

Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

For Examiner's Use

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

## **ASSESSMENT AND QUALIFICATIONS ALLIANCE**

**General Certificate of Secondary Education**

**Higher Tier**

**June 2010**

### **Additional Applied Science**

**Unit 2 Science at Work**

**Written Paper**

**AASC/2H**

**Friday 28 May 2010 9.00 am**

**For this paper you must have:**

- a ruler.

**You may use a calculator.**

**TIME ALLOWED**

- 1 hour plus your additional time allowance.

**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**

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## **INSTRUCTIONS**

- **Use black ink or black ball-point pen.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

## **INFORMATION**

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 60.**
- **You are expected to use a calculator where appropriate.**
- **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.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**

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

**1 Read about the changes to tennis racquets.**

**Tennis racquets used to be made of wood and were heavy (380g). Then aluminium was used to make racquets. This was stronger, lighter and more flexible than wood. The string area of the aluminium racquet was more than 50% larger than that of the wooden racquets.**

**The lighter weight and greatly increased power of these large racquets was good for the beginner. For powerful players the greater flexibility of the frames distorted the strings and the direction of the ball was unpredictable.**

**Good players needed a less flexible material for the frame. The best material proved to be a mixture of carbon fibres and a plastic resin to bind them together. This new material is called graphite carbon fibre. The technology for reducing flexibility without adding weight continues to improve. Today the average racquet weighs about 300g.**

**Unlike wooden racquets, which warped, cracked and dried out with age, graphite carbon fibre racquets can last for many years.**

**1 (a) (i) Describe how the flexibility of the tennis racquet has changed. [2 marks]**

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**1 (a) (ii) What type of material is graphite carbon fibre? [1 mark]**

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**1 (a)(iii) What are the advantages of using graphite carbon fibre? [3 marks]**

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**[Question 1 continues on the next page]**

- 1 (b) Use the information to work out the percentage reduction in weight of a graphite carbon fibre racquet compared with an original wooden racquet. [3 marks]

Use the equation below.

$$\% \text{ Reduction in weight} = \frac{\text{Reduction in weight}}{\text{Original weight}} \times 100$$

Show clearly how you work out your answer.

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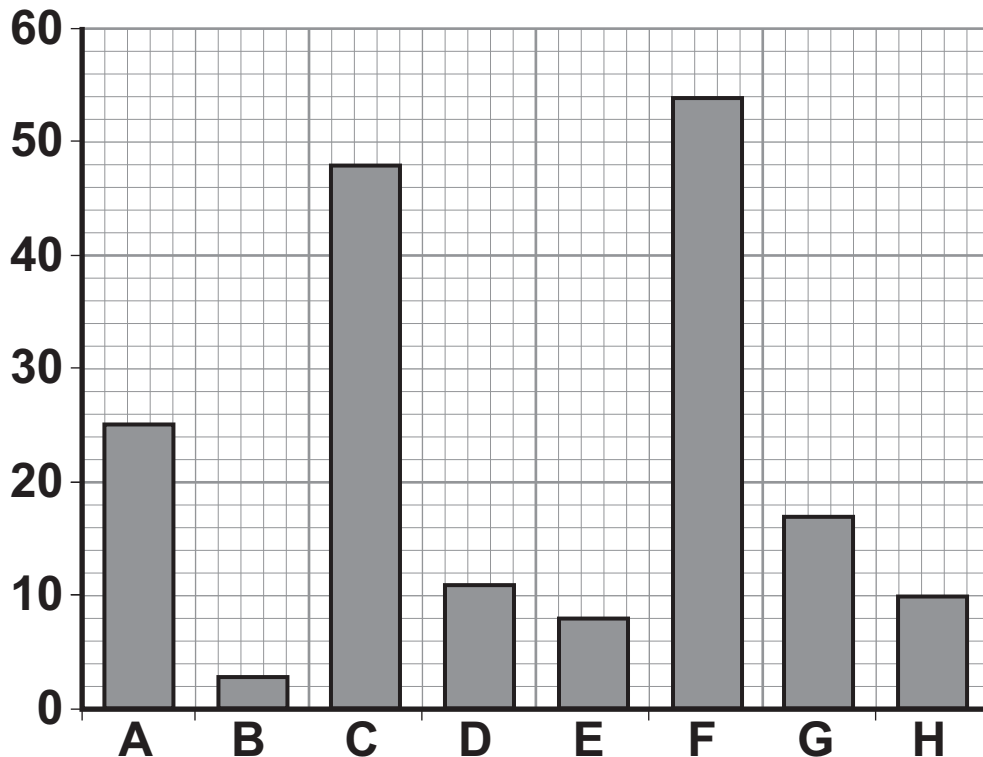
\_\_\_\_\_ %

