.

Responses to a single training session
Change in tidal volume
Change to blood pH
Change in arteriovenous oxygen difference (a-vO ₂ diff)

Table 1

- (d) Evaluate the impact of each of the responses in **Table 1** on Shawn's ability to maintain the increased activity level during his training session.

(8)

[illegible]



Handwriting practice area with 30 horizontal dotted lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 2 = 18 marks)



Ariana exercises regularly.

The energy required for exercise is produced using the body's energy systems.

Figure 2 shows a simplified summary of energy production through two different energy systems.

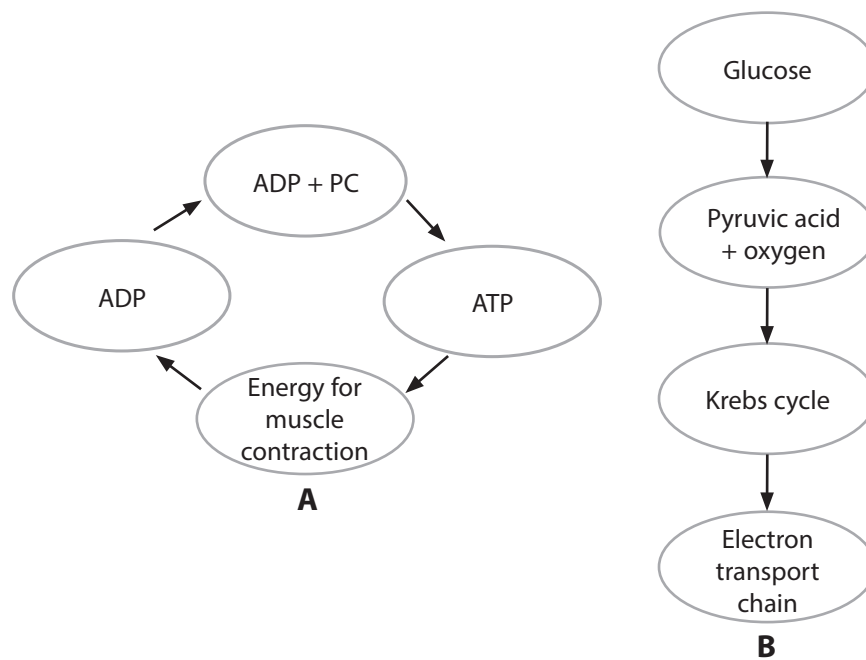


Figure 2

3 (a) Name the energy systems labelled **A** and **B** in **Figure 2**.

(2)

A

B

Ariana's exercise session has long periods of low-intensity work and short periods of high-intensity work.

(b) Explain which **one** of the energy systems, **A** or **B** in **Figure 2**, is used for the long periods of low-intensity work.

(3)

.....
.....
.....
.....
.....
.....



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

The cardiac cycle maintains blood flow so that nutrients can be transported to the muscles for energy production.

(c) Describe the **two** phases of the cardiac cycle.

(4)

1

2

Without sufficient energy sources muscle fatigue will occur.

(d) State **one other** cause of muscle fatigue during exercise.

(1)



The cardiovascular system and the thermoreceptors in the nervous system work together to maintain Ariana's body temperature during exercise.

- (e) Analyse the role of the **cardiovascular system and the thermoreceptors** in maintaining Ariana's body temperature during exercise.

(8)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area with 30 horizontal dotted lines.

(Total for Question 3 = 18 marks)



Ava competes in ultra-distance bike races. The races are at least 700km long.

To cycle this distance Ava must have an appropriate nutritional strategy to maintain her energy levels.

- 4 (a) Explain **one** nutritional strategy Ava should use to complete this endurance event.

(2)

Ava drinks plenty of fluids during her race to rehydrate.

- (b) Explain **one** reason why it is important that Ava rehydrates during her race.

(3)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Minute volume is the amount of air breathed in and out every minute.

(c) (i) State the calculation for minute volume.

(2)

.....

.....

.....

.....

(ii) Explain **one** reason why an increase in minute volume would be an advantage to Ava during an ultra-distance bike race.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



P 6 7 5 1 5 A 0 1 7 2 0

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

- DO NOT WRITE IN THIS AREA**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Handwriting practice area with 30 horizontal dotted lines.

(Total for Question 4 = 18 marks)

TOTAL FOR PAPER = 70 MARKS



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

