Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
June 2009

ADDITIONAL APPLIED SCIENCE **AASC/2H**
Unit 2 Science at Work
Higher Tier

H

Thursday 4 June 2009 9.00 am to 10.00 am

For this paper you must have:
- a ruler
- a calculator.

Time allowed: 1 hour

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 60.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

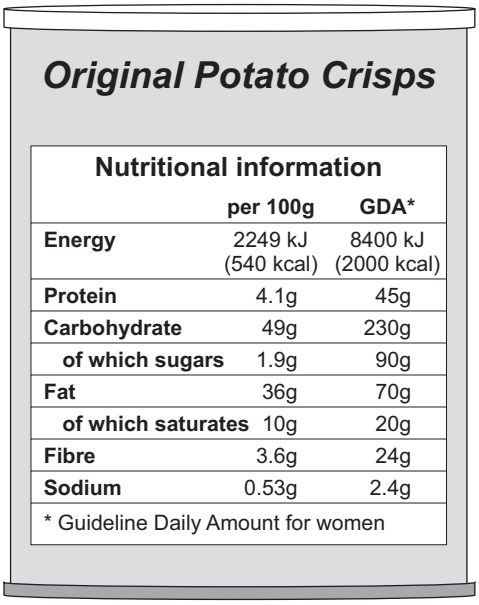
Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Question	Mark	Question	Mark
1		3	
2		4	
		5	
		6	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

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

1 (a) A crisps manufacturer developed a new brand of crisps made out of rice instead of potatoes.

Use the information on the nutrition labels to answer the questions.

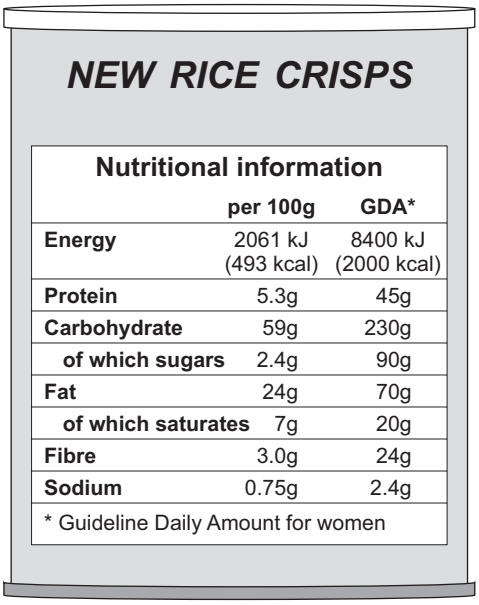


Original Potato Crisps

Nutritional information

	per 100g	GDA*
Energy	2249 kJ (540 kcal)	8400 kJ (2000 kcal)
Protein	4.1g	45g
Carbohydrate	49g	230g
of which sugars	1.9g	90g
Fat	36g	70g
of which saturates	10g	20g
Fibre	3.6g	24g
Sodium	0.53g	2.4g

* Guideline Daily Amount for women



NEW RICE CRISPS

Nutritional information

	per 100g	GDA*
Energy	2061 kJ (493 kcal)	8400 kJ (2000 kcal)
Protein	5.3g	45g
Carbohydrate	59g	230g
of which sugars	2.4g	90g
Fat	24g	70g
of which saturates	7g	20g
Fibre	3.0g	24g
Sodium	0.75g	2.4g

* Guideline Daily Amount for women

1 (a) (i) The nutritional information on the packet gives the Guideline Daily Amount of energy for women.

What percentage of the GDA for energy is provided by 100 g of potato crisps?

Show your working. .....

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..... %

(2 marks)

1 (a) (ii) Which brand could be marketed as 'naturally lower in fat'?

Explain your answer.

Brand .....

Explanation .....

.....

(1 mark)

1 (b) The British Heart Foundation (BHF) has produced a guide to food labelling to help people to lower the fat, sugar, salt and sodium content in their diets.