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**TURN OVER FOR THE NEXT QUESTION**

2 A survey was carried out into pupils' school meals.

Percentage  
of  
pupils



KEY

A = Cakes and muffins

B = Fruit

C = High fat main meals

D = Beans

E = Vegetables (not beans)

F = Chips (potatoes cooked in oil)

G = Meals lower in fat

H = Desserts

2 (a) The chart shows the different foods available in school canteens and the percentage of pupils who chose each type of food.

2 (a) (i) What percentage of pupils chose fruit as part of their meal? [1 mark]

\_\_\_\_\_ %



2 (a) (ii) Which food was chosen by over 50% of the pupils? [1 mark]

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2 (b) The table shows the amount of nutrients in potatoes when served in different ways.

Nutrient (amount per 140 gram serving)	Chips, fried in oil and salted	Baked in their skin and served with butter substitute	Baked in their skin and served with butter
Total fat (in g)	22.8	2.8	4.5
Cholesterol (in mg)	0.0	0.0	11.0
Sodium (in mg)	260.0	101.0	50.0
Total carbohydrate (in g)	33.9	33.9	33.9
Dietary fibre (in g)	3.0	3.1	3.1
Protein (in g)	5.0	4.0	4.0

2 (b) (i) How would you advise the school canteen to serve potatoes to encourage healthy eating? [1 mark]

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[Turn over]

**2 (b) (ii) Explain the choice you made in 2(b)(i).  
[2 marks]**

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**2 (b) (iii) What could be the risk to your health of eating too many chips? [1 mark]**

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**2 (c) Give THREE precautions that the canteen staff can take to prevent the spread of micro-organisms onto the food. [3 marks]**

1 

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2 

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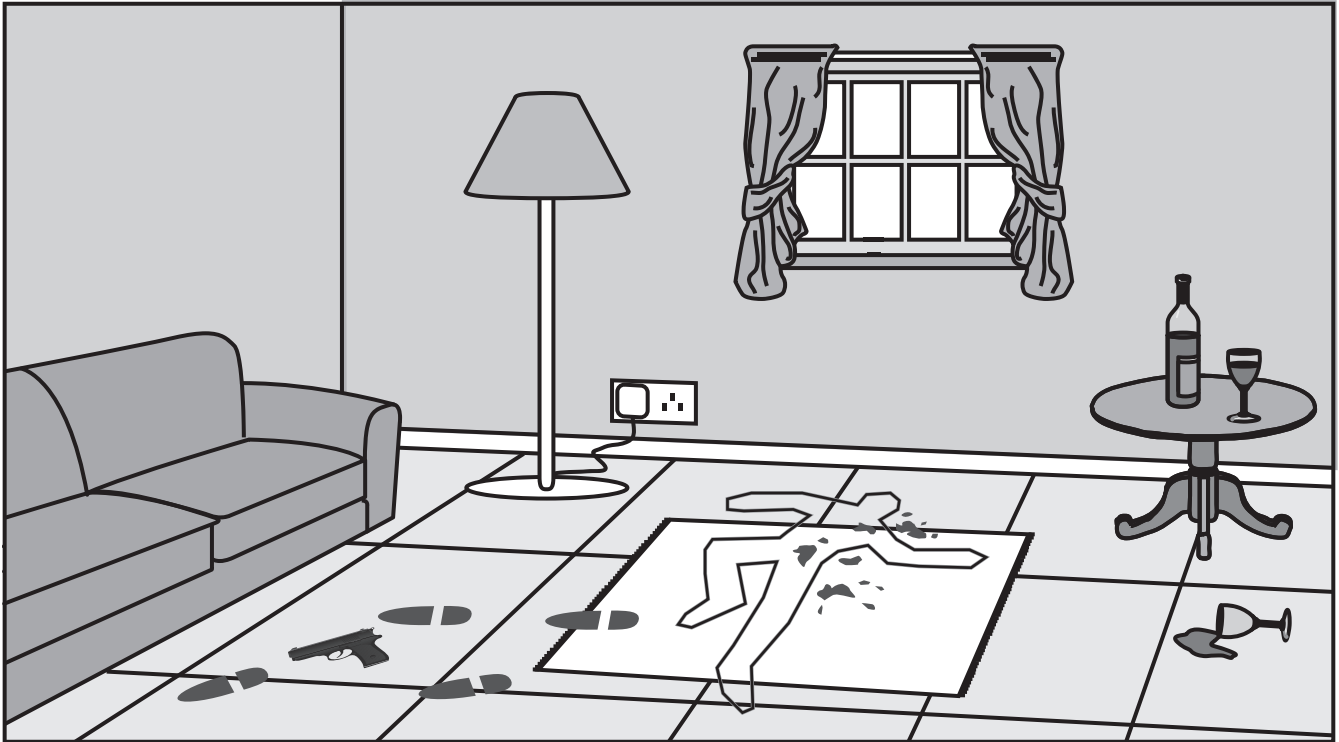
3 

