

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0682/02

**ADDITIONAL APPLIED SCIENCE
UNIT 2: Science at Work in Applied Contexts
HIGHER TIER**

A.M. MONDAY, 28 January 2013

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	12	
2.	12	
3.	6	
4.	8	
5.	6	
6.	4	
Total	48	

ADDITIONAL MATERIALS

In addition to this examination paper, you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

You are reminded to show all your working. Credit is given for correct working even when the final answer given is incorrect.

SECTION A (24 marks)

Answer all the questions in the spaces provided.

1. Scene of Crime Officers (SoCO) collect blood samples from a crime scene. These will be tested by a forensic scientist in a laboratory.

(a) (i) **Complete** the table to show the function of the different parts of the blood. [3]

Part of the blood	Function
Plasma	Carry dissolved substances
White blood cell
Red blood cell
Platelet

(ii) The red blood cells will be used to find the blood type. Three of the blood types are **A**, **B** and **AB**.

What is the name of the other blood type? [1]

(iii) State **two** ways in which the SoCO will prevent the blood samples from being contaminated. [2]

1.

2.

(b) (i) The forensic scientist can extract DNA from white blood cells but not from red blood cells. Give **one** reason why. [1]

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(ii) Explain why some people could be against compulsory storage of DNA details on a database. [2]

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(c) Drugs can be identified in blood samples with the aid of chromatography. Describe how paper chromatography is carried out. [3]

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2. A sports nutritionist advises athletes on their **personal energy requirement**. This is given by the following equation:

Personal energy requirement = basic energy requirements (BER) + extra energy requirements.

The **daily BER** depends on body mass.

For every kilogram of body mass, we need 130 kJ of energy every day.

The **extra energy requirements** depend on how active the athlete is.

For each hour of training, the athlete needs 20 kJ of energy for each kg of body mass.

The sports nutritionist uses scales and finds the mass of an athlete is 80 kg.

- (a) (i) Calculate the daily BER for the athlete. [2]

BER = kJ

- (ii) The athlete trains for **two** hours during the day.

Calculate the extra energy requirements. [2]

Extra energy requirements = kJ

- (iii) What is the personal energy requirement (PER) of the athlete for the day? [1]

PER = kJ

(iv) Why is the personal energy requirement different for other athletes in the team? [1]

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(b) The sports nutritionist advises the athlete of the daily diet needed to help improve performance. This is shown in the table below.

Nutrient	Daily energy supply (kJ)	kJ energy per gram of nutrient	Daily requirement of nutrient (g)
Carbohydrates	7200	15	480
Fats	3780	36	105
Proteins	1683	17

(i) **Complete** the table above. [1]

(ii) Explain why the athlete is advised to increase the carbohydrate intake. [2]

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(iii) Explain why the nutritionist recommends a low fat intake. [2]

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(iv) What is the purpose of protein in the diet? [1]

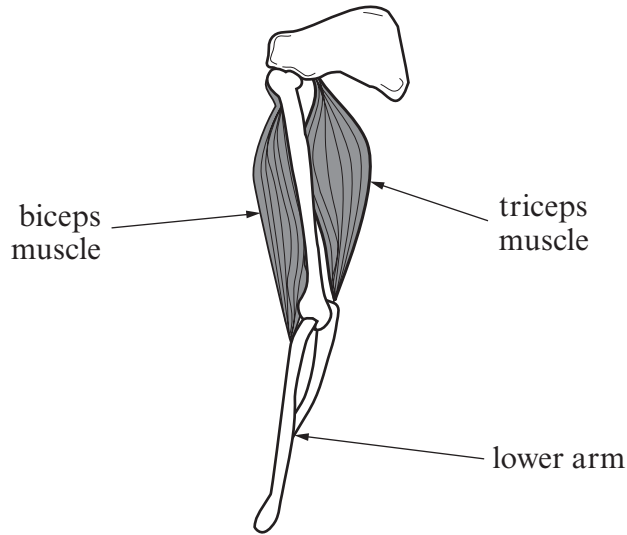
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SECTION B (24 marks)

Answer all the questions in the spaces provided.

3. A javelin thrower uses muscles in his upper arm to throw a javelin.



(i) Explain how the muscles, shown in the diagram above, control the movement of the lower arm. [4]

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(ii) Explain why javelin throwers need strong triceps. [2]



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4. The decathlon consists of ten track and field events. One event is throwing a discus.



The discus thrown by men has a mass of 2 kg and a diameter of 22 cm. Two types of discus are shown below.

A – Solid rubber



B – Wood with steel rim and centre



(a) Compare the properties of a polymer with a metal.

[3]

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(b) Some properties of the different materials are shown in the table below.

Material	Density (g/cm ³)	Mass of material in discus (kg)	Volume (cm ³)	Hardness (Moh)
Rubber	1.5	2	1333	1
Wood	0.8	0.6	750	1
Steel	8.0	1.4		4

(i) Find the volume of steel in the discus using the equation below. [3]

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{Volume} = \dots\dots\dots \text{cm}^3$$

(ii) Explain why discus **A** will wear away quicker than discus **B**. [2]

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5. During a catering course, students are training towards gaining a Food Hygiene Certificate. During the course, they learn about the dangers of food poisoning caused by bacteria.

(i) Describe the optimum conditions for the growth of bacteria. [3]

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(ii) The students learn how to keep food preparation areas free from bacteria. Describe how this can be done. [3]

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6. Explain why obesity has an economic impact on the country. [4]

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