Surname _____

Other Names _____

Centre Number_____

Candidate Number_____

For Examiner's Use

Candidate Signature _____

ASSESSMENT AND QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education
Foundation Tier
June 2010

Additional Applied Science

Unit 2 Science at Work

Written Paper

AASC/2F

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.

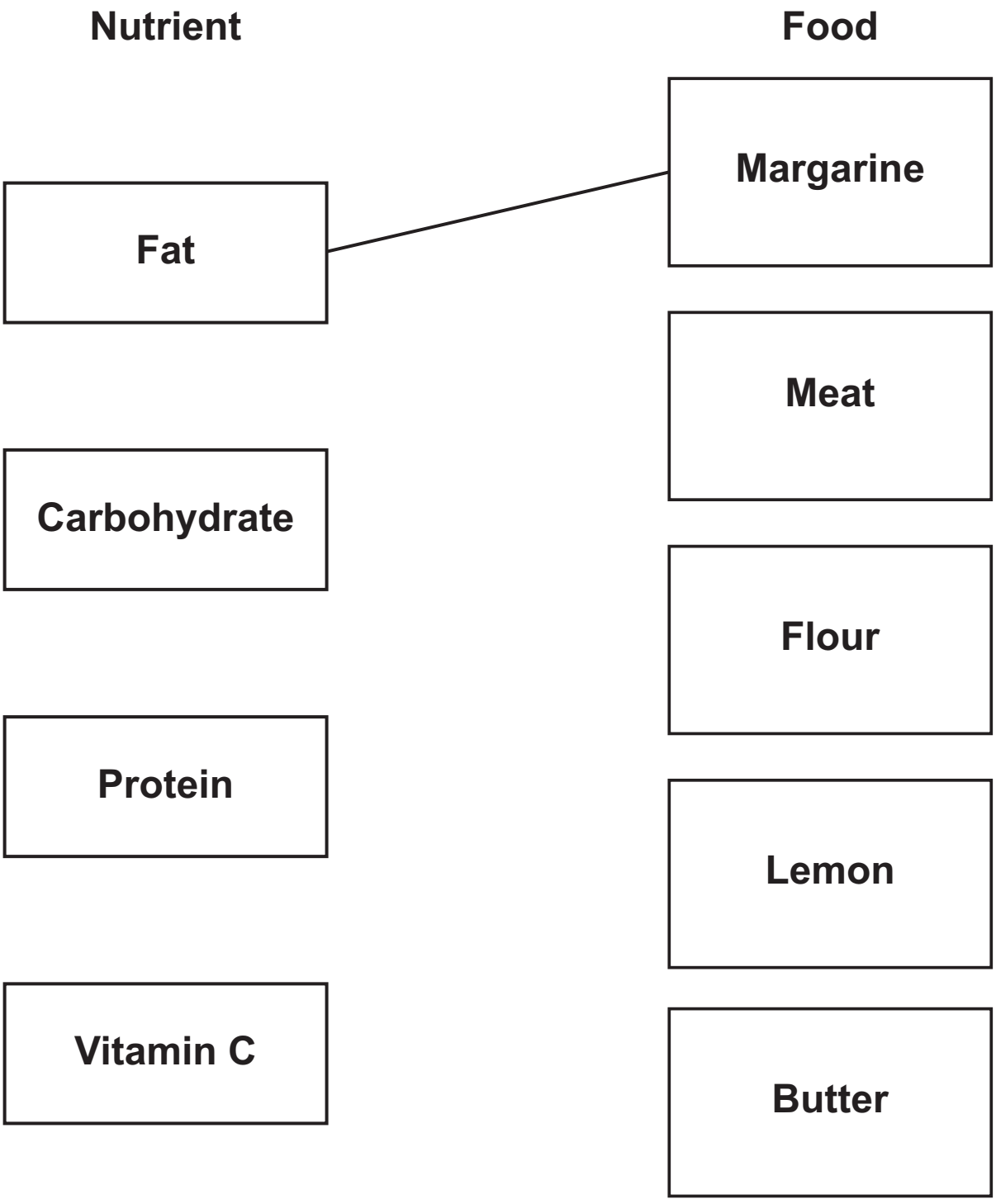
DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1 **A dietician working in a hospital gives advice to the patients about the nutrients in food.**

1 (a) **Draw a line from each nutrient to the food in which it can be found. [3 marks]**

One has been done for you.