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**TURN OVER FOR THE NEXT QUESTION**

3 The picture shows a crime scene.



3 (a) Give TWO ways in which a Scenes of Crime Officer (SOCO) would avoid contaminating evidence at a crime scene. [2 marks]

1 \_\_\_\_\_

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\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3(b) A suspect was arrested.**

**A sample of white fibres from the rug was collected and compared with some white fibres found on the suspect's jacket.**

**3(b) (i) What would the SOCO use to collect the fibres? [1 mark]**

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**3(b) (ii) A forensic scientist examines the fibres.**

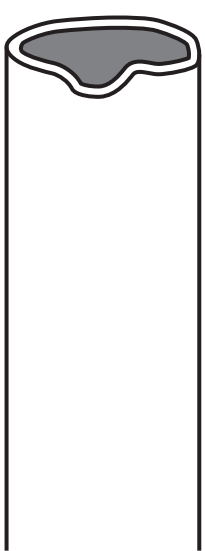
**What instrument would the forensic scientist use to examine the fibres from the rug and the fibres from the jacket at the same time? [1 mark]**

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**[Question 3 continues on the next page]**

3 (b)(iii) **DIAGRAM 1** shows magnified images of five fibres.

**DIAGRAM 1**



**Wool**



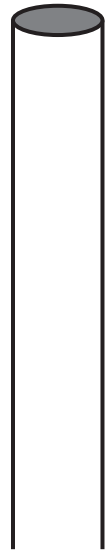
**Cotton**



**Lycra**



**Rayon**



**Polyester**

Name **THREE** distinctive features of fibres that can be used when matching samples.  
[3 marks]

