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

Monday 15 May 2023

Afternoon (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 upper skeleton.

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

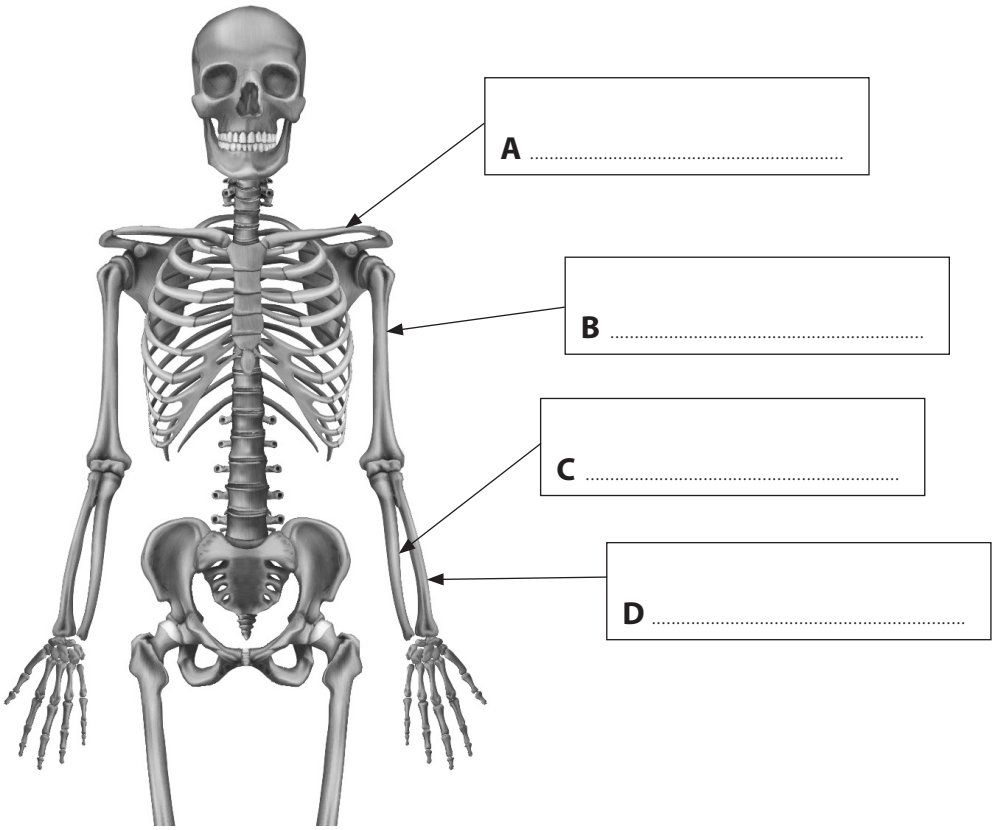

Figure 1

(Source: © studiovin/Shutterstock)

(Total for Question 1 = 4 marks)

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2 (a) Describe **two** postural deviations that would cause the curve of the spine to change from neutral.

(4)

(b) State the classification of the joint found at the thoracic vertebrae.

(1)

(Total for Question 2 = 5 marks)

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Emily is a rugby player who specialises in kicking the ball. She relies heavily on her knee joint to perform the kicks successfully.



(Source: © Oleksandr Osipov/Shutterstock)

Figure 2

3 (a) State the movement that takes place in Emily's left knee joint (circled) when she performs the kick.

(1)

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(b) Explain how synovial fluid enables Emily to kick the rugby ball.

(3)

(Total for Question 3 = 4 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.

Table 1 shows the types of muscle and examples of where they are found.

4 Complete **Table 1** to identify the muscle type or where it is found as indicated **A–C**.

Muscle type	Where it is found
A	Heart
Smooth	**B** .....
C	Biceps

Table 1

(Total for Question 4 = 3 marks)

When a person is exercising one response of the muscular system is an increase in muscle pliability.

5 State **three other** responses of the muscular system when a person is exercising.

1 .....

2 .....

3 .....

(Total for Question 5 = 3 marks)

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One of the adaptations of the muscular system to exercise is an increased storage of fat.

