

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Secondary Education
June 2008

ADDITIONAL APPLIED SCIENCE
Unit 2 Science at Work
Higher Tier

AASC/2H
H



Thursday 5 June 2008 9.00 am to 10.00 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> 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.

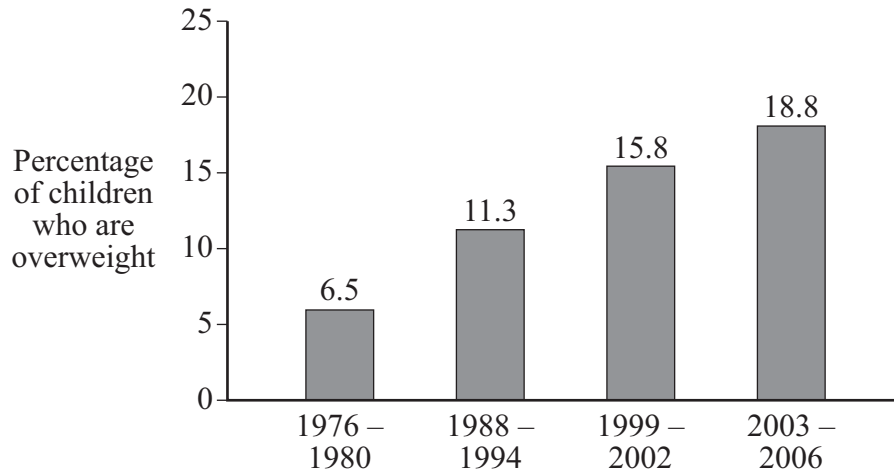
For Examiner's Use			
Question	Mark	Question	Mark
1		4	
2		5	
3		6	
Total (Column 1)		→	
Total (Column 2)		→	
TOTAL			
Examiner's Initials			



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

1 Dieticians are concerned about the energy intake in our diets.

The chart shows the percentages of overweight children aged 6–11 from 1976 to 2006



1 (a) What is the trend shown by this chart?

.....

 (1 mark)

1 (b) An increasing number of children eat take-away food.

Suggest why there is an increase in the number of children eating take-away food.

.....

 (1 mark)

1 (c) Study the information on two take-away meals.

Meal	Content	Proportion of the daily energy needs of an average 1–4 year old (percentage)
A	Chips	22
	Burger	20
	Milk shake	27
	Muffin	30
		} = 99
B	Chips	22
	Pizza	25
	Squash	10
	Ice cream	10
		} = 67



1 (c) (i) Using the information in the table, explain why **Meal A** might not be suitable.

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.....
.....

(2 marks)

1 (c) (ii) Do you think that eating a lot of take-away food is a reason for the number of overweight children?

Draw a ring around your answer. **Yes / No**

Explain your answer.

.....
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(2 marks)

1 (c) (iii) Apart from the energy content, suggest **three** reasons why meals **A** and **B** might not be balanced, healthy meals.

1

.....

2

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3

.....

(3 marks)

Question 1 continues on the next page

Turn over ►



1 (d) Some food contains additives.

Name an additive that you might find in a milk shake.

Explain why it is added.

Additive.....

Reason for use.....

.....

(2 marks)

11



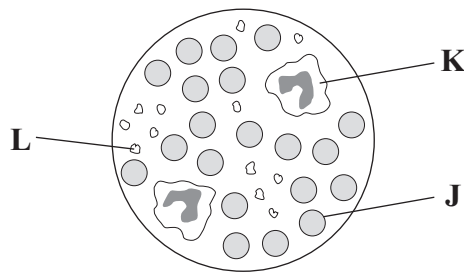
2 Some blood is found at the scene of a crime.

2 (a) Describe how a Scenes of Crime Officer would collect and store a sample of the blood.

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(3 marks)

2 (b) A forensic scientist examined a sample of the blood under a microscope. The diagram shows what he saw.



2 (b) (i) Name J, K and L.