1 \_\_\_\_\_

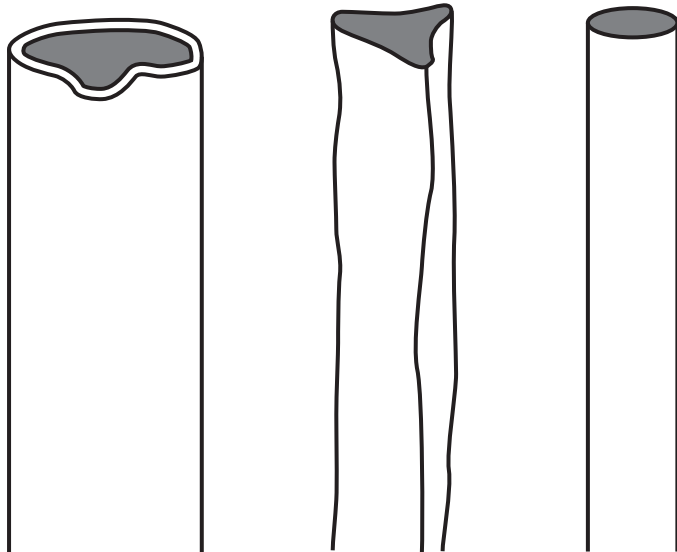
2 \_\_\_\_\_

3 \_\_\_\_\_

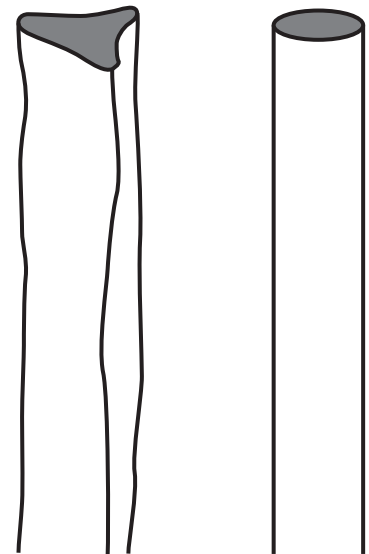
**DIAGRAM 2** shows fibres taken from the crime scene.

**DIAGRAM 3** shows fibres taken from the suspect's jacket.

**DIAGRAM 2**



**DIAGRAM 3**



**3 (b)(iv) What types of fibre were found on the suspect's jacket? [2 marks]**

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**[Question 3 continues on the next page]**

**3 (b) (v) Does the comparison of fibres from the crime scene and the suspect's jacket prove the suspect's presence at the crime scene? [2 marks]**

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

**Explain your answer.**

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**3 (c) What other evidence could be collected from the crime scene that could link the suspect to the crime? [1 mark]**

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- 4 A student investigated how much suspended matter there was in a particular brand of orange juice. He used three samples of the juice for the investigation.

The table shows the results.

	MASS IN GRAMS			
	Sample 1	Sample 2	Sample 3	Average
Orange juice	10.0	10.0	10.0	10.00
Dry, unused filter paper	0.9	0.8	0.8	0.83
Filter paper plus residue	2.6	2.1	2.6	2.43
Residue	1.7	1.3	1.8	

- 4 (a) (i) Calculate the average mass of residue that the student obtained. [1 mark]

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\_\_\_\_\_ grams

[Question 4 continues on the next page]

**4 (a) (ii) The average mass of the residue was higher than expected.**

**Which part of the experimental procedure has the student missed out to cause this result?  
[1 mark]**

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**4 (b) Vitamin C is found in orange juice.**

**What is the function of vitamin C in the body?  
[1 mark]**

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**4 (c) To find out the amount of vitamin C in a food, a blue chemical called DCPIP is used. The student also did an investigation to find out if vitamin C is lost from orange juice when it is stored in the refrigerator for 14 days.**

**He tested four different brands of orange juice. The table on page 19 shows his results.**

<b>BRAND</b>	<b>% OF VITAMIN C LOST AFTER 14 DAYS</b>	<b>PRESERVATIVE USED IN THE JUICE</b>
<b>W</b>	<b>36</b>	<b>None</b>
<b>X</b>	<b>21</b>	<b>Sorbic acid</b>
<b>Y</b>	<b>0</b>	<b>Benzoic acid</b>
<b>Z</b>	<b>0</b>	<b>Sulfur dioxide</b>

