

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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



General Certificate of Secondary Education
Foundation Tier
January 2012

Additional Applied Science **AASC/2F**

Unit 2 Science at Work

Written Paper

F

Tuesday 24 January 2012 9.00 am to 10.00 am

For this paper you must have:

- a ruler.

You may use 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. Do not write outside the box around each page or on blank pages.
- 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.

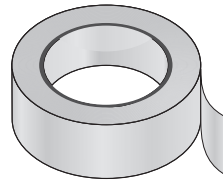
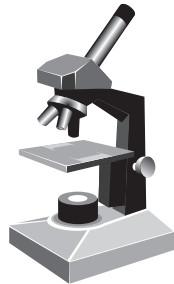
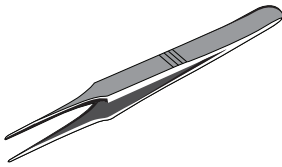


J A N 1 2 A A S C 2 F 0 1

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

1 A Scenes of Crime Officer (SOCO) is one of the first people to examine a crime scene.

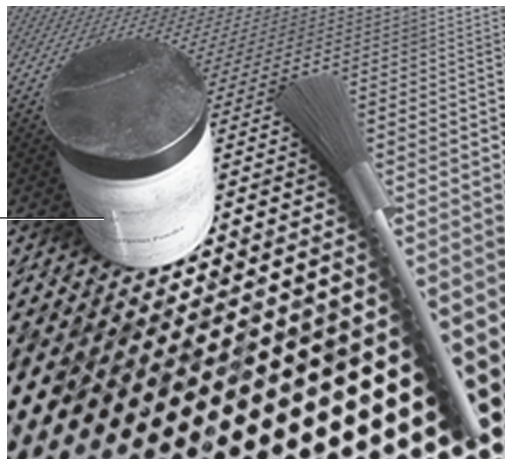
1 (a) Draw a ring around **two** pieces of equipment below that a SOCO might use to collect evidence at a crime scene.



(2 marks)

1 (b) The photograph shows some equipment used by a SOCO.

Aluminium powder



1 (b) (i) What would the SOCO use the equipment in the photograph for?

..... (1 mark)

1 (b) (ii) Describe how the SOCO would use this equipment.

.....
..... (1 mark)

1 (c) Some white powder found at a crime scene is placed in an evidence bag.

1 (c) (i) Suggest **three** pieces of information that would be written on the bag.



1

.....

.....

2

.....

.....

3

.....

.....

(3 marks)

Question 1 continues on the next page

Turn over ►



1 (c) (ii) The evidence bag was sent to a forensic scientist so that the white powder could be analysed.

Acid was added to the powder and a gas was given off.

What would you expect to see if a gas was given off?

.....
(1 mark)

1 (c) (iii) When this gas was collected and bubbled through limewater, the limewater turned cloudy.

What was the name of the gas collected?

.....
(1 mark)

1 (c) (iv) The forensic scientist tested the powder using a flame test.

The powder contained a calcium compound.

What colour would the flame go?

Draw a ring around the correct colour.

blue

brick red

lilac

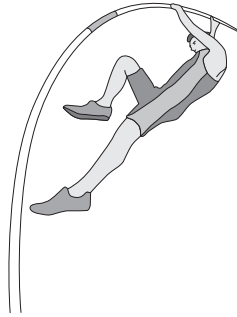
yellow

(1 mark)

10



2 One of the events in the London Olympics is the pole vault.



A vaulting pole needs to be easy to carry, take the weight of the athlete and be able to alter its shape. The original poles were made from wood, bamboo or aluminium but none was very successful. They were then made of glass fibre and more recently of a carbon fibre based material.

2 (a) (i) Suggest **three** properties that a material should have for use as a vaulting pole.

1

2

3

(3 marks)

2 (a) (ii) What type of material is carbon fibre reinforced plastic?