J

K

L

(3 marks)

2 (b) (ii) Which part of a blood cell is needed for DNA profiling?

.....

(1 mark)

2 (b) (iii) The forensic scientist also tested the blood to identify its blood group.

Name the **four** main blood groups.

.....

(2 marks)



- 3 Two athletes visited a sports nutritionist for advice about their fitness.

The nutritionist measured the height and weight of each athlete.

Table 1

Athlete	Height (in m)	Mass (in kg)	BMI
1	1.50	63.5	28.2
2	1.60	65.0	

To find out if the athletes were the correct weight for their height the sports nutritionist calculated their BMI.

- 3 (a) (i) What does BMI stand for?

.....
(1 mark)

- 3 (a) (ii) Use the formula:

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

to calculate the BMI for **Athlete 2**.

BMI
(2 marks)



- 3 (b) **Table 2** shows what the BMI values mean.

Table 2

BMI	What it means
<18.5	Underweight
18.5–24.9	Ideal weight
25.0–29.9	Overweight
>30.0	Obese

- 3 (b) (i) The sports nutritionist advised **Athlete 1** about his training programme and diet.

Use the information in **Table 1** and **Table 2**, and your own knowledge, to say what advice she should give to **Athlete 1**.

.....

.....

.....

.....

(2 marks)

- 3 (b) (ii) Suggest why the BMI is only an **indicator** of ideal weight.

.....

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(1 mark)

- 3 (c) The sports nutritionist told **Athlete 2** to record his dietary habits.

Describe how the athlete could do this and what he would need to record.

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(3 marks)

9

Turn over ►



4 The Food Standards Agency (FSA) is responsible for making sure that food is safe to eat and will not cause food poisoning.

4 (a) (i) Give an example of a bacterium that could cause food poisoning.

.....
(1 mark)

4 (a) (ii) The staff in a restaurant should be aware of the need for good personal hygiene.
Give **one** precaution that they should take, and explain why.

Precaution

.....

Explanation

.....

(2 marks)

4 (b) The FSA often has to determine the number of bacteria in food. Milk is one example of a food that would be tested.

Describe how to complete serial dilutions of milk to do an accurate bacterial count.
You may use a diagram to help you with your answer.

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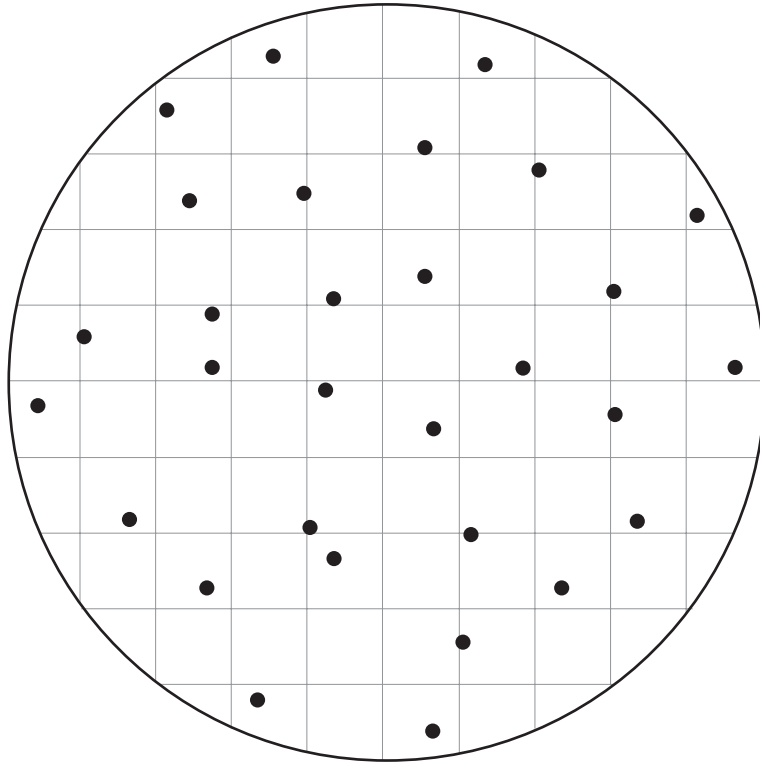
(4 marks)



- 4 (c) A food scientist at the FSA did some serial dilutions of a sample of milk containing bacteria. The final dilution was 1:1000.

