

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson BTEC  
Level 3 Nationals  
Certificate

Centre Number

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Learner Registration Number

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**Friday 17 January 2020**

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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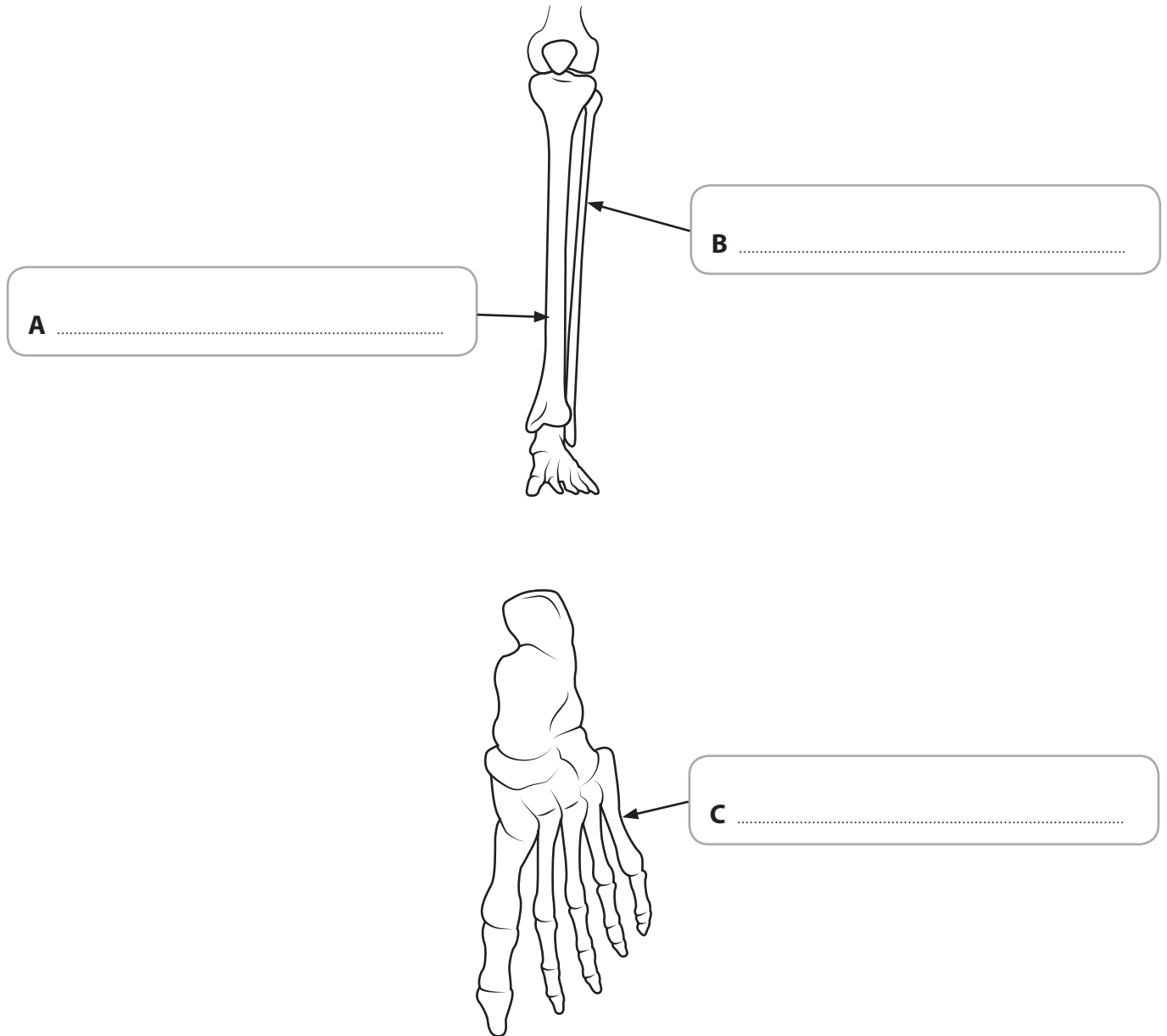
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**SECTION A: The Skeletal System for Sports Performance**

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

**Figure 1** shows the bones of the lower leg and foot.

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



**Figure 1**

**(Total for Question 1 = 3 marks)**

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**Figure 2** shows Claire performing a squat.



