

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, 24 January 2012

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	4	
2.	11	
3.	9	
4.	9	
5.	11	
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.

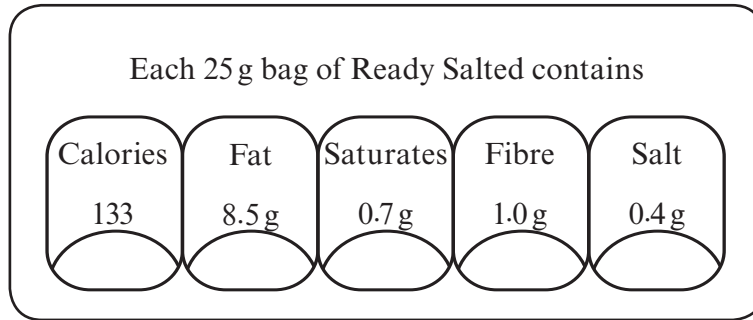
You are reminded to show all your working. Credit is given for correct working even when the final answer given is incorrect.

SECTION A (24 marks)

Answer **all** the questions in the spaces provided.

1. A manufacturer of crisps has developed a healthier baked version of ready salted crisps. The labels compare the nutrients in the baked crisps with original crisps.

Original Crisps



Baked Crisps

	per 100 g	per 25 g
Energy (Calories)	392	98
Protein	6.0 g	1.5 g
Carbohydrates	74 g	18.5 g
of which sugars	6.4 g	1.6 g
Fat	8.0 g	2.0 g
of which saturates	1.2 g	0.3 g
Fibre	5.6 g	1.4 g
Sodium*	0.6 g	0.2 g
*Equivalent as salt	1.5 g	0.4 g

- (a) Explain why the manufacturer can claim that baked crisps are healthier. [2]

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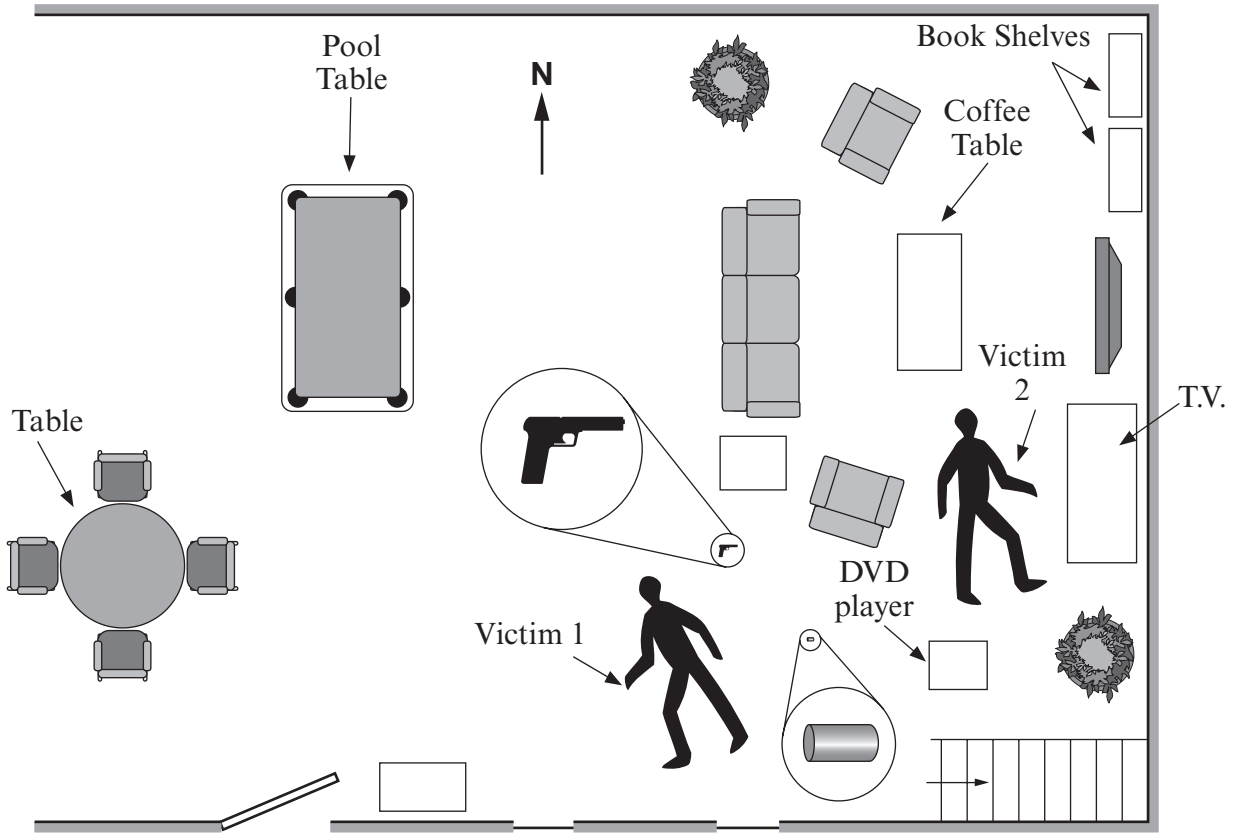
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- (b) The GDA (Guideline Daily Amount) for salt is 2.4 g. Calculate the percentage of the GDA of salt provided by the original crisps. [2]

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Answer = %

2. The diagram below shows a room from a crime scene.



(a) State **two** ways in which a Scene of Crime Officer (SOCO) protects the crime scene. [2]

1.