1 (b) (i) The dietician also gives advice about the amount of energy in food.

What is the unit of energy? [1 mark]

Draw a ring around ONE answer.

joules newtons amperes grams

1 (b) (ii) Carbohydrates provide us with energy.

What happens if a person eats more carbohydrate than they need? [1 mark]

Tick (✓) ONE box.

☐ The carbohydrate is turned into fat and stored in the body.

☐ The carbohydrate is passed out as waste from the body.

☐ The carbohydrate is oxidised and used for energy.

1 (b) (iii) Starch is a type of carbohydrate.

What chemical would you use to test food for starch? [1 mark]

_____

1 (b) (iv) What colour would you see in the test if the food contained starch? [1 mark]

_____

[Question 1 continues on the next page]

1 (c) The dietician advised a patient to eat an apple a day.

Apples contain minerals in very small amounts. These are called micronutrients.

TABLE 1 shows the amounts of micronutrients in an apple.

TABLE 1

Micronutrient	Amount in 100 g of apple in mg
Boron	0·08
Copper	0·04
Iron	0·10
Manganese	0·07
Zinc	0·05

1 (c) (i) Name the micronutrient found in the highest amount in an apple. [1 mark]

_____

1 (c) (ii) **TABLE 2 shows two functions of the micronutrients in an apple.**

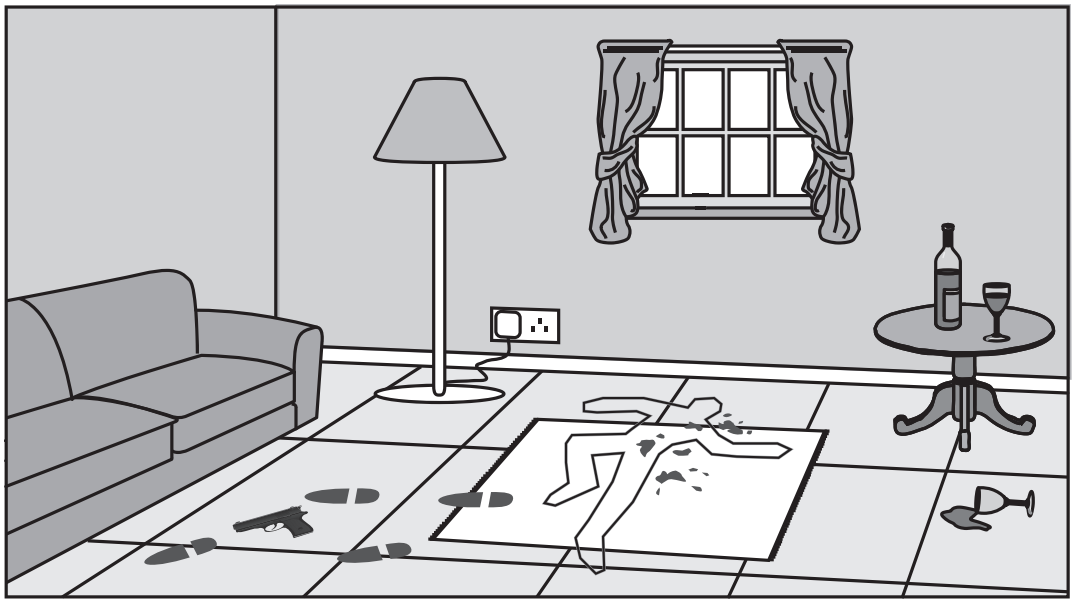
Write the names of the correct micronutrients into the table. [2 marks]

TABLE 2

Function	Micronutrient in an apple
Helps the body to make haemoglobin, which transports oxygen around the body	
Helps with enzyme action and healing of wounds	

10

2 **Study the picture of a crime scene.**



2 (a) **The Scenes of Crime Officer (SOCO) looks for evidence at the crime scene.**

State THREE pieces of evidence that the SOCO may photograph at the crime scene. [3 marks]

1 _____

2 _____

3 _____

2 (b) (i) **Describe how the SOCO would reveal and collect fingerprints at the crime scene. [2 marks]**

_____

_____

_____

_____

2 (b) (ii) **How is the information about the fingerprints stored so that it could be matched to other fingerprints? [1 mark]**