6 Explain why an increased storage of fat can benefit an endurance athlete.

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(Total for Question 6 = 2 marks)

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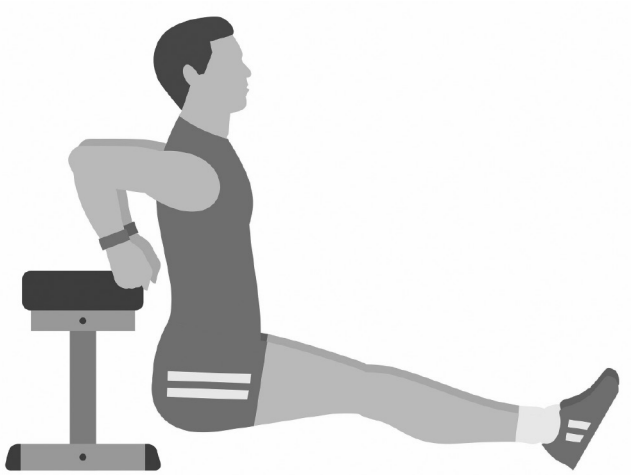
Mo is a basketball player.

As part of his training he participates in gym-based sessions, mainly doing body-weight exercises. One such exercise is the triceps dip. **Figure 3** shows him completing the downward phase of a triceps dip.



(Source: © VOLYK IEVGENII/Shutterstock)

Figure 3

7 (a) Describe the antagonistic muscle action that enables Mo to complete the downward phase of the triceps dip.

(2)

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Over a period of time, Mo's muscular system has adapted to the training programme, causing muscular hypertrophy.

(b) Explain the impact of hypertrophy of Mo's leg muscles on his basketball performance.

(3)

(Total for Question 7 = 5 marks)

TOTAL FOR SECTION B = 13 MARKS

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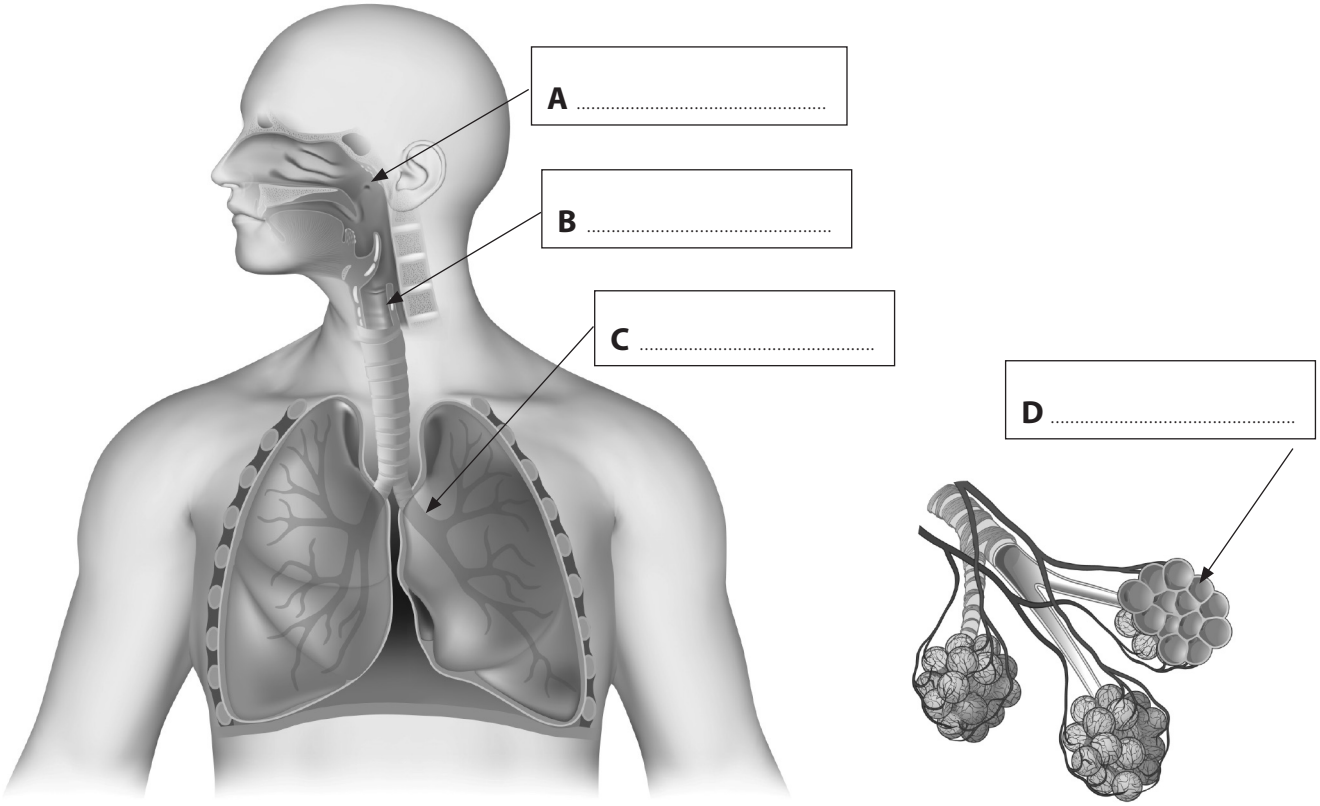
SECTION C: The Respiratory System for Sports Performance