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2.

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(b) The SOCO found these fingerprints at the crime scene.

A



B



C



(i) State the name of this type of fingerprint pattern. [1]

(ii) A fingerprint taken from the suspect is shown below.



1. Which fingerprint from the crime scene is a match for the suspect's fingerprint?

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[1]

2. Add **two** circles to the suspect's fingerprint that helped you make your decision.

[2]

(iii) Explain why only fingerprint evidence cannot prove that the suspect did the crime. [2]

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(iv) Describe how a SOCO **reveals, records and stores** fingerprints. [3]

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11

3. Over time the design of badminton racquets has changed so top players can improve their performance. Read about how badminton racquets have changed over time.



Badminton racquets are lightweight, with top quality carbon fibre racquets having a mass of 90 g and a volume of 60 cm³. They are made from many different materials ranging from carbon fibre reinforced plastic to solid steel. Earlier racquets were made of wood. Cheap racquets are still often made of metals such as steel, but wooden racquets are no longer made because of their larger mass (240 g). Also, unlike wooden racquets, which warped, cracked and dried out with age, carbon fibre racquets can last for many years. Carbon fibre has an excellent specific strength and gives excellent kinetic energy transfer to the shuttlecock when compared to wood.

- (a) (i) Describe how badminton racquets have changed over time. [4]
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-
- (ii) What type of material is carbon fibre reinforced plastic? [1]
- (b) (i) Find the density of carbon fibre using the equation: [2]

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

Density =g/cm³

- (ii) The strength of carbon fibre is 4 200 MPa.
Calculate the specific strength of carbon fibre using the equation:

[2]

$$\text{specific strength} = \frac{\text{strength}}{\text{density}}$$

Specific strength =kNm/kg

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SECTION B (24 marks)

Answer all the questions in the spaces provided.

4. Bacteria such as salmonella can contaminate food and cause food poisoning. Staff in a restaurant kitchen are trained to take hygiene precautions when they **store** and **prepare** food.

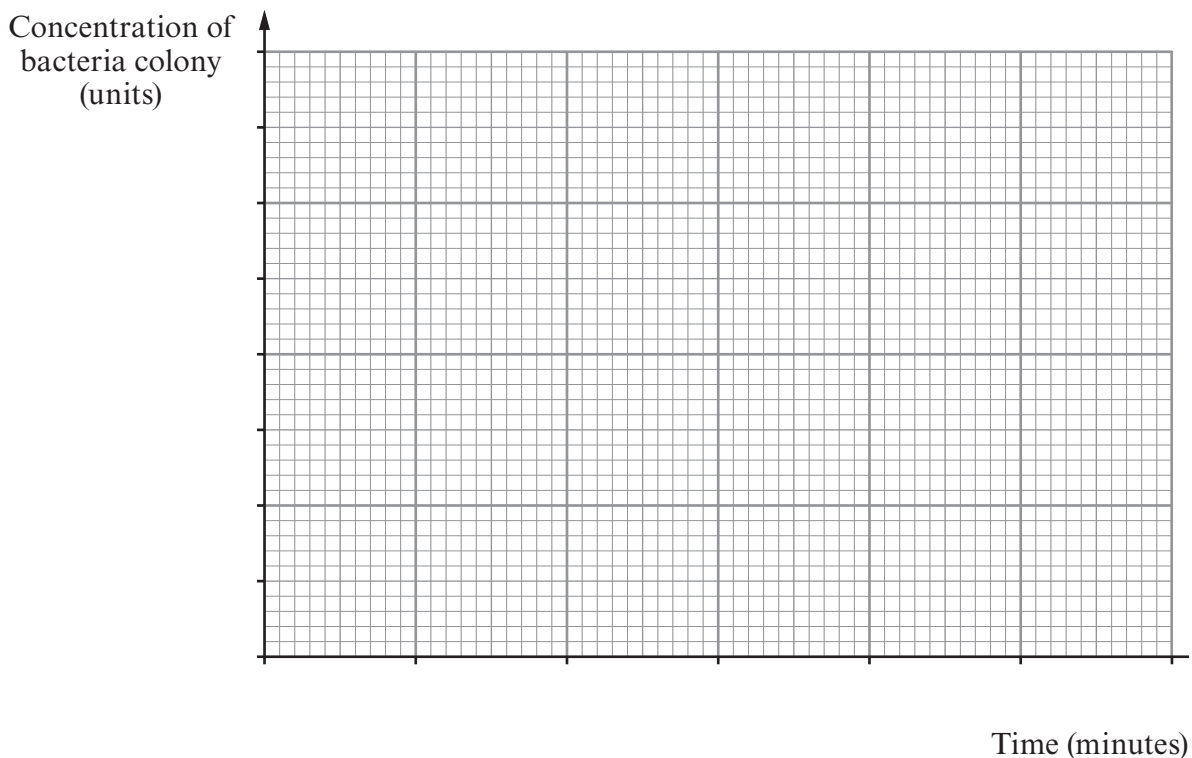
- (a) One precaution is to keep cooked meat chilled until it is ready to be served. State **three other** precautions. [3]