_____

2 (b) (iii) **Match the fingerprint pattern with the name of the fingerprint type by drawing a line between them. [2 marks]**

Fingerprint pattern	Name of fingerprint type
	whorl
	loop
	arch

[Question 2 continues on the next page]

2 (b) (iv) What other important evidence, OTHER THAN fingerprints, might be found on the wine glass at the crime scene? [1 mark]

_____

_____

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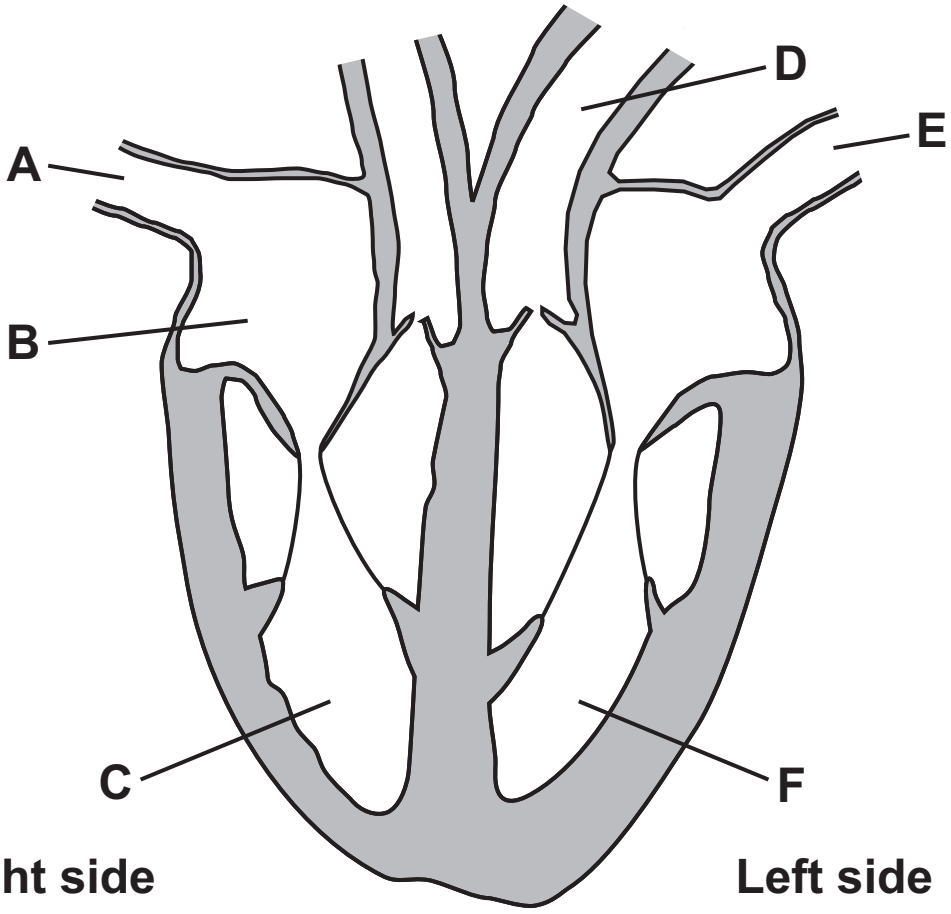
TURN OVER FOR THE NEXT QUESTION

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

The diagram shows the structure of the heart.

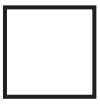


3 (a) (i) **The table shows the names of the parts of the heart and their functions.**

Use letters from the diagram to complete the table. [4 marks]

Name of part	Function	Letter
Aorta	Carries blood from the heart	
Vena cava	Carries blood from the body to the heart	
Left ventricle	Pumps blood out of the heart to the body	
Right atrium	Receives blood from the body	

3 (a) (ii) **Some parts of the heart contain blood with a lot of oxygen.**
Give a letter, A, B, C, D, E or F, from the diagram which labels ONE of these parts. [1 mark]



[Question 3 continues on the next page]

3 (b) The sports physiologist explains how the blood is circulated around the body.

Draw a ring around the correct word to complete each sentence.
[1 mark + 1 mark + 1 mark + 1 mark]

3 (b) (i) Blood vessels that carry blood away from the heart are called

- arteries.
- veins.
- capillaries.

3 (b) (ii) Blood vessels that have very thin walls are called

- arteries.
- veins.
- capillaries.