Draw a ring around the correct answer.

ceramic

composite

metal

polymer

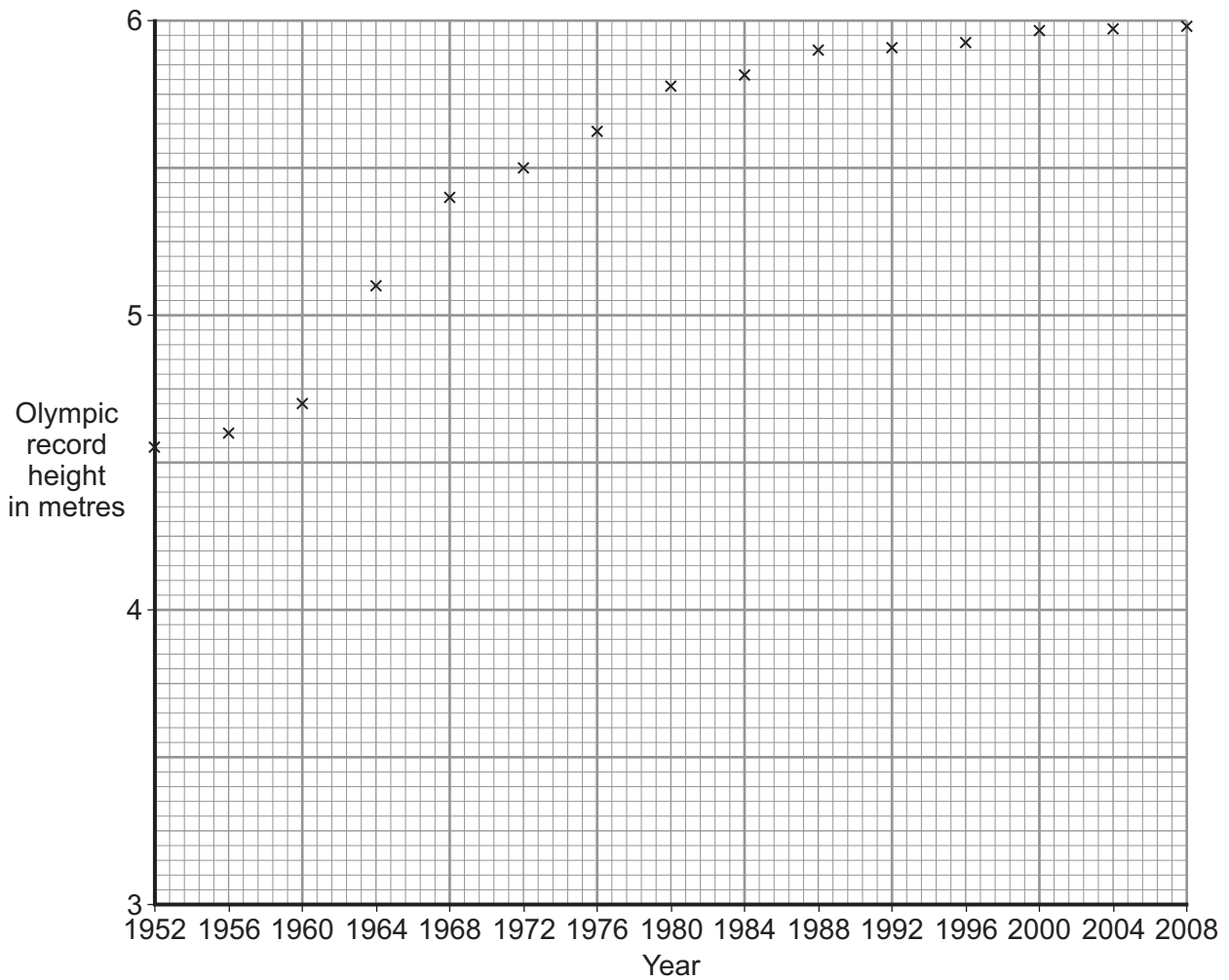
(1 mark)

Question 2 continues on the next page

Turn over ►



2 (b) The graph shows the Olympic record height for pole vaulting from 1952 to 2008.



2 (b) (i) Suggest the year of the Olympics in which bamboo poles were replaced by poles made from more modern materials.

.....
 (1 mark)

2 (b) (ii) By how much has the Olympic record height increased from 1952 to 2008?

..... metres
 (1 mark)

2 (b) (iii) Apart from the material used in the poles, give **two** other possible reasons for the improvement in the height vaulted.

1

2

(2 marks)



2 (c) An Olympic athlete must be able to grip the pole tightly.

2 (c) (i) Suggest how the vaulting pole is designed to help the athlete to grip the pole tightly.

.....
.....

(1 mark)

2 (c) (ii) During vaulting, some muscles in the arm contract while other muscles relax.

Name a muscle in the arm that would contract during vaulting to allow the athlete to pull on the pole.

.....

(1 mark)

2 (c) (iii) What is the name given to a pair of muscles which work together to move a joint?