Guide to food labelling

Nutrient	Low content (per 100 g of food)	High content (per 100 g of food)
Fat	3.0 g	20.0 g
Saturated fat	1.5 g	5.0 g
Sugars	5.0 g	15.0 g
Salt	0.3 g	1.5 g
Sodium	0.1 g	0.6 g

1 (b) (i) The crisps manufacturer claims that the rice crisps are a healthy snack. Use the BHF guide and the nutritional information on the rice crisps label to give **two** reasons why this claim might not be true.

Reason 1 .....

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Reason 2 .....

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(2 marks)

1 (b) (ii) Name **two** nutrients in the BHF Guide and say why it is important to control them in the diet.

Nutrient 1 .....

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Nutrient 2 .....

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(2 marks)

Question 1 continues on the next page

1 (b) (iii) The BHF also recommends eating plenty of foods containing fibre.

Explain the importance of fibre in the diet.

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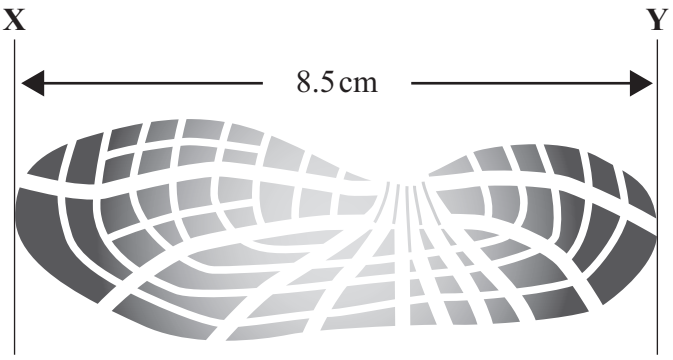
(2 marks)

9

2 The diagram shows a shoeprint found in the soil at the scene of a crime.



Scale 1:3

2 (a) (i) Use the scale on the diagram and the chart, to work out the size of the shoe.

Men's shoe sizes															
Length of shoe (cm)	23.5	24	24.5	25	25.5	26	26.5	27	27.5	28	28.5	29	29.5	30	30.5
Shoe size	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12

Show your working .....

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Shoe size ..... *(2 marks)*

Question 2 continues on the next page

2 (a) (ii) Describe how a Scenes of Crime Officer would obtain a cast of the shoeprint.

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(3 marks)

2 (a) (iii) Apart from shoe size, what **two** features could a forensic scientist use to match the cast of the shoeprint to the shoes of a suspect?

Feature 1 .....

Feature 2 .....

(2 marks)

2 (b) A database can be used to identify the tread marks of a shoe.

Suggest how the shoeprint could be recorded and used in a database.

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(2 marks)