The food scientist took 0.1 ml of the final dilution and grew the bacteria on an agar plate.

The diagram shows the results.



- 4 (c) (i) How many colonies of bacteria grew on the plate?
Write your answer in the box.

(1 mark)

- 4 (c) (ii) Use the formula to work out the number of bacteria in the sample of milk.

Total bacterial count in 0.1 ml = number of colonies × dilution

.....
.....

(1 mark)

- 4 (c) (iii) How many bacteria would there be in 1 ml of the sample?

.....
.....

(1 mark)



- 5 (a) A materials scientist tested different fibres to see which would be best for making a hockey player's shirt.

Look at the fibre comparison chart.

Property	Polypropylene	Polyester	Wool	Cotton
Absorbency	0.05	0.40	16.00	8.00
Relative density	0.91	1.38	1.32	1.54
Colour fastness	Very good. Pre-coloured in manufacture	Good	May fade in washing	May fade in washing
Durability	Excellent	Excellent	Fair	Fair
Stain resistance	Resists stains	Requires stain-release chemicals	Requires dry cleaning for stain release	Requires bleaching for stain removal

Which fibre would you choose for making the hockey player's shirt? Use the information in the chart to explain your choice.

Choice of fibre

Explanation

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(4 marks)



5 (b) Hockey sticks used to be made from wood but are now made from carbon fibre.

5 (b) (i) What type of material is carbon fibre?

.....
(1 mark)

5 (b) (ii) Suggest why carbon fibre is used instead of wood.

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(2 marks)

5 (c) The picture shows a helmet used by a hockey goalkeeper.



The face guard is made of the metal titanium.

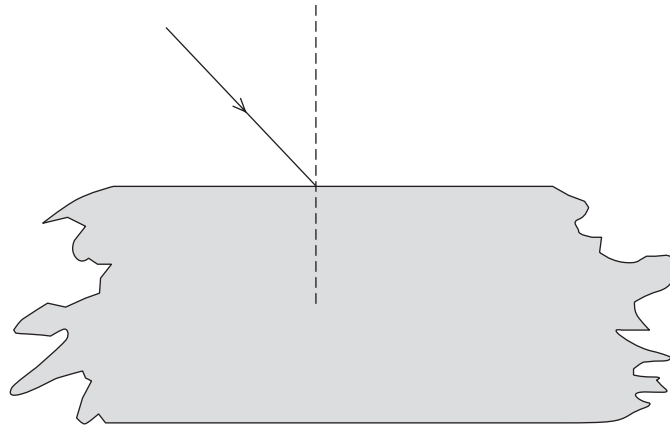
Suggest properties of titanium that make it suitable for a face guard.

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(3 marks)



6 Scenes of Crime Officers found some glass at the scene of a hit-and-run.
The glass was examined to find its refractive index.

6 (a) The diagram shows a ray of light entering the piece of glass.



6 (a) (i) On the diagram, draw the path of the ray of light as it passes through the glass. (2 marks)

6 (a) (ii) On the diagram, label the angle of incidence (i) and the angle of refraction (r). (1 mark)

6 (a) (iii) How is the refractive index of the glass obtained?

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(3 marks)



6 (b) A suspect was arrested and breathalysed. The breathalyser test detects a compound with the formula C_2H_5OH .

6 (b) (i) What is the name of this compound?

.....
(1 mark)

6 (b) (ii) Name the type of bonding in this compound.

.....
(1 mark)

6 (b) (iii) Describe how a forensic scientist might test for this compound in the laboratory.

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(3 marks)

11

END OF QUESTIONS



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