Draw a ring around the correct answer.

antagonistic biomechanical dynamic opposite

(1 mark)

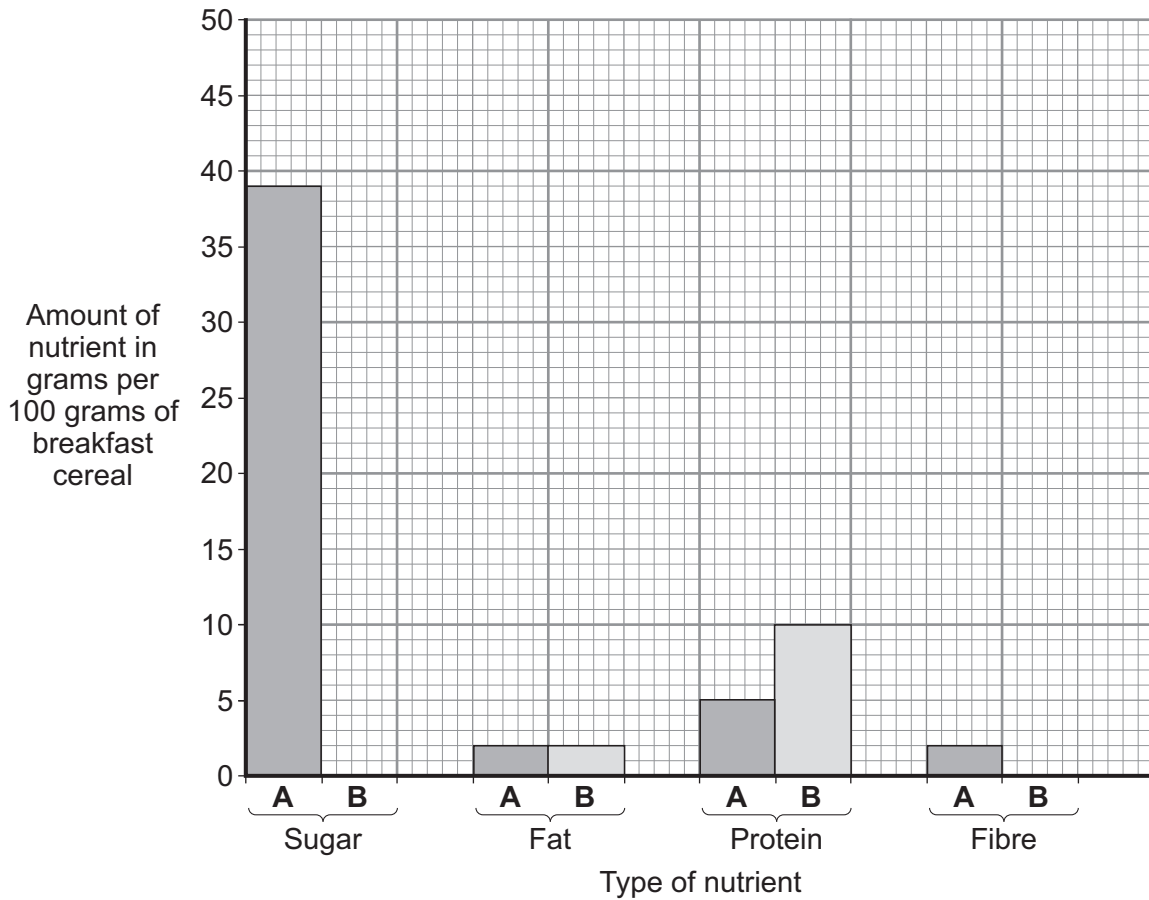
11

Turn over for the next question

Turn over ►



- 3 A dietician gives advice to families about their diet.
The bar chart shows the amounts of different nutrients in 100 grams of breakfast cereal **A** and breakfast cereal **B**.



- 3 (a) Calculate the amount of sugar in a 250 gram box of breakfast cereal **A**.

.....

..... g
 (2 marks)

- 3 (b) The table shows the amounts of some of the nutrients in breakfast cereal **B**.

Nutrient	Amount in grams per 100 grams of breakfast cereal
Sugar	15
Fat	2
Protein	10
Fibre	9



3 (b) (i) Plot the figures for sugar and fibre in 100g of breakfast cereal **B** on the bar chart. (1 mark)

3 (b) (ii) The dietician advised a mother to give her child breakfast cereal **B**.