**4 (c) (i) What conclusions can be made from the results of this experiment? [3 marks]**

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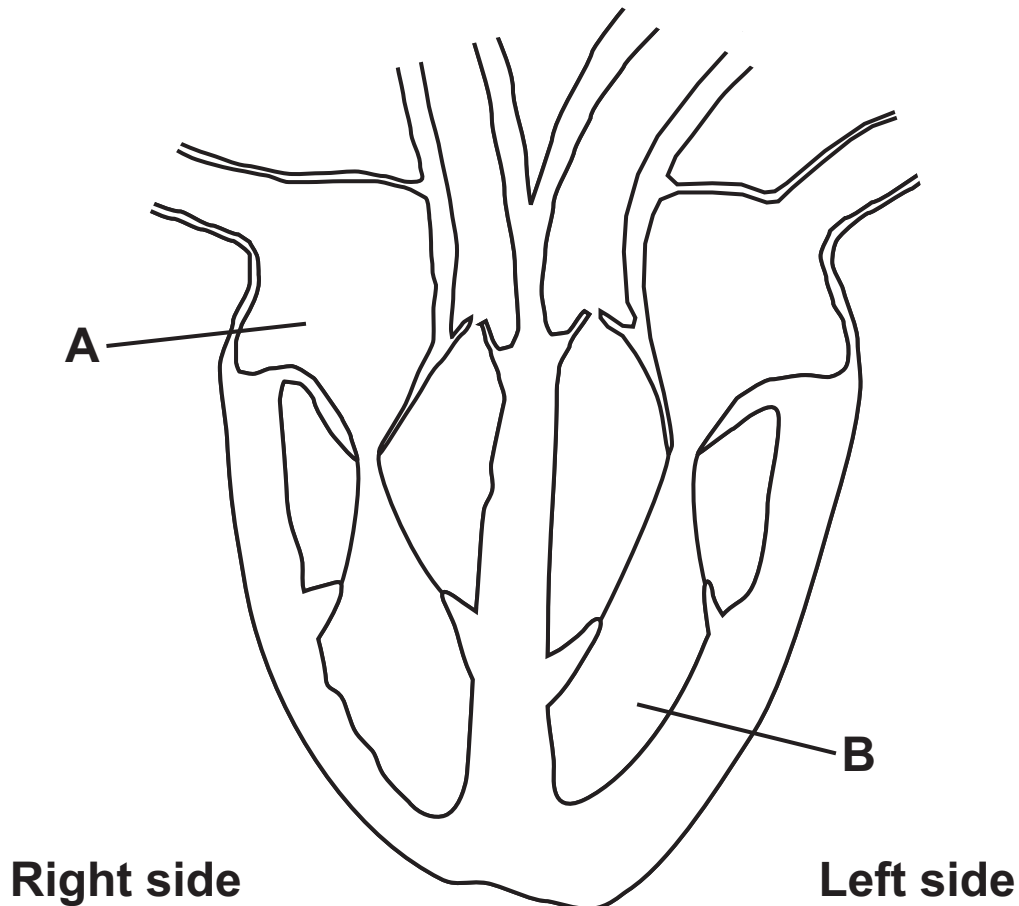
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**[Question 4 continues on the next page]**