3 (b) (iii) The thin walls allow substances to diffuse out of the blood and into the surrounding muscle cells.

This substance is most likely to be

- oxygen
- carbon dioxide
- nitrogen

for respiration.

3 (b) (iv) The blood leaving the right side of the heart is

pumped to the

brain.
lungs.
stomach.

3 (c) During exercise the heart rate increases.

Explain why the heart rate increases. [1 mark]

_____

_____

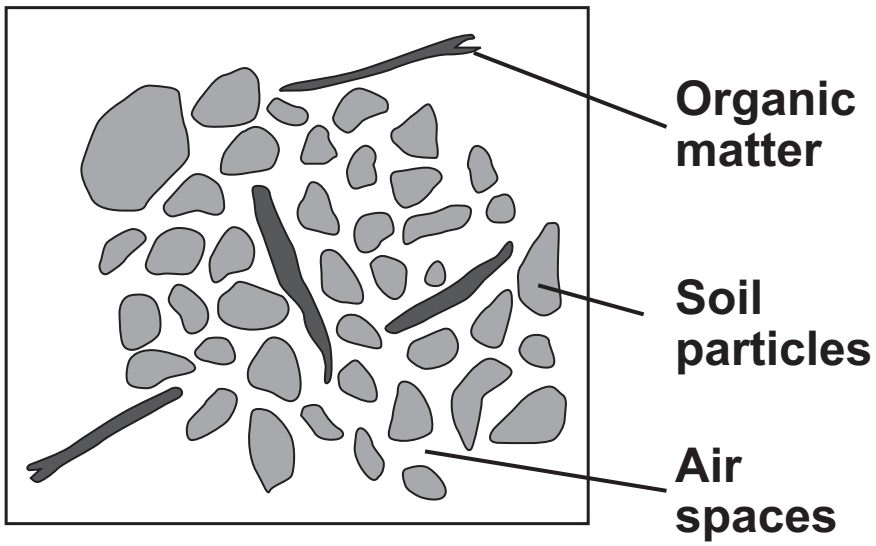
10

[Turn over for the next question]

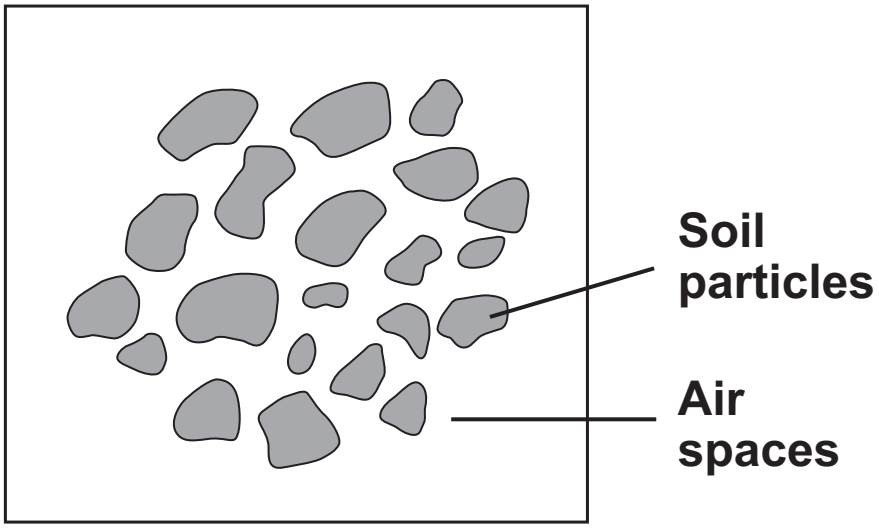
4 **A stolen car was found at a crime scene.**

Some soil found at the crime scene was examined under a microscope in the forensic laboratory. It was compared with a sample of soil taken from the suspected thief's shoe.

Soil from the crime scene



Soil from the sole of the suspect's shoe



The samples show distinctive features.