Using the information from the bar chart and the table, suggest **two** reasons for giving this advice.

1

2

(2 marks)

3 (b) (iii) Iron supplements are often added to breakfast cereals.

Give **one** reason why iron is important in the diet.

.....

(1 mark)

3 (c) Breakfast cereal can be kept in a sealed container for a long time and microorganisms will not grow on it.

3 (c) (i) Give the name of **one** type of microorganism.

.....

(1 mark)

3 (c) (ii) Microorganisms need food to grow.

Name the **two** other factors that all microorganisms need to grow.

1

2

(2 marks)

3 (c) (iii) Other food can also be kept for a long time in a cupboard.

Name **two** methods of preserving food that is normally kept in a cupboard.

1

2

(2 marks)

11

Turn over ►



4 Sprint cycling is another event that will be in the Olympics this year.

Sprint cyclists need to build up the power in their legs.



The following is an example of a typical daily diet for a sprint cyclist.

- Breakfast – large bowl of porridge, a banana and a handful of seeds
- Mid-morning snack – banana and yoghurt
- Lunch – chicken breast, large baked potato, sweet corn and salad
- Afternoon snack – cake and coffee
- Dinner – pasta, steak, salad and fruit
- Evening snack – bowl of cereal

4 (a) (i) Name **two** foods in the cyclist's daily diet given above that are a good source of protein.

1

2

(2 marks)

4 (a) (ii) Explain why the cyclist needs a lot of protein in his diet.

.....
.....

(1 mark)

4 (a) (iii) The cyclist's diet is also high in carbohydrate.

What could be a possible **disadvantage** of eating too much carbohydrate?

.....
.....

(1 mark)

4 (b) A typical man needs around 2000 calories a day while a sprint cyclist needs around 5000 calories a day.

4 (b) (i) Why does a sprint cyclist need around 5000 calories a day?

.....
.....

(1 mark)



- 4 (b) (ii)** The sprint cyclist had 5000 calories in one day.
4000 calories in the cyclist's diet comes from carbohydrates and the rest comes from fats and proteins.

Calculate the percentage of the total calorie intake that comes from fats and proteins.

.....
.....

(2 marks)

- 4 (c)** During a race, the cyclist needs clothing that will help him to keep cool.

A scientist tested some materials used to make clothing worn by cyclists. The scientist wanted to see how much heat the materials could transfer to the surroundings.

The results are shown in the table.

Material	Temperature of material at start of test in °C	Temperature of material at end of test in °C	Temperature change in °C
Cotton	22	20	2
Lyca	22	18	4
Nylon	22	17	5

- 4 (c) (i)** Which material in the table, if worn by the cyclist, would help the cyclist to cool down the quickest?

.....
(1 mark)

- 4 (c) (ii)** Which material in the table is a natural material?

.....
(1 mark)

- 4 (d)** Sprint cyclists often wear lycra clothing.

Suggest how wearing lycra will improve the sprint cyclist's performance in a race.

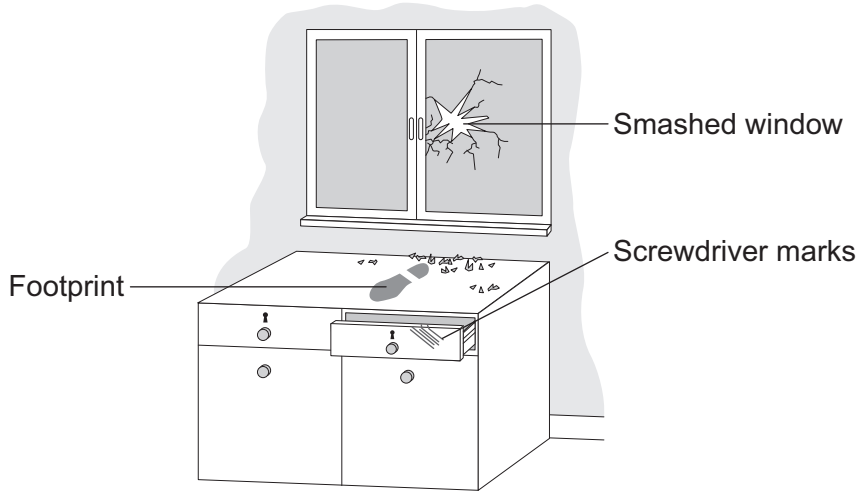
.....
.....

