

Physical Education

Advanced

COMPONENT 1: Scientific Principles of Physical Education

Total Marks

Friday 24 May 2024 – Morning

Time: 2 hours 30 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Calculator

YOU WILL BE GIVEN

Diagram Booklet

INSTRUCTIONS

Answer ALL questions in Sections A and B.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – there may be more space than you need.

INFORMATION

The total mark for this paper is 140.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

The question marked with an ASTERISK (*) requires candidates to use their knowledge and understanding from across the course of study in their answer.

Calculators can be used.

There may be spare copies of some diagrams.

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 – Applied anatomy and physiology

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

1 Look at FIGURE 1 for Question 1(a) in the Diagram Booklet. It shows an image of the vertebral column.

(a) Name the region labelled **X at the top of the vertebral column in FIGURE 1.
(1 mark)**

**(b) Name the region designed to carry the most load.
(1 mark)**

(Total for Question 1 = 2 marks)

- 2 (a) List TWO bones articulating at the elbow joint.
(2 marks)

(continued on the next page)

2 continued.

- (b) List FOUR movements possible at the shoulder joint.
(4 marks)**

(Total for Question 2 = 6 marks)

**3 Summarise how wave summation can increase force output.
(4 marks)**

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(Total for Question 3 = 4 marks)

**4 Summarise FOUR advantages of an athlete using the aerobic energy pathway.
(4 marks)**

[illegible]

(Total for Question 4 = 4 marks)

- 5 Look at FIGURE 2 for Question 5 in the Diagram Booklet. It shows the horizontal forces acting on a swimmer. The swimmer is moving at a constant speed. Force **A** is **100 N** (this is the forward arrow).

(a) Give force **B** (in Newtons).
(1 mark)

(b) The swimmer accelerates by increasing force **A** to **120 N**.

Calculate the size of the resultant force (in Newtons) acting on the swimmer as they accelerate.
(1 mark)

(continued on the next page)

5 continued.

- (c) Describe THREE factors that affect the fluid friction on a swimmer.
(3 marks)**

(Total for Question 5 = 5 marks)

- 6 Summarise the roles of troponin, tropomyosin and myosin in muscle contraction.
(3 marks)**

(Total for Question 6 = 3 marks)

- 7 Summarise SIX chronic adaptations that occur within skeletal muscle as a result of a cross training programme.
(6 marks)**

Answer space continues on the next page.

[illegible]

7 continued.

(Total for Question 7 = 6 marks)

8 Describe how the duration and intensity of exercise affect the fuel sources used.
(4 marks)

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(Total for Question 8 = 4 marks)

- 9 Outline how oxygen delivery to the muscles is increased during exercise.
(5 marks)**

Answer space continues on the next page.

[illegible]

9 continued.

(Total for Question 9 = 5 marks)

**10 Examine how athletes use each of the three lever systems in sporting activities.
(8 marks)**

Answer space continues on the next 2 pages.

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10 continued.

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Turn over

10 continued.

(Total for Question 10 = 8 marks)

11 Examine the physiological responses of the respiratory system at the start of exercise. (8 marks)

Answer space continues on the next 2 pages.

[illegible]

11 continued.

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Turn over

11 continued.

(Total for Question 11 = 8 marks)

- 12 Discuss the stages of recovery and their application to different sporting contexts.
(15 marks)**

Answer space continues on the next 7 pages.

12 continued.

[illegible]

Turn over

12 continued.

[illegible]

Turn over

12 continued.

[illegible]

Turn over

12 continued.

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12 continued.

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12 continued.

[illegible]

Turn over

12 continued.

(Total for Question 12 = 15 marks)

TOTAL FOR SECTION A = 70 MARKS

SECTION B – Exercise physiology and applied movement analysis

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

13 Exercise economy is a principal determinant of running performance.

List THREE other principal determinants of running performance.

(3 marks)

(Total for Question 13 = 3 marks)

Turn over

- 14 Outline THREE factors that determine how athletes achieve optimal body weight for performance.
(3 marks)**

(Total for Question 14 = 3 marks)

**15 (a) Define anaerobic capacity.
(1 mark)**

(continued on the next page)

15 continued.

- (b) Identify THREE factors that determine an athlete's anaerobic capacity.
(3 marks)**

(Total for Question 15 = 4 marks)

16 Describe FOUR different types of assisted training. (4 marks)

[illegible]

(Total for Question 16 = 4 marks)

An athlete is at a shot put competition.

- 17 (a) During their first attempt, the athlete puts a shot with a mass of **7.26 kg** and an average acceleration of **19 m/s^2** .

Calculate the average force.
(2 marks)

Answer space continues on the next page.

17(a) continued.

(continued on the next page)

17 continued.

- (b) On their second attempt, the athlete's put is in the air for 0.38 seconds and reaches a distance of 18 metres.**

**Calculate the average speed of the shot put.
(2 marks)**

Answer space continues on the next page.

17(b) continued.

(Total for Question 17 = 4 marks)

**18 Summarise the protocol of the Margaria-Kalamen test.
(5 marks)**

Answer space continues on the next page.

18 continued.

(Total for Question 18 = 5 marks)

19 An endurance athlete is preparing to run a marathon.

Describe how they could achieve progressive overload using the FITT training principles.

(4 marks)

[illegible]

(Total for Question 19 = 4 marks)

20 Spin is a factor that can affect the flight of a tennis ball.

Describe how FOUR other factors may affect the flight of a tennis ball.

(4 marks)

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(Total for Question 20 = 4 marks)

- 21 Examine the advantages and disadvantages of different rehabilitation strategies an athlete could use to recover from a soft tissue injury.**
(8 marks)

Answer space continues on the next 2 pages.

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21 continued.

[illegible]

Turn over

21 continued.

(Total for Question 21 = 8 marks)

22 Examine the most appropriate methods of training to improve an athlete's maximal aerobic fitness. (8 marks)

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22 continued.

[illegible]

Turn over

22 continued.

(Total for Question 22 = 8 marks)

23 Examine the factors that could affect the reliability of fitness testing.
(8 marks)

Answer space continues on the next 2 pages.

[illegible]

23 continued.

[illegible]

Turn over

23 continued.

(Total for Question 23 = 8 marks)

***24 Evaluate the role that technology plays in aiding an athlete in their preparation for an event.**

**Use your knowledge and understanding from across the course of study to answer this question.
(15 marks)**

Answer space continues on the next 7 pages.

24 continued.

[illegible]

Turn over

24 continued.

[illegible]

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24 continued.

[illegible]

Turn over

24 continued.

[illegible]

Turn over

24 continued.

[illegible]

Turn over

24 continued.

[illegible]

Turn over

24 continued.

(Total for Question 24 = 15 marks)

TOTAL FOR SECTION B = 70 MARKS
TOTAL FOR PAPER = 140 MARKS
END OF PAPER