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 Certificate

Friday 12 January 2024

Morning (Time: 1 hour 30 minutes)

Paper reference **31524H**

Sport

UNIT 1: Anatomy and 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 80.
- 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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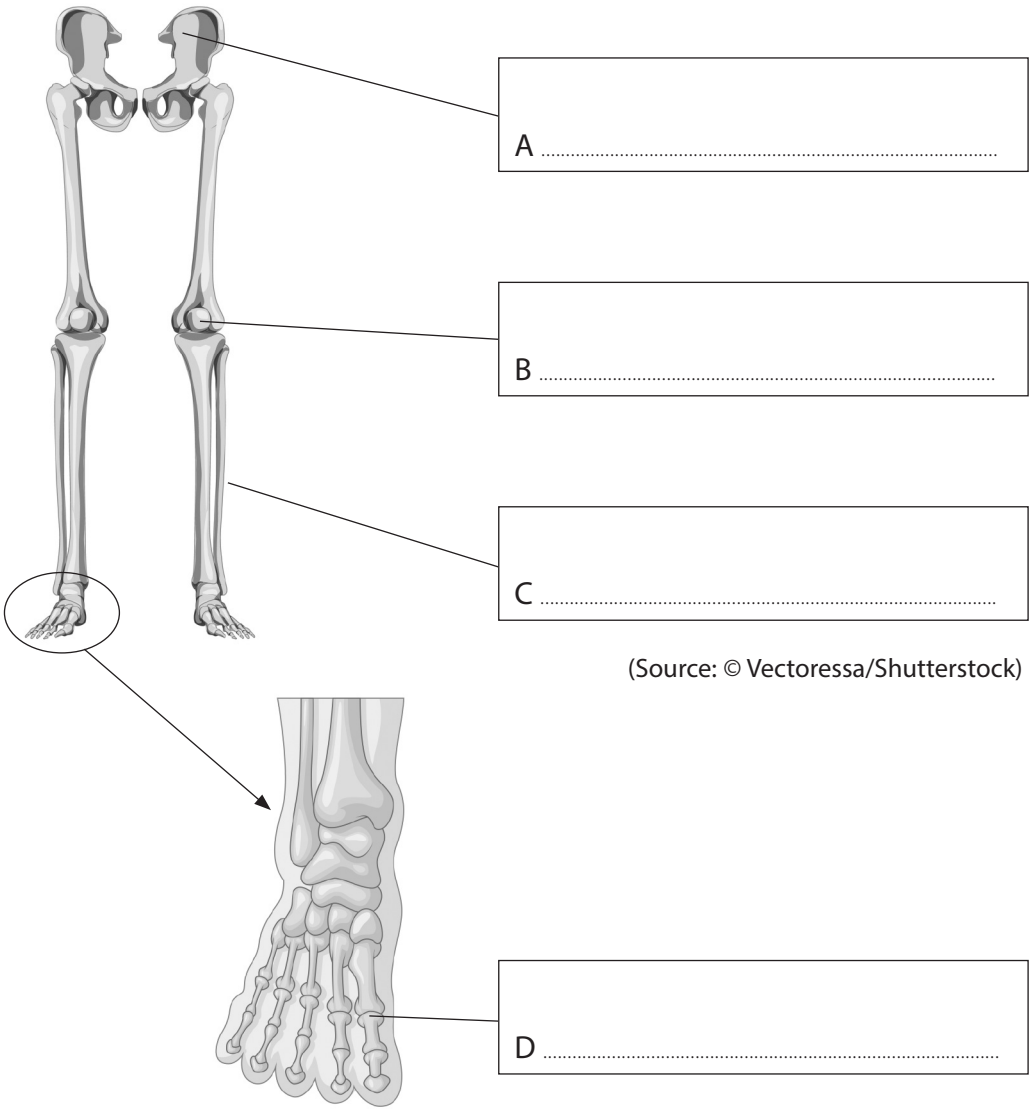
SECTION A: The Skeletal System for Sports Performance

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

Figure 1 shows the bones in the lower skeleton and the foot.

1 Identify the bones labelled **A–D**.

(4)



(Source: © Vectoressa/Shutterstock)

(Source: © Rendix Alextian/Shutterstock)

Figure 1

(Total for Question 1 = 4 marks)

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2 Explain the benefits of **two** adaptations of the skeletal system to exercise.

(Total for Question 2 = 4 marks)

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Figure 2 shows a tennis player about to take a serve.



(Source: © Kluva/Shutterstock)

Figure 2

3 (a) State the movement taking place at the elbow joint of the arm holding the racket.

(1)

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(b) State the type of synovial joint found at the elbow.

(1)

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(c) Explain how the bursa in the elbow joint helps the player to serve.