**Figure 2**

**2** Complete **Table 1** by:

- (a) identifying the joint type at the knee and hip (2)
- (b) identifying the movement from standing to the position shown in **Figure 2**. (2)

	(a) Joint type	(b) Movement
Knee		
Hip		

**Table 1**

**(Total for Question 2 = 4 marks)**



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**3** Describe the range of movement at the ankle.

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**(Total for Question 3 = 2 marks)**

**4** Describe the function of the synovial membrane.

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**(Total for Question 4 = 2 marks)**

**5** Describe the process of bone growth.

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**(Total for Question 5 = 3 marks)**

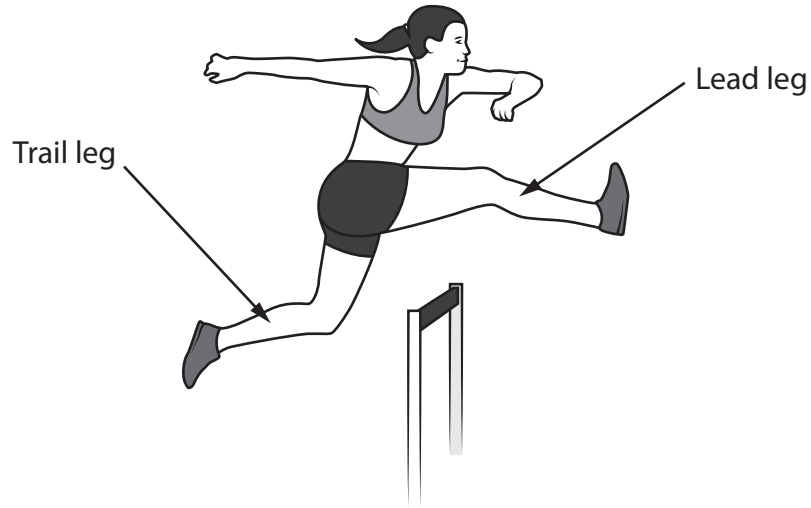
**TOTAL FOR SECTION A = 14 MARKS**



**SECTION B: The Muscular System for Sports Performance**

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

**Figure 3** shows an athlete jumping over a hurdle.



**Figure 3**

**6** Complete **Table 2** by

- (a) identifying the agonist muscles (2)
- (b) identifying the type of contraction of the agonist for each movement. (2)

Joint movement	(a) Agonist	(b) Type of contraction
Knee extension (lead leg)		
Knee flexion (trail leg)		

**Table 2**

**(Total for Question 6 = 4 marks)**



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One characteristic of skeletal muscle is that it is fatiguing.

7 State **one other** characteristic of skeletal muscle.

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(Total for Question 7 = 1 mark)

Gareth is a basketball player.

Figure 4 shows Gareth performing a sit-up as part of his training regime.