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

Figure 4 shows the structure of the respiratory system.

8 Identify the respiratory structures labelled **A–D**.



(Source: © Alila Medical Media/Shutterstock)

(Source: © first vector trend/ Shutterstock)

Figure 4

(Total for Question 8 = 4 marks)

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James is a road racing cyclist. During a race his tidal volume increases.

9 (a) Explain why James' tidal volume increases during his race.

(3)

James has been a cyclist for 15 years. During this time his respiratory system has adapted by increasing the strength of his respiratory muscles and increasing his oxygen and carbon dioxide diffusion rate.

(b) Explain how an increased strength of the respiratory muscles affects James' cycling performance.

(3)

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(c) Analyse the effect of an increase in the oxygen and carbon dioxide diffusion rate on James' cycling performance.

(6)

(Total for Question 9 = 12 marks)

TOTAL FOR SECTION C = 16 MARKS

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SECTION D: The Cardiovascular System for Sports Performance

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

Plasma is one component of blood. One function of plasma is to help regulate body temperature.

10 Complete **Table 2** by:

(a) stating **two other** components of blood.

(b) giving **one** function of each component of blood.

	Component of blood	Function of component of blood
Example	Plasma	Helps regulate body temperature
1	**(1)**	**(1)**
2	**(1)**	**(1)**

Table 2

(Total for Question 10 = 4 marks)

11 Describe hyperthermia.

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(Total for Question 11 = 2 marks)

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Penny is a runner.

Figure 5 shows her heart rate before, during and after a race.

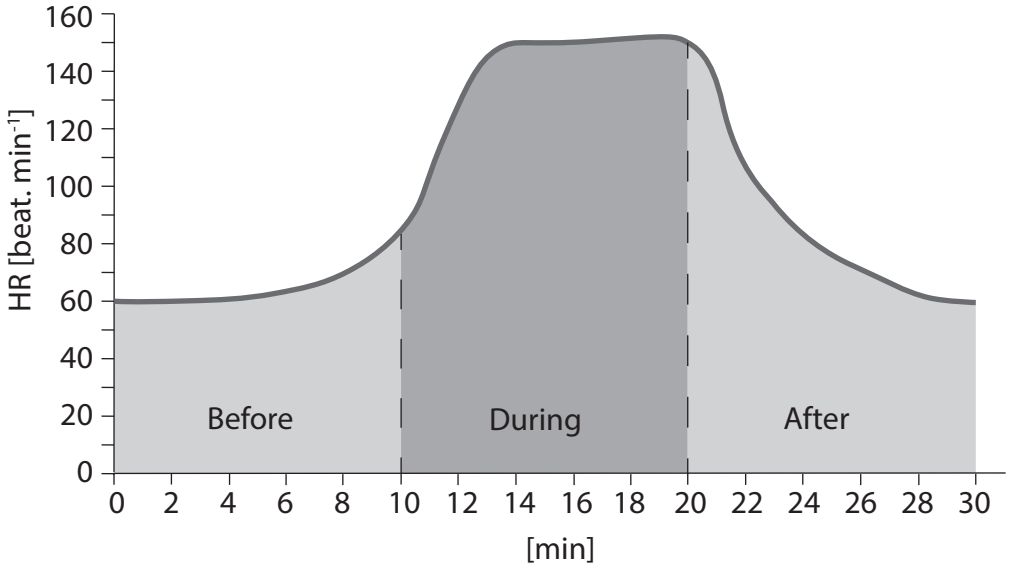

Figure 5

12 (a) Explain, using **Figure 5**, the changes to Penny's heart rate **before** the race.