(3)

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(Total for Question 3 = 5 marks)

TOTAL FOR SECTION A = 13 MARKS

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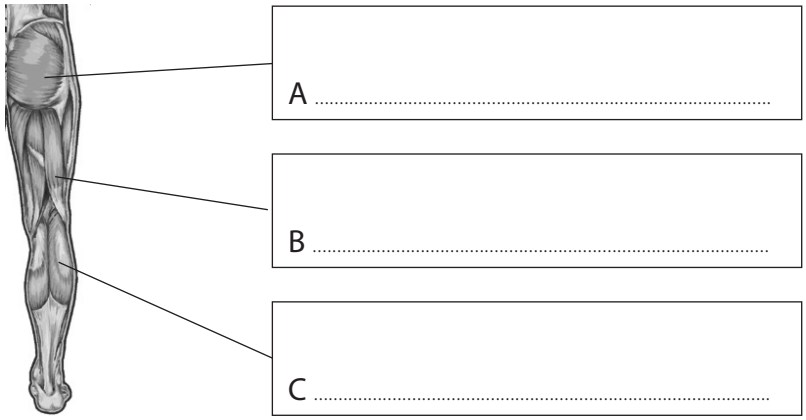
SECTION B: The Muscular System for Sports Performance

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

Figure 3 shows the muscles in the lower body.

4 Identify the muscles labelled **A–C**.

(3)



(Source: © stihii/Shutterstock)

Figure 3

(Total for Question 4 = 3 marks)

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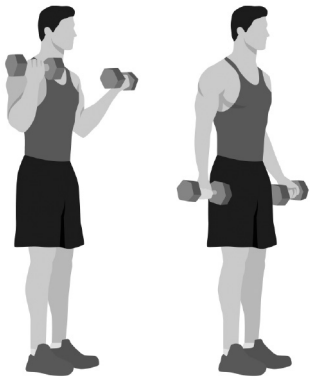
Figure 4 shows Phillip training.



(Source: © Lio putra/Shutterstock)

Figure 4

5 Complete **Table 1** by:

(a) stating the agonist muscle for each phase of movement

(2)

(b) stating the type of contraction when lowering the weight down.

(1)

Phase of movement	Agonist muscle	Type of contraction
Lifting the weight up	**(1)**	Concentric
Lowering the weight down	**(1)**	**(1)**

Table 1

(Total for Question 5 = 3 marks)

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Gareth is participating in his first marathon. He completes 20 miles and then he gets cramp.

6 Describe cramp and how it affects Gareth's performance.

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(Total for Question 6 = 2 marks)

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Steph is a badminton player.

As part of her weekly training she participates in two gym-based sessions, mainly doing bodyweight exercises. Over a period, Steph's muscular system has adapted to the training programme.

An adaptation to this training is an increase in the number and size of mitochondria.

7 (a) State **two other** adaptations of the muscular system.

(2)

1 .....

2 .....

(b) Explain the impact of an increased number and size of mitochondria on Steph's badminton performance.

(3)

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(Total for Question 7 = 5 marks)

TOTAL FOR SECTION B = 13 MARKS

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SECTION C: The Respiratory System for Sports Performance

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

8 Describe the role of the diaphragm during **inspiration and expiration**.

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(Total for Question 8 = 4 marks)

9 (a) Complete **Table 2** by identifying each lung volume described **(A–C)** from the descriptions given**.**

(3)

Description	Lung Volume
The maximum amount of air that can be forced out of the lungs after maximal inspiration	Vital capacity
The volume of air passing in or out of the lungs in 60 seconds	A .....
The air that remains in the lungs after maximal expiration	B .....
The amount of air breathed in or out during a normal breath	C .....

Table 2

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Jess is a boxer who has been training for six months for a fight.

(b) Explain the impact of Jess' training on her vital capacity and how this affects her performance.

(3)

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In preparation for the fight, Jess has spent two months training at altitude.

(c) Analyse the **immediate** and **long-term** effects of training at altitude and the **impact** on Jess' performance in the fight.

(6)

(Total for Question 9 = 12 marks)

TOTAL FOR SECTION C = 16 MARKS

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QUESTION 10 BEGINS ON THE NEXT PAGE