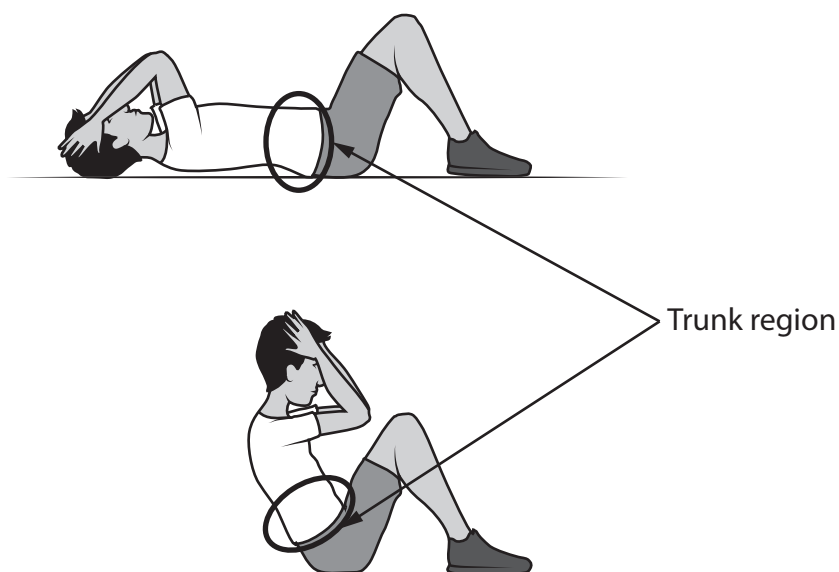


Figure 4

8 (a) Describe the action of the antagonistic muscle pair at the trunk that allows Gareth to complete the upwards phase of the sit-up shown in Figure 4.

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During the game Gareth experiences cramp.

(b) Describe cramp **and** the impact it has on Gareth's basketball performance.

(2)

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Throughout the basketball game Gareth will use all three muscle fibre types.

(c) Explain why type Ila muscle fibres will be used during the game.

(3)

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**(Total for Question 8 = 9 marks)**

**TOTAL FOR SECTION B = 14 MARKS**

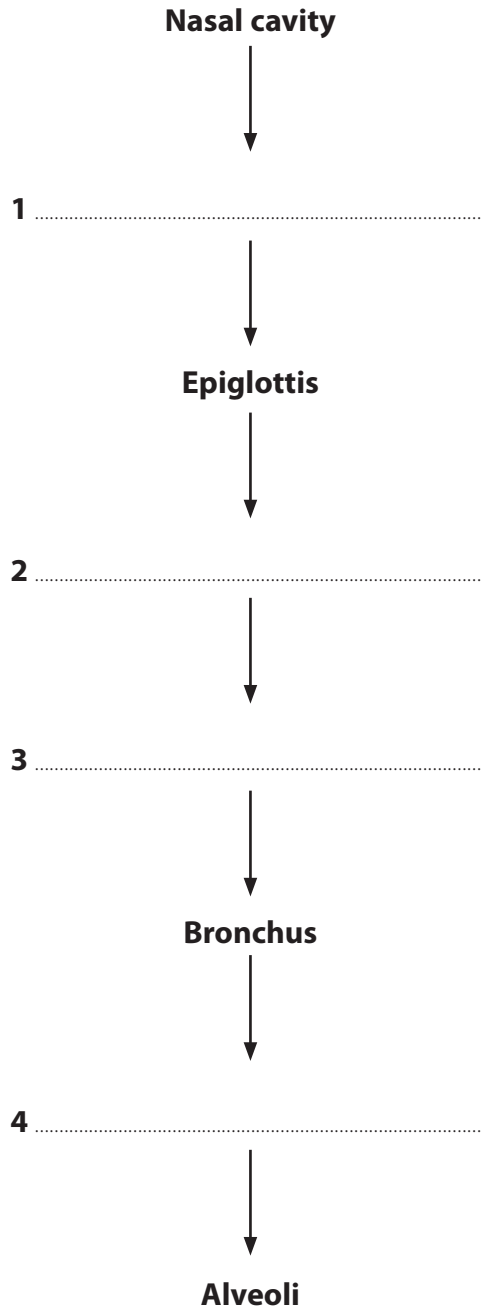


**SECTION C: The Respiratory System for Sports Performance**

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

**Figure 5** is an incomplete flow diagram of the route that air passes through when travelling from the nasal cavity to the alveoli.

**9** Identify the **four** structures needed to complete the flow diagram shown in **Figure 5**.



**Figure 5**

**(Total for Question 9 = 4 marks)**

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**10** State the role of chemoreceptors.