4 (a) (i) **Name THREE distinctive features of the samples that would help the scientist to identify if they were the same type of soil. [3 marks]**

1 _____

2 _____

3 _____

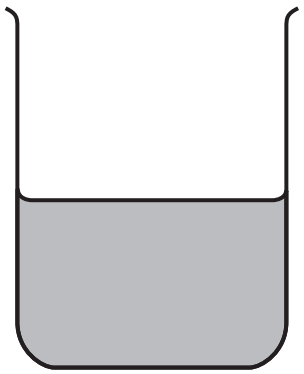
4 (a) (ii) **Which type of microscope is it best to use to examine the samples of soil?**

Draw a ring around ONE answer. [1 mark]

comparison **electron** **light**

[Question 4 continues on the next page]

4 (b) **The forensic scientist mixed the soil from the crime scene with water.**



4 (b) (i) **How would the forensic scientist produce a clear solution? [1 mark]**

_____

_____

4 (b) (ii) **How would the forensic scientist measure the pH of this solution? [2 marks]**

_____

_____

_____

_____

4 (c) **A bag of powder was found in the car at the crime scene.**

4 (c) (i) **Describe how the forensic scientist would test a sample of the powder to see if it was soluble. [2 marks]**

_____

_____

_____

_____

4 (c) (ii) **When the powder was mixed with an acid, a gas was given off.**

How could you tell if the gas is carbon dioxide? [1 mark]

Tick one (✓) box.

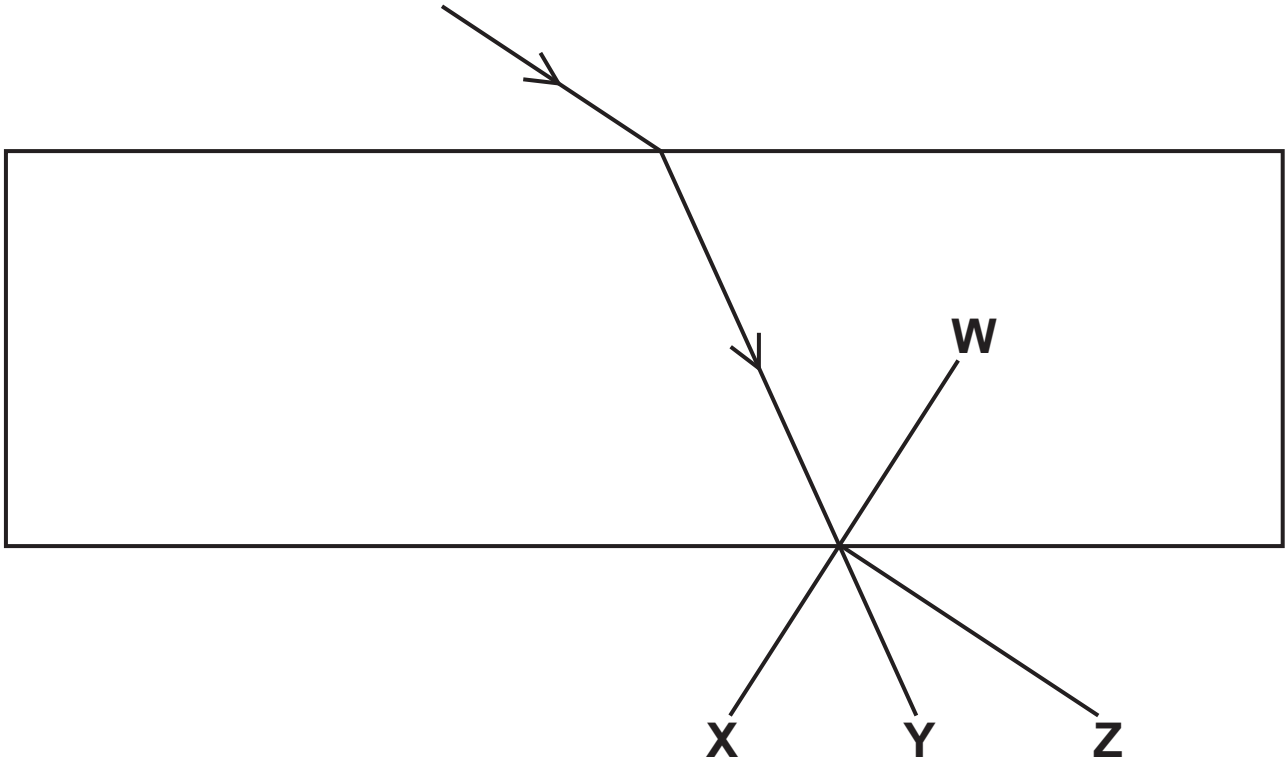
☐ **When the gas is added to limewater, the limewater turns cloudy.**

☐ **When a glowing splint is put in the gas, the splint lights up.**

☐ **When a burning splint is placed in the gas there is a popping sound.**

[Question 4 continues on the next page]

4 (d) **The forensic scientist also examined a piece of glass found at the crime scene.**
He directed a ray of light through the glass.



