

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. TUESDAY, 15 May 2012

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	5	
3.	12	
4.	13	
5.	11	
<b>Total</b>	<b>48</b>	

**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. Kitchen staff in the London Olympic Village have to take care that they do not cause food poisoning amongst competitors since this could disrupt the games.

(i) Describe the precautions they will take to prevent this happening. [3]

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(ii) Explain how some bacteria cause food poisoning. [2]

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(iii) State **two** symptoms of food poisoning. [2]

1. ....  
2. ....

2. Competitors in the London Olympics know that their skin will help to control their body temperature so they will not become too hot.



- (i) Explain how the skin controls a competitor's body temperature so it does not rise. [3]

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- (ii) Describe how a competitor can find out the mass of water lost during a training session. [2]

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3. Cyclists competing in events in the London Velodrome carefully select their equipment to enable them to go faster.



- (a) Explain why a lycra body suit **and** the shape of the helmet allows the cyclist to reach higher speeds. [3]

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- (b) Cycle frames can be made of steel, aluminium, carbon fibre, or titanium. Some properties of these materials are shown in the table below. Use the information to answer the questions that follow.

Material	Density (g/cm <sup>3</sup> )	Strength (MPa)	Stiffness (GPa)
Steel	7.8	420	200
Aluminium	2.7	200	70
Carbon fibre	1.8	3000	240
Titanium	4.5	434	110

- (i) The volume of steel used to make a frame is 900 cm<sup>3</sup>. Its mass is 7 kg. Use the equation to show the density of steel is 7.8 g/cm<sup>3</sup>. [2]

$$\text{density} = \frac{\text{mass (g)}}{\text{volume (cm}^3\text{)}}$$

Density = .....g/cm<sup>3</sup>

- (ii) Use the information in the table to estimate the mass of the same size frame (900 cm<sup>3</sup>) made from carbon fibre. [2]

Mass = ..... g

- (iii) If there were four cycle frames of the same size each made from a different material in the table, arrange them in order from heaviest to lightest. [1]



- (iv) Apart from having a lighter mass, state **two** advantages of a carbon fibre frame shown by the information in the table. [2]

- 1. ....
- 2. ....

(c) Part of a velodrome track is shown below.



Explain why it is important for the cycle tyres to have a good tread. [2]

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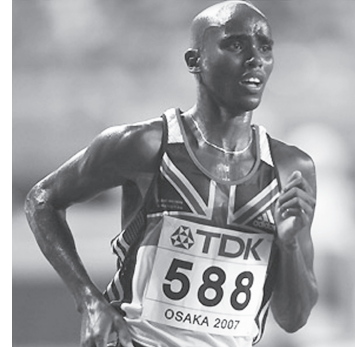
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**Section B (24 marks)**

*Answer all the questions in the spaces provided.*

- 4. As part of their preparation for the Olympics, athletes learn how they can improve their performance.



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- (a) Athletes running the marathon often experience ‘hitting the wall’, where almost all of the athlete’s energy stores are depleted, at around the 20-mile (32 km) point. This can be delayed by changing to a diet which is carbohydrate loaded a few days before the race.

Explain how the carbohydrate content of a diet will help marathon runners so they delay ‘hitting the wall’. [3]

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- (b) (i) Name **and** describe the process in body cells that releases the energy used by the runners. [3]

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- (ii) Explain how insufficient oxygen supply to the cells during exercise will affect the athlete’s body. [3]

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- (c) Each athlete will have a different Personal Energy Requirement (PER) during training. This is given by the equation below.

$$\text{Personal Energy Requirement (PER)} = \text{Basic Energy Requirement (BER)} + \text{Extra Energy Requirement (EER)}$$

The BER is given by:

$$\text{BER} = 32 \times \text{body mass}$$

and the EER is given by:

$$\text{EER} = 8.5 \times \text{Number of hours training} \times \text{body mass}$$

Calculate the PER of an athlete of mass 70 kg who trains for 2 hours. [4]

PER = ..... units

**Please Turn Over For Next Question**

5. Scenes of crime officers (SOCO) are collecting samples of a colourless powder from what they think is a bomb factory. To identify the powder they carry out a series of tests including precipitation reactions.

(a) What is a precipitation reaction? [2]

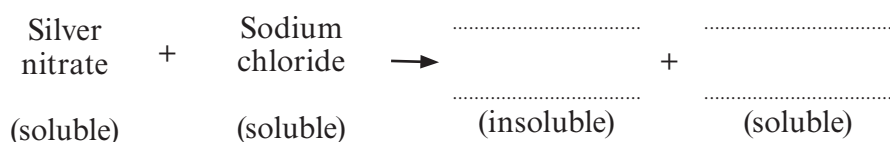
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(b) The SOCO reacts a solution of the powder with a solution of sodium chloride. This confirms the powder to be silver nitrate which can be used to make bombs.

(i) Complete the word equation for the reaction below. [2]



(ii) Complete the chemical equation for this reaction using the correct symbols and formulae. [3]



(c) Describe another chemical test that a SOCO could use to test an unknown powder. [2]

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(d) Sodium chloride is an ionic compound. Describe the structure of sodium chloride. [2]

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