(2)

(b) Explain, using **Figure 5**, the changes to Penny's heart rate **during** the race.

(3)

(Total for Question 12 = 5 marks)

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Kellis is a netball player.

Figure 6 shows the percentage distribution of blood at rest and during a netball game.

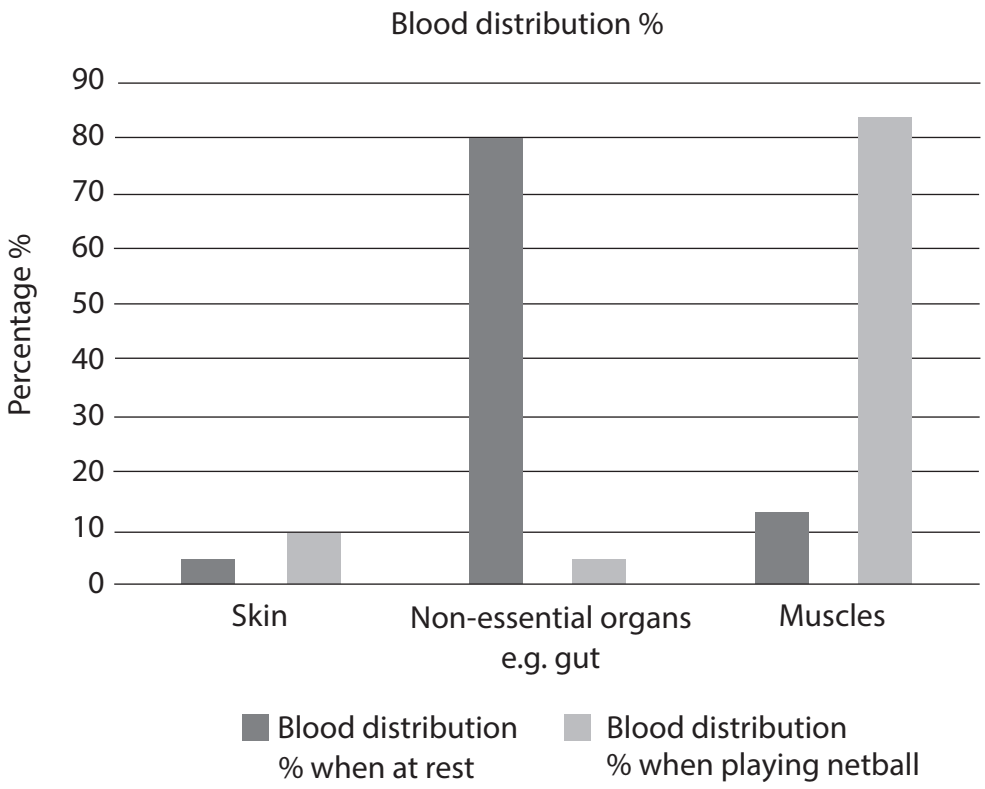

Figure 6

13 Analyse, using **Figure 6**, the changes in distribution of Kellis' blood flow to her skin, non-essential organs and muscles when playing netball.

(6)

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(Total for Question 13 = 6 marks)

TOTAL FOR SECTION D = 17 MARKS

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SECTION E: Energy Systems for Sports Performance

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

14 Complete **Table 3** by:

(a) stating the chemical source or fuel used for each energy system.

(b) giving the amount of ATP produced by each energy system.

Energy system	Chemical source/fuel	Amount of ATP produced
ATP-PC	**(1)**	**(1)**
Lactate	**(1)**	**(1)**

Table 3

(Total for Question 14 = 4 marks)

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15 Describe the electron transport chain.

(Total for Question 15 = 3 marks)

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Shaz is an elite badminton player.

Table 4 shows the contribution of the energy systems during her badminton match.

Energy system	Contribution %
ATP – PC	30
Lactate	10
Aerobic	60

Table 4

16 Assess the contribution of each energy system during her badminton match.

(6)

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(Total for Question 16 = 6 marks)

TOTAL FOR SECTION E = 13 MARKS

SECTION F: Interrelationships between Body Systems for Sports Performance

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

Jesse is a footballer. He tested his fitness at the start and at the end of a three-month training programme. The tests showed significant improvements to Jesse's cardiovascular and energy system adaptations.

17 Analyse how the adaptations to Jesse's cardiovascular and energy systems will affect his fitness for football.

(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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