4 (d) (i) **Which line, X, Y or Z, shows the correct path of the light as it leaves the glass? [1 mark]** ☐

4 (d) (ii) **The forensic scientist needs to find the refractive index of the glass.**

Draw the 'normal' on the diagram, which would allow him to calculate the refractive index.
[1 mark]

4 (d) (iii) **What is the correct word to describe how light is bent? [1 mark]**

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TURN OVER FOR THE NEXT QUESTION

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

Tennis racquets used to be made of wood and were heavy (380 g). 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 300 g.

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

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

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

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

[Question 5 continues on the next page]

5 (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.

_____

_____

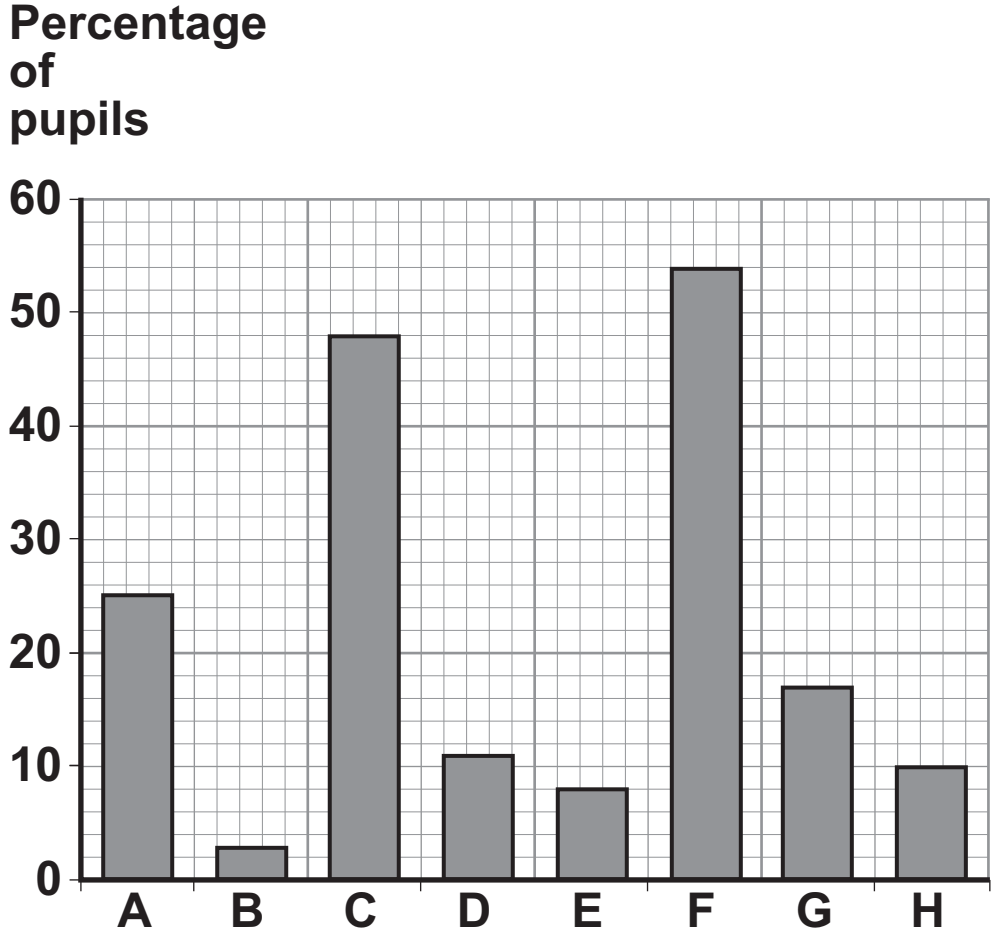
_____

_____

_____ %

9

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



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

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

[Question 6 continues on the next page]

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

_____ %

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

_____

6 (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

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

_____

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

_____

_____

_____

_____

_____

_____

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

_____

_____

_____

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

1 _____

2 _____

3 _____

9

END OF QUESTIONS

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

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