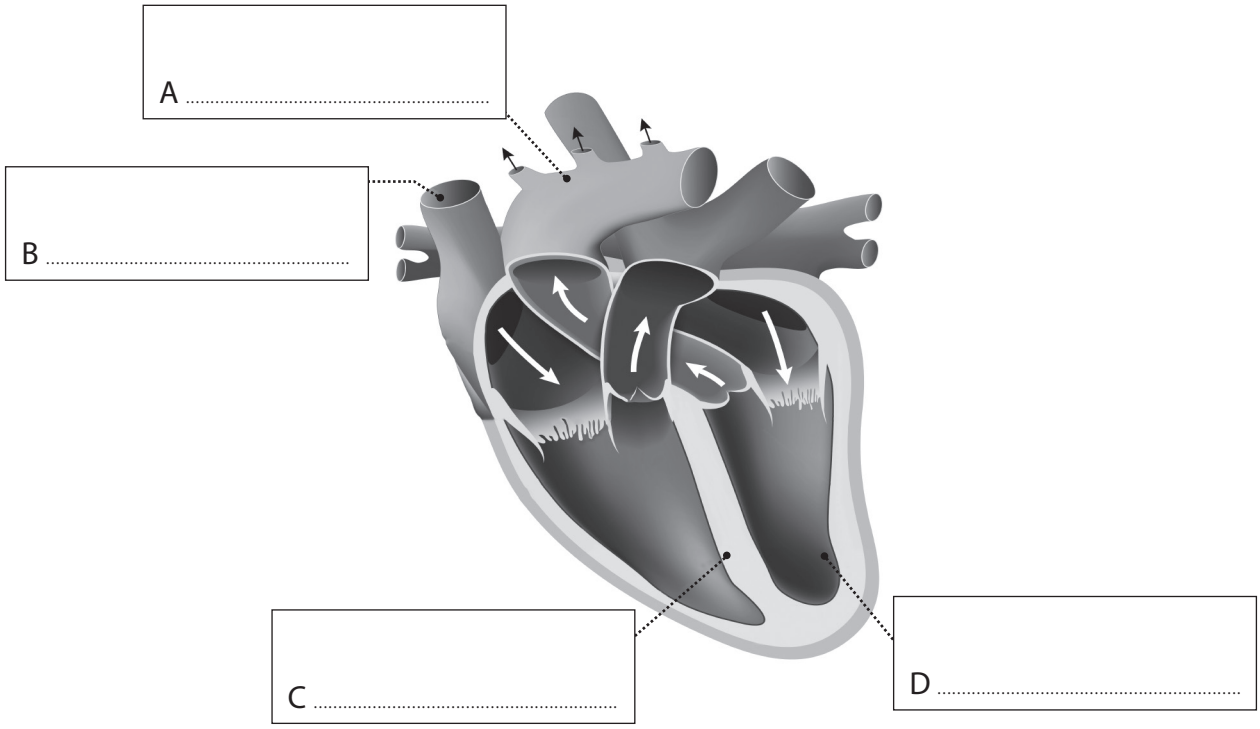
SECTION D: The Cardiovascular System for Sports Performance

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

Figure 5 shows the heart.

10 Identify the structures of the heart labelled **A–D**.

(4)



(Source: © Designua/Shutterstock)

Figure 5

(Total for Question 10 = 4 marks)

11 Explain the effect of low blood pressure during exercise.

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(Total for Question 11 = 2 marks)

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12 Describe how the cardiovascular system fights infection.

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(Total for Question 12 = 3 marks)

Billie is a tennis player. Over the years of playing and training her cardiovascular system has adapted. Two of these adaptations are cardiac hypertrophy and increased blood volume.

13 (a) State **two other** adaptations of the cardiovascular system.

(2)

1 .....

2 .....

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(b) Analyse the impact that cardiac hypertrophy and increased blood volume have on Billie's tennis performance.

(6)

(Total for Question 13 = 8 marks)

TOTAL FOR SECTION D = 17 MARKS

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QUESTION 14 BEGINS ON THE NEXT PAGE

SECTION E: Energy Systems for Sports Performance

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

14 Complete **Table 3** by giving the amount of ATP produced by **each** stage of the aerobic energy system.

(3)

Aerobic energy system stage	Amount of ATP produced
Aerobic glycolysis	**(1)**
Krebs cycle	**(1)**
Electron transport chain	**(1)**

Table 3

(Total for Question 14 = 3 marks)

Paul completes a 200-metre swim race in three minutes.

15 Explain the effect that lactic acid production has on Paul's performance in the final length of the race.

(Total for Question 15 = 4 marks)

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16 Analyse the ATP-PC system and its role in creating energy for exercise.

(Total for Question 16 = 6 marks)

TOTAL FOR SECTION E = 13 MARKS

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SECTION F: Interrelationships between Body Systems for Sports Performance

Answer the question. Write your answer in the space provided.

Claire is a rower.

Claire's muscular and cardiovascular systems both respond to the demands of a high intensity training session.



(Source: © anka77/Shutterstock)

Figure 6

17 Analyse the impact of both the muscular **and** cardiovascular systems' responses during Claire's training session.

(8)

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(Total for Question 17 = 8 marks)

TOTAL FOR SECTION F = 8 MARKS
TOTAL FOR PAPER = 80 MARKS

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