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**(Total for Question 10 = 1 mark)**

**11** Describe the process of gaseous exchange at the alveoli.

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**(Total for Question 11 = 4 marks)**



Becky is a footballer. Throughout the season her respiratory system has adapted. Two of these adaptations are an increase in her vital capacity and increased strength of her respiratory muscles.

**12** Analyse how increased vital capacity **and** increased strength of her respiratory muscles will impact on Becky's football performance.

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**(Total for Question 12 = 6 marks)**

**TOTAL FOR SECTION C = 15 MARKS**

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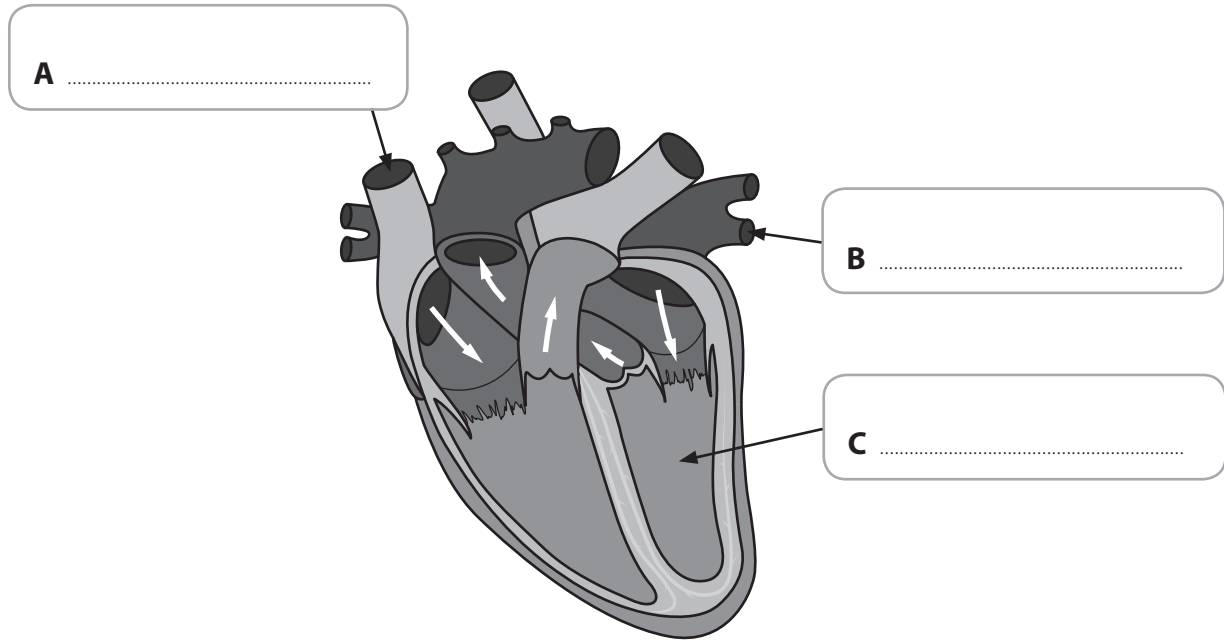


**SECTION D: The Cardiovascular System for Sports Performance**

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

**Figure 6** shows the heart.

**13** Identify the structures of the heart labelled A–C.



**Figure 6**

**(Total for Question 13 = 3 marks)**

Hyperthermia is a factor that affects the cardiovascular system.

**14** Explain hyperthermia.

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**(Total for Question 14 = 3 marks)**

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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**

**15** (a) Explain why Katie's resting heart rate is higher than Beth's resting heart rate.

(3)

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One response of the cardiovascular system before exercise is to increase heart rate.

(b) Explain why Beth's heart rate increases before she starts to exercise.

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(c) Analyse how the sympathetic and parasympathetic nervous systems control the changes in Beth's cardiac cycle, during and after her exercise session.

