OCR
Oxford Cambridge and RSA

Thursday 11 January 2024 – Morning

Level 3 Cambridge Technical in Sport and Physical Activity

05826/05827/05828/05829/05872 Unit 1: Body systems and the effects of physical activity

Time allowed: 1 hour 30 minutes
C400/2401

C400/2401

You can use:
- a calculator

0 5 8 2 6 – 0 1

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

Date of birth | D | D | M | M | Y | Y | Y | Y |

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION
- The total mark for this paper is **70**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE
- Read each question carefully before you start your answer.

SECTION A

Put a tick (✓) in the box next to the **one** correct answer for each question.

1 Which one of the following bones is **not** part of the appendicular skeleton?

(a) Clavicle ☐

(b) Cranium ☐

(c) Fibula ☐

(d) Metatarsal ☐

[1]

2 Which one of the following muscles is a fixator during the bicep curl exercise?

(a) Biceps brachii ☐

(b) Biceps femoris ☐

(c) Deltoid ☐

(d) Triceps brachii ☐

[1]

3 Which one of the following actions causes air to be expired?

(a) Decrease in pressure in the thoracic cavity ☐

(b) Decrease in volume of the thoracic cavity ☐

(c) Movement of the ribs up and out ☐

(d) Raising the arms above the head ☐

[1]

4 Which one of the following blood vessels contains valves to prevent the backflow of blood?

(a) Arteries ☐

(b) Arterioles ☐

(c) Veins ☐

(d) Venules ☐

[1]

5 Which one of the following is represented on the energy continuum?

(a) How much energy is produced during exercise ☐

(b) The by-products of energy production ☐

(c) The main energy system used in an activity ☐

(d) Which food fuels are being used during exercise ☐

[1]

6 Which one of the following is a structural characteristic of slow oxidative muscle fibres?

(a) Limited amount of myoglobin ☐

(b) Limited number of capillaries ☐

(c) Many fibres per motor neurone ☐

(d) Many mitochondria ☐

[1]

7 Which one of the following relies most on the aerobic energy system?

(a) Cross-country running ☐

(b) Pole vault ☐

(c) Squash rally ☐

(d) 500-metre rowing race ☐

[1]

8 Consider the following statements:

A – Arterioles to the skin vasodilate during exercise.

B – During a warm-up, arterioles to working muscles vasoconstrict.

C – Pre-capillary sphincters to the stomach open during exercise.

Which of the following is true?

(a) **A** alone is correct ☐

(b) **A** and **B** are both correct ☐

(c) **B** and **C** are both correct ☐

(d) **A**, **B** and **C** are all correct ☐

[1]