1.
2.
3.

- (b) The table below shows how the concentration of a bacteria colony in cooked meat changes with time at room temperature.

Concentration of bacteria colony (units)	0	0.2	0.4	0.8	1.6	3.2	6.4
Time (minutes)	0	20	40	60	80	100	120

- (i) Use the information to plot a graph on the grid below. [3]



- (ii) During training, kitchen staff are told that food poisoning from cooked meat occurs if the bacteria concentration reaches 2.4 units. Use the graph to find out how long cooked meat can be displayed at room temperature before it could cause food poisoning. [1]

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- (iii) Explain how and why the graph will change on a summer's day. [2]

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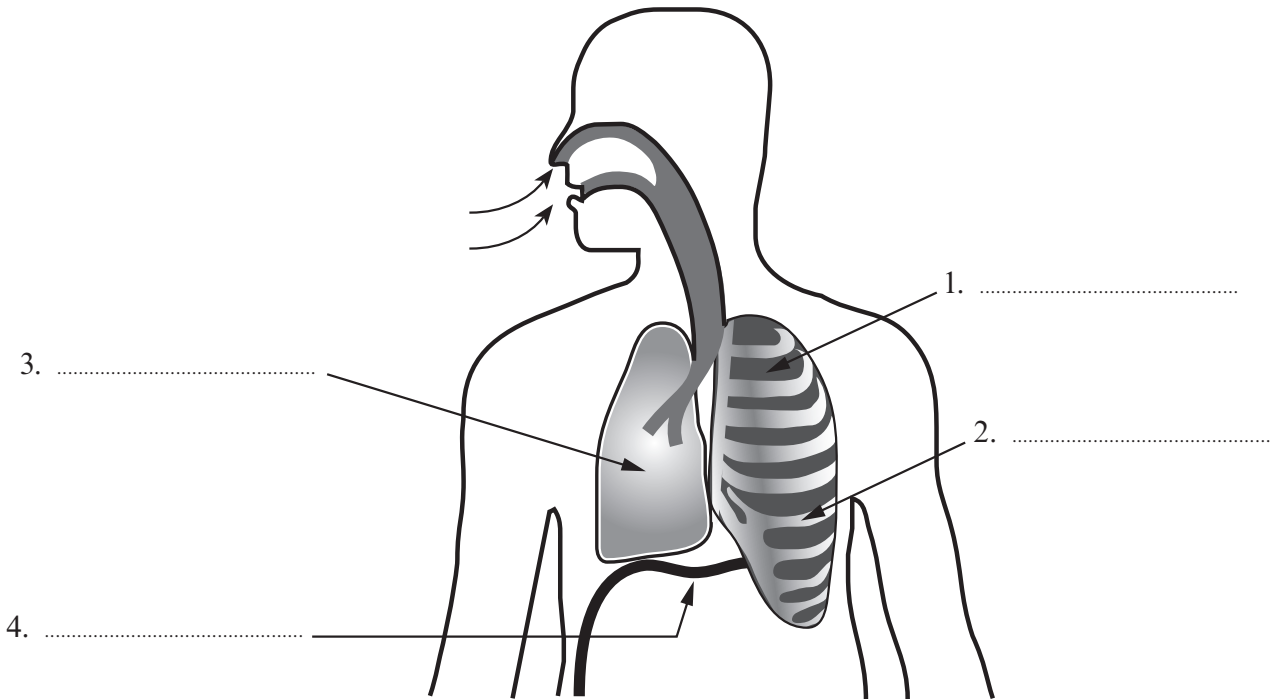
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5. An athlete learns from his fitness instructor that exercise will result in deeper breathing and an increase in the breathing rate.

(a) (i) The diagram shows the structures in the chest that are involved during breathing. Label the parts indicated. [4]



(ii) Explain how these structures enable the athlete to breathe. [4]

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(b) During exercise, the athlete will breathe faster and more deeply. Explain why. [3]

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6. China's food and drug regulator has ordered a ban on eight new food additives due to a health scare.
Discuss the arguments in the debate whether additives should be used or not. [4]

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