(6)

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(Total for Question 15 = 11 marks)

**TOTAL FOR SECTION D = 17 MARKS**



**SECTION E: Energy Systems for Sports Performance**

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

**16** The aerobic energy system can be broken down into three processes.

Complete **Table 4** by:

- (a) Identifying, **in the correct order**, each process of the aerobic energy system (3)
- (b) Identifying the amount of ATP produced at that stage of the process. (3)

	(a) Name of process	(b) Amount of ATP produced
Process 1		
Process 2		
Process 3		

**Table 4**

**(Total for Question 16 = 6 marks)**

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Evan is an 800 m runner who has just completed a race in two minutes. Throughout the race he used all three energy systems but mainly the lactate system.

**17** Assess why the lactate system was the main energy system used by Evan during the 800 m race.

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**(Total for Question 17 = 6 marks)**

**TOTAL FOR SECTION E = 12 MARKS**

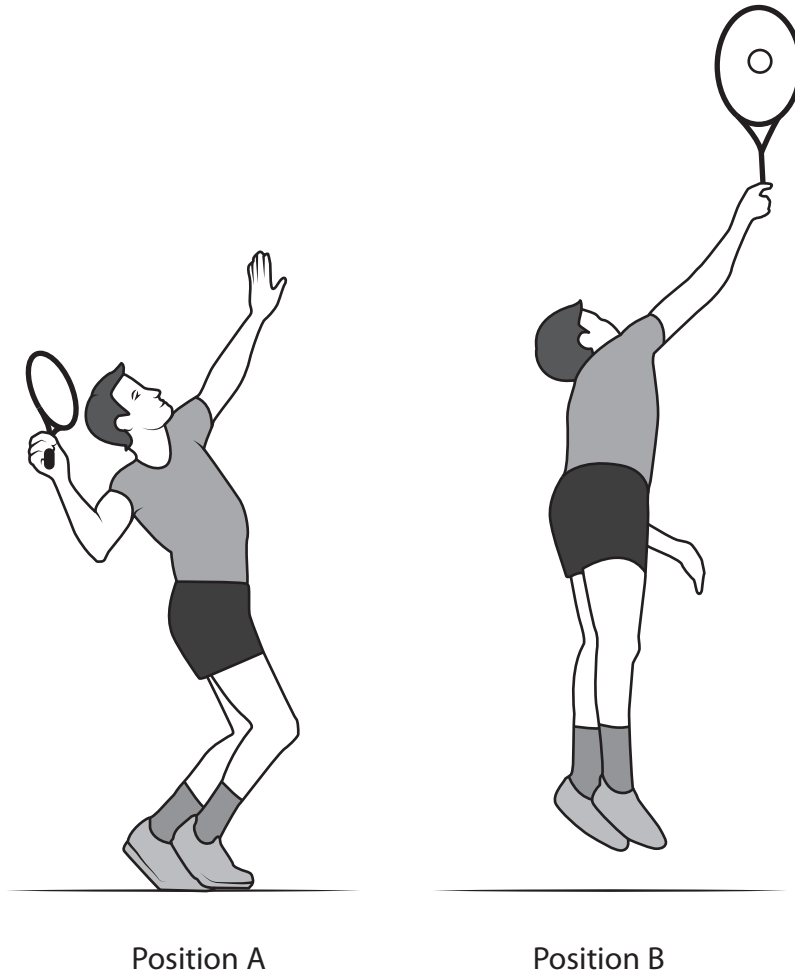


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**SECTION F: Interrelationships between Body Systems for Sports Performance.**

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

Ted is a tennis player. **Figure 7** shows the preparation (position A) and the hitting (position B) phases of his serve.



**Figure 7**

**18** Analyse how the skeletal and muscular systems interact to enable the movement of the shoulder, elbow and wrist of Ted's racquet arm from position A to position B in **Figure 7**.

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**(Total for Question 18 = 8 marks)**

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



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