9 Name **one** muscle that contracts to flex the knee joint.

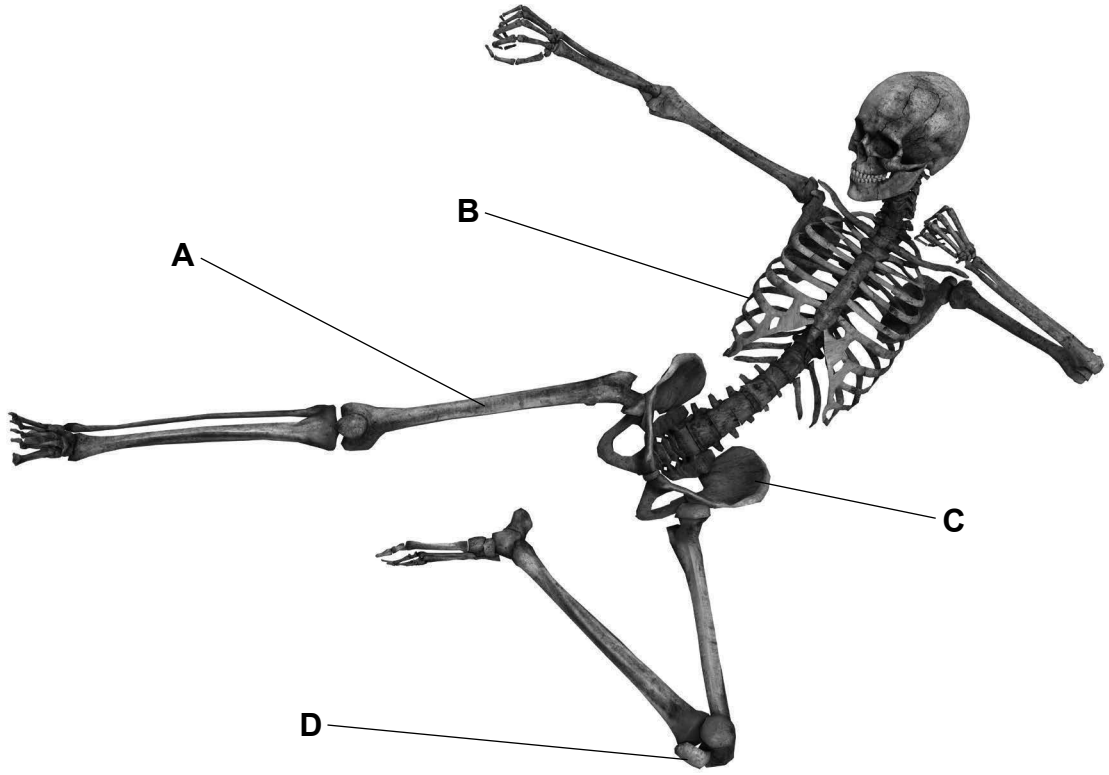
..... **[1]**

10 Which blood vessel connects an arteriole to a venule?

..... **[1]**

SECTION B

11 The diagram shows an image of a skeleton.



(a) Identify the bones labelled **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D .....

[4]

(b) One function of the skeleton is protection. State **four** other functions of the skeleton.

1 .....

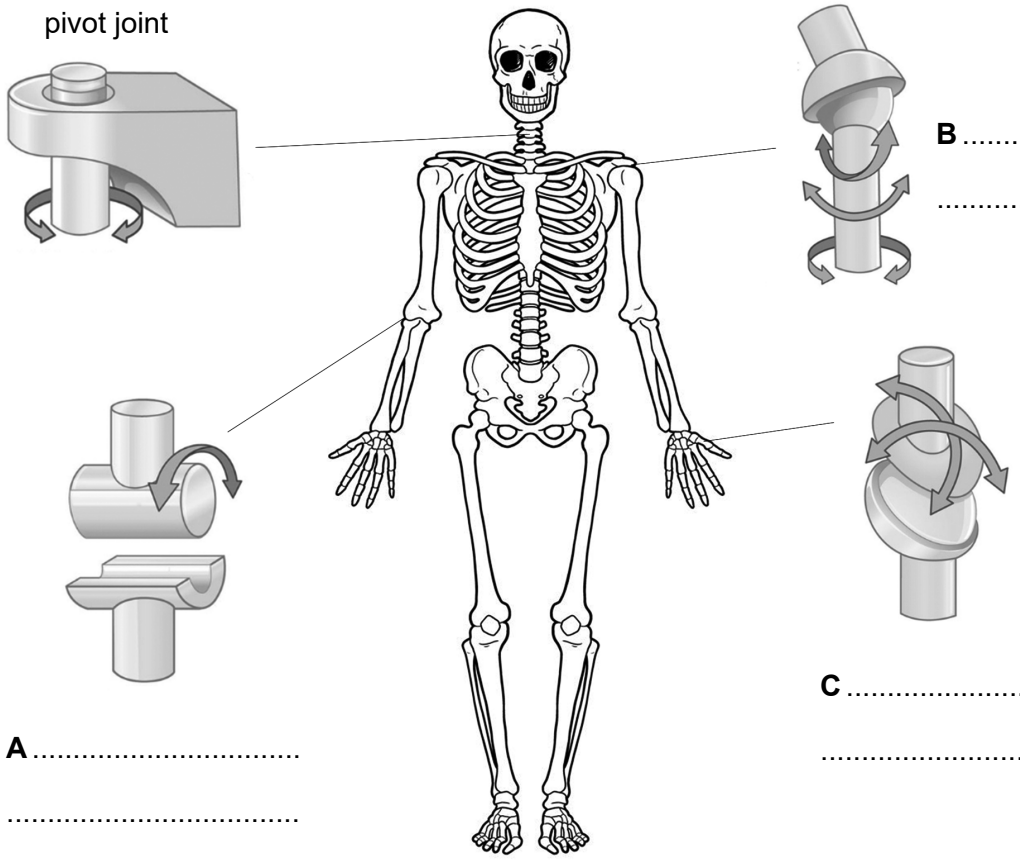
2 .....

3 .....

4 .....

[4]

12 The diagram highlights four types of synovial joint in the human body. The pivot joint at the neck has been identified.



(a) Fill in the blank spaces for **A**, **B** and **C** to identify the **three** other types of synovial joint.

[3]

(b) Describe **four** long-term benefits of regular physical activity for the skeletal system.

1 .....

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2 .....

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3 .....

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4 .....

