Write your name here
Surname
Other names

Total Marks

Paper Reference
Pearson BTEC
Level 3 Nationals
Certificate

You do not need any other materials.

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.
SECTION A
The Skeletal System for Sports Performance

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

Figure 1 shows a synovial joint.

1  (a) Name the components of the synovial joint labelled A–C in Figure 1.

Figure 1

A ............................................................................................................................

B ............................................................................................................................

C ............................................................................................................................

(Source: © Tefi/Shutterstock)
(b) Synovial fluid is a thick liquid found in synovial joints.

Give three functions of synovial fluid.

(Total for Question 1 = 6 marks)
Michael is a high jumper. He has recently experienced severe pain and his doctor has diagnosed postural deviations.

2 Complete the table by:
   (a) giving \textbf{two} types of postural deviation in Column A. 
   (b) giving \textbf{one} characteristic of each type of postural deviation in Column B.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of postural deviation</td>
<td>Characteristic of postural deviation</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

(Total for Question 2 = 4 marks)

3 (a) Give an example of a flat bone. 
   (1)

(b) State the function of a flat bone. 
   (1)

(Total for Question 3 = 2 marks)

TOTAL FOR SECTION A = 12 MARKS
SECTION B
The Muscular System for Sports Performance

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

4 State two characteristics of cardiac muscle.

1 ..........................................................................................................................
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2 ..........................................................................................................................
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(Total for Question 4 = 2 marks)

5 (a) Give the meaning of the term ‘isometric contraction’.

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(b) Give one example of a sporting action that requires an isometric contraction.

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(Total for Question 5 = 2 marks)
Jane is an 800m runner. One of the adaptations of her training is an increase in the size and number of her mitochondria.

6 (a) (i) State the function of mitochondria. (1)

(ii) Explain why an increase in the number of mitochondria is beneficial to Jane’s 800m performance. (4)

One reason Type IIa muscle fibres are important to an 800m runner’s performance is that they are more resistant to fatigue than Type IIx muscle fibres.

(b) Explain one other reason that Type IIa muscle fibres are important to an 800m runner’s performance. (3)

(Total for Question 6 = 8 marks)

TOTAL FOR SECTION B = 12 MARKS
SECTION C
The Respiratory System for Sports Performance
Answer ALL questions. Write your answers in the spaces provided.

7 Name the structures, A–C, described in Table 1.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A flap of cartilage at the base of the tongue, which prevents food from entering the windpipe.</td>
</tr>
<tr>
<td>B</td>
<td>Large single tube strengthened by rings of cartilage.</td>
</tr>
<tr>
<td>C</td>
<td>Tiny airways that carry oxygen to the alveoli.</td>
</tr>
</tbody>
</table>

Table 1
(Total for Question 7 = 3 marks)
8  Explain the role of the diaphragm during inspiration and expiration.

Inspiration

Expiration

(Total for Question 8 = 4 marks)

9  (a) State the meaning of the term ‘tidal volume’.

(b) State one other response of the respiratory system when starting sport or exercise

(Total for Question 9 = 2 marks)
Cameron is a long distance cyclist.

10 Discuss the immediate **and** long-term effects of altitude training on Cameron's respiratory system.
One of the functions of the cardiovascular system is to deliver oxygen to the working muscles.

11 Describe, in the correct order, the flow of oxygenated blood through the heart.

(Total for Question 11 = 4 marks)
Figure 2 shows the various types of blood vessel.

12 Name the blood vessels labelled A–C in Figure 2.

A ............................................................................................................................
B ............................................................................................................................
C ............................................................................................................................

(Total for Question 12 = 3 marks)
Nadia is a triathlete. When on a training run some of her blood vessels vasodilate and some vasoconstrict.

13 Explain why vasodilation and vasoconstriction help Nadia to perform in the triathlon.

Vasodilation -

Vasoconstriction -

(Total for Question 13 = 4 marks)
**Figure 3** shows Nadia’s heart rate and stroke volume during the running training session.

![Graph showing Nadia's heart rate and stroke volume](image)

**Figure 3**

14. Explain the effects of exercise intensity on cardiac output.  

(Total for Question 14 = 3 marks)
Nadia's cardiovascular system has adapted as a result of completing her triathlon training programme.

15 Analyse the effect of cardiac hypertrophy on Nadia's performance in the triathlon.
SECTION E
Energy Systems for Sports Performance

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

16 Describe how ATP is broken down for muscular contraction and then resynthesised.

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(Total for Question 16 = 4 marks)
Describe the process of anaerobic glycolysis.

(Total for Question 17 = 3 marks)
Joe is a 100m sprinter. Joe takes **11.50 seconds** to complete a race. **Figure 4** shows the contribution from each of the energy systems to sprinting.

**Figure 4**

**18** Assess the contribution of each energy system to Joe's 100m sprint.

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SECTION F
Interrelationships between Body Systems for Sports Performance

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

Figure 5 shows Joe in action during his race.

**Figure 5**

19 Analyse how the muscular system and the skeletal system work together to carry out the action of the leading leg which is shaded in **Figure 5**.

(8)