**5 A sports physiologist must have a detailed understanding of the heart system.**

**The diagram shows the structure of the heart.**



**5 (a) (i) Draw arrows on the diagram to show how the blood circulates through the heart. [2 marks]**

**5 (a) (ii) Name the parts of the heart labelled A and B. [2 marks]**

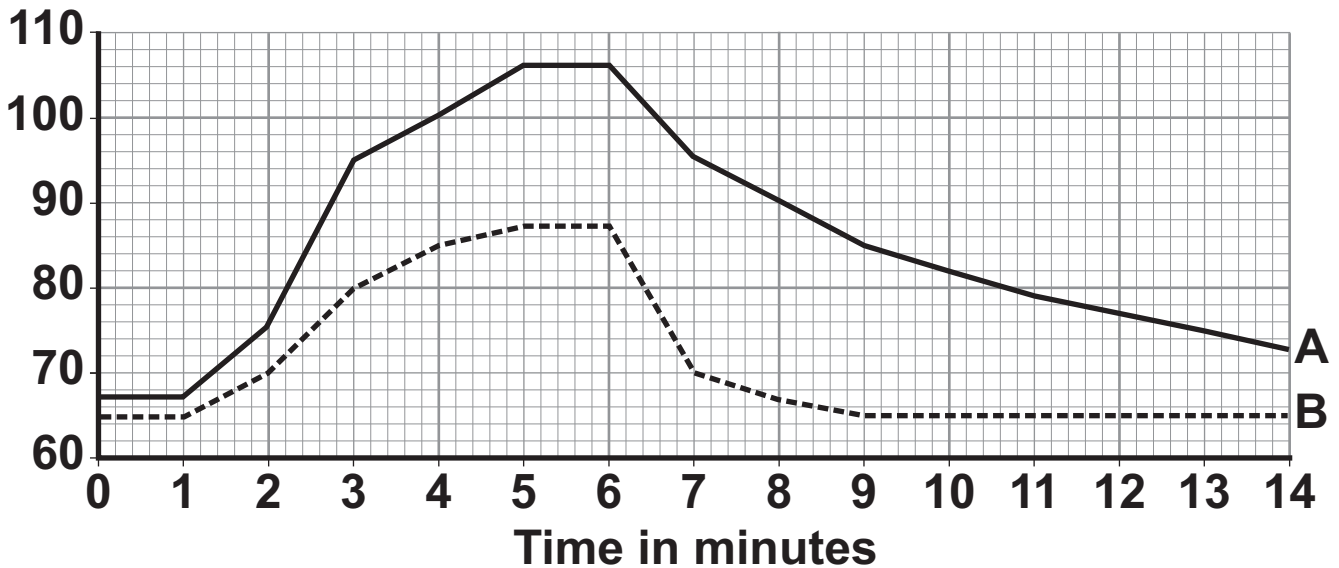
**A** \_\_\_\_\_

**B** \_\_\_\_\_

**[Question 5 continues on the next page]**

5(b) An athlete and an office worker monitored their heart rate by taking their pulse before, during and after exercise. The graph shows their results.

Pulse  
(beats  
per minute)



5(b) (i) Why does the heart rate increase during exercise? [1 mark]

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5 (b) (ii) Suggest which line, A or B, shows the results for the athlete.

Give THREE reasons for your answer.  
[3 marks]

1 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5 (c) A good level of fitness (strength, stamina and suppleness) would increase the athlete's chance of success in her sport.

Name TWO other factors that would increase the athlete's chance of success. [2 marks]

1 \_\_\_\_\_

2 \_\_\_\_\_





6 (a) (ii) How could you make the results of this test more reliable? [1 mark]

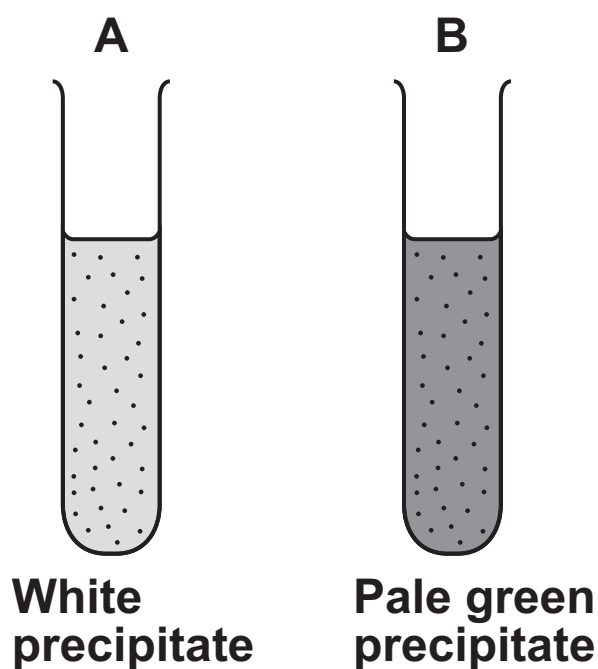
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6 (b) A series of chemical tests was carried out on the samples of powder in the jars.  
Two of the samples, A and B, were mixed with water and then with sodium hydroxide solution.

The results are shown below.



6 (b) (i) Name the metal ions present in Sample B. [1 mark]

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[Question 6 continues on the next page]

- 6 (b) (ii) When more sodium hydroxide solution was added to Sample A the precipitate dissolved to give a colourless solution.

Suggest the metal ion present in Sample A.  
[1 mark]

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- 6 (c) (i) When a sample from another jar was analysed it was found to have the chemical formula  $C_6H_{12}O_6$ .

Name this compound. [1 mark]

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- 6 (c) (ii)  $C_6H_{12}O_6$  is a covalent compound.

Most covalent compounds have low melting points.

Explain why. [2 marks]

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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

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