9

Turn over for the next question

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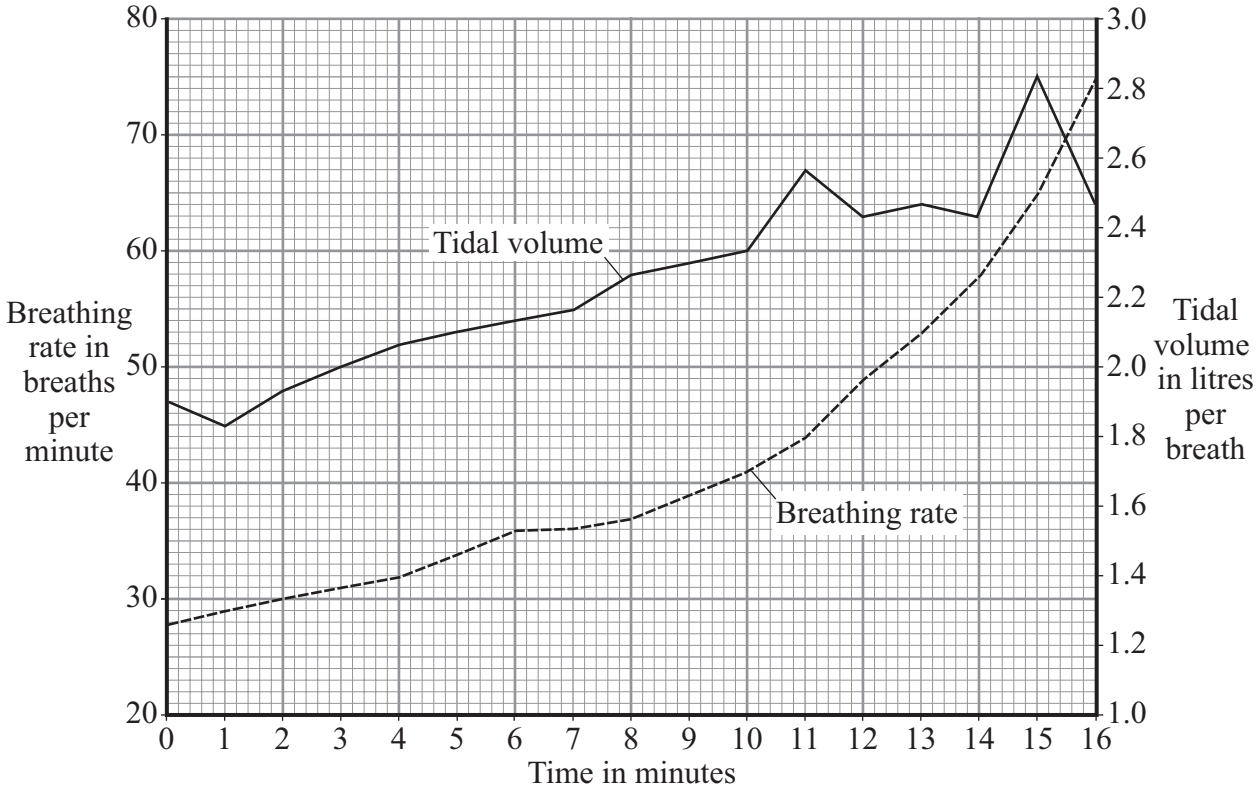
3 An athlete exercised on a running machine. The machine increased in speed every 60 seconds.

3 (a) The graph shows the effect of the exercise on the athlete's breathing rate and tidal volume.



3 (a) (i) What is meant by tidal volume?

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(1 mark)

3 (a) (ii) What is the athlete's tidal volume at 3 minutes?

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(1 mark)

3 (a) (iii) The difference in breathing rate from 0 to 8 minutes is 9 breaths per minute.

Calculate the difference in breathing rate from 8 to 16 minutes.

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(1 mark)

3 (a) (iv) Explain why breathing rate changes as exercise increases.

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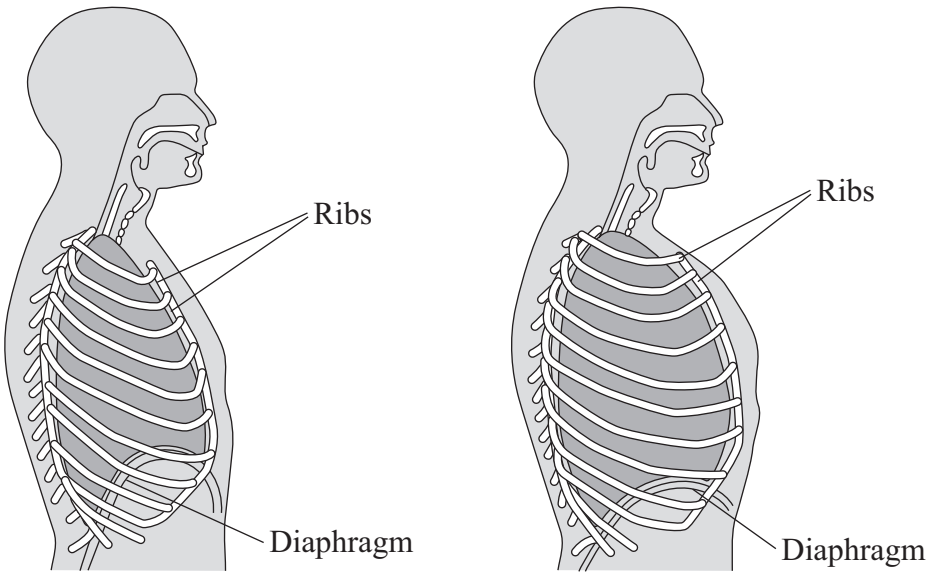
(3 marks)

Question 3 continues on the next page

3 (b) The diagram shows how the lungs are ventilated.