(1 mark)



5 A Scenes of Crime Officer (SOCO) took a photograph of a crime scene.

The drawer had been forced open using a screwdriver and marks were left in the wood. A shoeprint was left on the top of the cupboard.



5 (a) (i) How would the SOCO collect evidence of the marks left by the screwdriver at the crime scene?

.....

.....

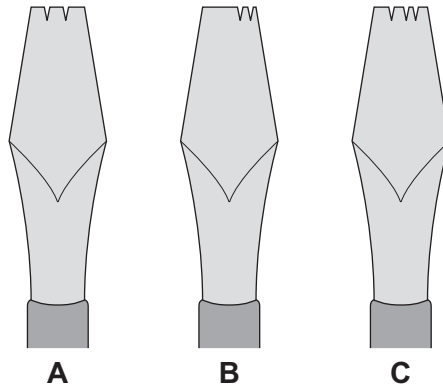
.....

.....

(2 marks)



5 (a) (ii) The marks made by the screwdriver were analysed by a forensic scientist.
 Three screwdrivers were collected, one from each of three possible suspects.



The diagram below shows the marks on the drawer at the crime scene.



Which screwdriver, **A**, **B** or **C**, caused the marks on the drawer?

Screwdriver (1 mark)

5 (a) (iii) The shoeprint mark left at the crime scene was found to match one of the shoes from a suspect.

This does **not** mean the suspect committed the crime.

Give **one** reason why not.

.....

(1 mark)

Question 5 continues on the next page

Turn over ►



5 (b) A large piece of glass from the broken window was collected and analysed to find the refractive index of the glass. It was later compared with fragments of glass found on a suspect's clothing.

Other than the oil immersion method, describe how the forensic scientist would find the refractive index of the large piece of glass.

You may draw a diagram to help explain your answer.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)



5 (c) The table shows the refractive index of four different types of glass.

Type of glass	Refractive index
Headlight	1.47–1.49
Television	1.49–1.51
Window	1.51–1.52
Bottle	1.51–1.52

The refractive index of the piece of glass from the window was 1.512.
The refractive index of the fragments of glass found on the suspect was 1.504.

What conclusions can be made from these results?

Use the information in the table to help you.

.....

.....

.....

.....

(2 marks)

9

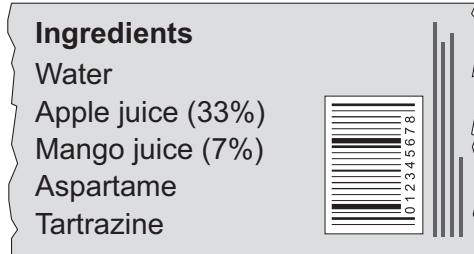
Turn over for the next question

Turn over ►



6 One of the roles of the Food Standards Agency is to study food additives to ensure that they are safe to use in food.

6 (a) The following list of ingredients was found on the label of a bottle of fruit drink.



6 (a) (i) Identify the additives in this fruit drink and explain why they are added.

.....

.....

.....

.....

(2 marks)

6 (a) (ii) A mother chose not to buy this drink for her child because it contained tartrazine.

Suggest why she made this decision.

.....

.....

(1 mark)

6 (a) (iii) The acceptable daily allowance of aspartame is 50 milligrams per kilogram of body weight.

If a child weighs 13 kilograms, calculate how many milligrams of aspartame she would be allowed in a day.

.....

.....

..... mg
(1 mark)



6 (b) The following product recall notice appeared in a local newspaper.

Food alert: for information

Ref: 31/2009/Northern Ireland

Allied Quality Associated Bottling Company (AQABC) is withdrawing certain batches of 500 ml bottles of Juicy Juice due to high levels of benzoic acid.

The product listed below is being withdrawn from sale. No other batches of Juicy Juice are known to be affected. The affected batch was distributed only in Northern Ireland and the Republic of Ireland.

Product: Juicy Juice
Pack size: 500 ml
Batch codes: KH42315L91807 to KH42359L91807
 with best before dates of end December 2011

6 (b) (i) Why might soft drink manufacturers add small amounts of benzoic acid to their products?

.....
(1 mark)

6 (b) (ii) Suggest **two** possible problems that such a recall might cause to the company.

1

.....

2

.....
(2 marks)

6 (b) (iii) Suggest **two** possible effects that such a recall might have on the consumer.

1

.....

2

.....
(2 marks)

9

END OF QUESTIONS



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