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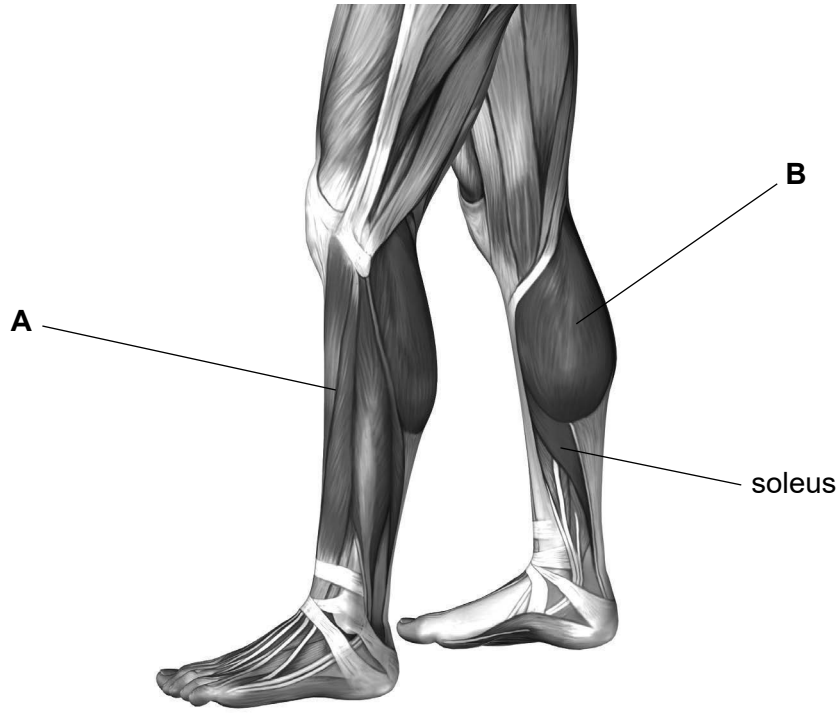
[4]

13 The diagram shows an image of the lower legs.



(a) Identify the muscles labelled **A** and **B**.

A .....

B .....

[2]

(b) State the joint movements at the ankle caused by contracting muscle **A** and muscle **B** concentrically.

Joint movement caused by muscle **A** .....

Joint movement caused by muscle **B** .....

[2]

(c) Complete the following sentences to describe different types of muscle contraction.

..... muscle contractions occur when a muscle contracts and lengthens to control movement and resist gravity.

..... muscle contractions occur when a muscle contracts but there is no movement.

..... muscle contractions occur when a muscle shortens under tension.

[3]

14

(a) What is meant by the following terms?

Agonist muscle .....

.....

.....

Antagonist muscle .....

.....

.....

[2]

(b) Name **two** muscles that contract to rotate the radio-ulnar joint.

1 .....

2 .....

[2]

15 One short-term effect of exercise on the muscular system is an increase in muscle temperature.

Outline **three** other short-term effects of exercise on the muscular system.

1 .....

.....

2 .....

.....

3 .....

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[3]

16 Complete the sentences to compare circulatory values for untrained individuals with trained athletes.

Assume that the untrained individual and the trained athlete are the same size and weight.

The first comparison has been done for you.

The maximal stroke volume of an untrained individual is **lower** than the resting stroke volume of a trained athlete.

The resting heart rate of an untrained individual is ..... than the resting heart rate of a trained athlete.

The resting stroke volume of an untrained individual is ..... than the resting stroke volume of a trained athlete.

The maximal cardiac output of an untrained individual is ..... than the maximal cardiac output of a trained athlete.

[3]

17

(a) Complete the table to identify and describe the roles of various structures of the lungs.

Structure	Role
.....	Hollow tubes ringed with cartilage. They branch off to the left and right lungs.
Alveoli	....
.....	Air enters here and passes over the vocal cords before moving into the trachea.
Bronchioles	....
.....	This warms, moistens and filters inspired air.

[5]

(b) The box below lists some of the respiratory muscles used to increase ventilation during exercise. Use them to answer **(i)** and **(ii)**.

diaphragm	internal intercostals	pectoralis minor
rectus abdominus	sternocleidomastoid	scalene

(i) Identify **two** respiratory muscles that contract to inhale air during exercise.

1 .....

2 .....

[2]

(ii) Which **two** respiratory muscles contract to exhale air during exercise?

1 .....

2 .....

[2]

18 The table below shows typical respiratory values at rest and during exercise.

Complete the table by calculating the missing values.

	Breathing frequency (breaths/minute)	Tidal volume (litres)	Minute ventilation (litres/minute)
At rest	12	0.5	.....
During exercise	30	.....	90

[2]

19 Gaseous exchange at the alveoli depends on differences in partial pressures of gases.

Explain how differences in partial pressures of oxygen (O_2) and carbon dioxide (CO_2) cause gaseous exchange at the alveoli.

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..... **[4]**

20 Describe the energy system that is predominantly used during the performance of a long jump in athletics.

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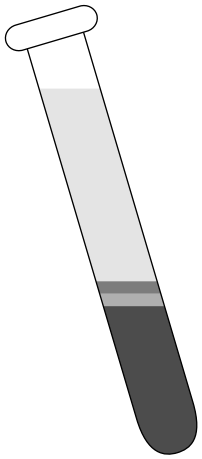
..... **[3]**

SECTION C

21* The image shows a test tube containing blood, separated into its four components.



Describe the functions of the **four** components of blood. Explain how each component affects performance in physical activity.

Your answer should include:

- how each component might help during physical activity
- factors that limit how effective each component can be during physical activity.

[10]

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END OF QUESTION PAPER

EXTRA ANSWER SPACE

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.