Which diagram, **A** or **B**, shows inhalation (breathing in)? Explain your answer.

Diagram .....

Explanation .....

.....

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(2 marks)

3 (c) Glucose provides the energy we need to exercise. Insulin is the hormone that controls the glucose level in the blood.

3 (c) (i) Which organ in the body produces insulin?

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(1 mark)

3 (c) (ii) Describe how insulin controls the blood glucose level.

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(3 marks)

12

Turn over for the next question

4 Kitchen sponges and plastic brushes are used for washing dishes.

They are a common source of bacteria that cause food poisoning.

4 (a) Describe and explain **two** reasons why sponges and brushes may be sources of bacteria.

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(4 marks)

4 (b) A public health officer suspected that kitchen sponges and plastic brushes were a source of infection in a school kitchen.

Describe how the public health officer could take samples and test them to confirm his suspicion.

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(3 marks)

4 (c) Give **two** methods of keeping kitchen equipment free of bacteria.

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(2 marks)

9

Turn over for the next question

5 The environment around the scene of a crime gives many clues in forensic examinations.

A Scenes of Crime Officer collected some soil from the bottom of a suspect's shoe. She put the soil in an evidence bag, sealed the bag and labelled it.

5 (a) (i) Suggest **two** pieces of information that the Scenes of Crime Officer should include on the label.

1 .....

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2 .....

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(2 marks)

5 (a) (ii) Explain how this soil sample could be used to link the suspect to the crime scene.

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(3 marks)

5 (b) Give **two** distinctive features of soil that enable samples to be matched.

1 .....

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2 .....

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(2 marks)

5 (c) Give **three** pieces of advice that a forensic scientist should follow when presenting evidence in court.

1 .....

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2 .....

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3 .....

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(3 marks)

10

Turn over for the next question

6 A sports nutritionist gives some advice on diet to a weightlifter.

6 (a) The table shows three diets, **P**, **Q** and **R**.

Meal	Diet P	Protein (g)	Diet Q	Protein (g)	Diet R	Protein (g)
Breakfast	2 eggs on toast	24.6	Bacon sandwich	15	Cereal	7
Lunch	Cheese sandwich and yoghurt	7.5	Ham sandwich and banana	9	Macaroni cheese	3.6
Dinner	Triple burger with cheese	71	Roast chicken and vegetables	22	Steak and chips	54

Protein is needed in the diet. The standard recommended protein intake is 0.8 g per kg of body weight every day.

6 (a) (i) Which diet, **P**, **Q** or **R**, would be the most suitable for a 80 kg person on a normal balanced diet?

Give a reason for your answer.

Diet .....

Reason .....

.....

(2 marks)

6 (a) (ii) Which diet, **P**, **Q** or **R**, would be the most suitable for a 80 kg weightlifter?

Give a reason for your answer.

Diet .....

Reason .....

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(2 marks)

6 (b) Describe how to test for the presence of protein in a food sample.

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(3 marks)

6 (c) The Body Mass Index (BMI) is used by nutritionists as an indicator of ideal weight. The ideal BMI is 19–25. People with a BMI above 30 are considered obese.

6 (c) (i) A weightlifter is 1.70 metres tall and weighs 93 kg. Use the equation to calculate his BMI.

$$\text{BMI} = \frac{\text{weight (in kg)}}{\text{height}^2 \text{ (in m}^2\text{)}}$$

Show your working .....

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BMI = ...

(2 marks)

6 (c) (ii) A weightlifter's BMI is often higher than the ideal. Explain why.

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(2 marks)

11

END OF QUESTIONS

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